DOCKETED	
Docket Number:	07-AFC-05C
Project Title:	Ivanpah Solar Electric Generating System (Compliance)
TN #:	231194
Document Title:	2018 ISEGS Annual Compliance Report
Description:	N/A
Filer:	Cenne Jackson
Organization:	NRG Ivanpah Solar Electric Generating System
Submitter Role:	Applicant
Submission Date:	12/12/2019 2:52:02 PM
Docketed Date:	12/12/2019

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 24, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C)
Conditions of Certification, COMPLIANCE-4 and COMPLIANCE-7; 2018 Annual Compliance Report

Dear Mr. Payne and Mr. Ahrens,

Pursuant to the requirements of CEC Conditions of Certification, COMPLIANCE-4 and COMPLIANCE-7, the 2018 Annual Compliance Report for Ivanpah Solar Electric Generating System that covers the period from January 1, 2018 to December 31, 2018 is being submitted on behalf of Solar Partners I, II, and VIII, LLCs for your review.

Please feel free to contact me with any questions or concerns.

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Ivanpah Solar Electric Generating System

California Energy Commission (07-AFC-5C)
Bureau of Land Management
(CACA-48668, 49502, 49503, and 49504)
Conditions of Certification COMPLIANCE-4 and COMPLIANCE-7

Annual Compliance Report

January 1, 2018 – December 31, 2018 Reporting Period

January 23, 2019

Prepared by: NRG Energy Services
on behalf of Solar Partners I, II, and VIII, LLCs

100302 Yates Well Road
Nipton, CA 92364

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Annual Compliance Report Summary

2018 Annual Compliance Report

Section 1

Summary of Current Operating Status and Changes to Facility Operations

(COMP-7 Item 2)

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 9, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Summary of Current Project Operating Status to fulfill California Energy Commission Conditions of Certification, COMPLIANCE-7 Item 2

Dear Mr. Payne and Mr. Ahrens,

Pursuant to the requirements of Conditions of Certification COMPLIANCE-7 Item 5 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following summary of current project operating status during the reporting period as a requirement in the Annual Compliance Report:

- Beginning January 2018, Ivanpah continues to monitor 90 tortoises consisting of 30 tortoises in each study group: 30 from short distance translocated group, 30 from control group, and 30 from resident group as part of the continuation of the Effectiveness Monitoring Program (EMP). These numbers were reduced from the 240 study tortoises monitored in 2017 due to the completion of the 5-year EMP study. During the reporting period, these tortoises were tracked once a month. A health assessment will be completed during the fall of 2021 on all tortoises.
- As of January 1, 2018 the avian surveys shifted to Operations-led schedule of once every other week. West Inc. approved avian biologists continued to support avian surveys until NRG Operators attended classroom and field training on avian mortality surveys of the power block in February 2018. On February 27, 2018, NRG Operators began avian surveys on each power block. Due to scheduling difficulties, West Inc. avian biologists reassumed the every other week avian surveys in April 2018, and will continue to perform avian surveys for the foreseeable future.
- Ivanpah developed and submitted a Risk Management Plan (RMP) for the new ammonia tank system to SBC CUPA in November 2017. The RMP was accepted by CUPA on November 28, 2017. The RMP also passed the 45-day public review period with no comments received. The new ammonia system, a 500-gallon tank for each power block, was constructed during the first quarter

of 2018, inspected by the CBO on March 6, 2018, and was approved on June 12, 2018. The ammonia tanks were commissioned/initially filled on June 19, 2018.

- On July 29, 2018, Ivanpah experienced a hail storm event that resulted in a significant number of broken heliostats. The projected number of broken heliostats damaged during this event was estimated to be between 10,000 to 12,000 heliostats. Please refer to Appendix U in this report for more information.
- The kiosk panel design for the Solar Ecological Interpretive Center (SEIC) was approved by BLM for production/fabrication in February 2018. A fabrication pre-payment for the kiosk panels were subsequently suggested by BLM. NRG sent a pre-payment to BLM on April 2, 2018. On November 14, 2018, indicated through email correspondence that they are satisfied with the effort provided by NRG and accepted this mitigation requirement as complete.
- MDAQMD conducted an Air Quality audit on April 24, 2018 to verify Ivanpah's compliance with the permits issued to the facility. MDAQMD certified on May 8, 2018 that ISEGS is in compliance with all permit conditions. A copy of the MDAQMD inspection report is attached.
- A hydraulic oil spill occurred in the Ivanpah Unit 3 Steam Turbine Generator (STG) enclosure on December 29, 2018 at approximately 0830 hours PDT while the unit was in start-up. The HP Turbine Oil Control System experienced a drop in oil pressure due to a leak at the O-ring of the HP Emergency Stop Valve causing a release of approximately 30 gallons of hydraulic oil into the concrete sump underneath the hydraulic valve. A small amount of hydraulic oil seeped out of the sump into a secondary containment outside of the east wall of the STG compartment. Ivanpah provided verbal notifications to relevant agencies on December 29, 2018. The Spill Report was submitted to the San Bernardino County CUPA, CEC, BLM and Chemical Emergency Planning and Response Commission on January 3, 2019. The spill was properly remediated without impacting any permeable surfaces and/or watershed. The failed O-ring in the STG HP Emergency Stop Valve Control Oil system has been repaired and is functioning normally.
- Natural gas consumption for each power block is below the annual limit of 525 mmscf.
    - Ivanpah 1 - 453 mmscf
    - Ivanpah 2 - 497 mmscf
    - Ivanpah 3 - 388 mmscf.
- Ivanpah used 66% of the allotted 100 acre-feet of ground water extraction/drawn from Well #1 and Well #2, of which, approximately 92% of the extracted water was used by the three (3) units for electricity generation.
- All three units are stable, and able to attain and sustain full load.
- There were no significant changes to the facility operations during the reporting period.

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Ph: 702-815-2021 Fax: 702-815-2030

Please feel free to contact me with any questions.

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 -- 800.635.4617 -- FAX 760.245.2022

GENERAL INSPECTION FORM

33938

Start Date: 04/24/2018 End Date: 04/24/2018 Inspector: Catherine Tran

OWNER OR OPERATOR (Co.#1769)

Solar Partners II, LLC
HCR1 Box 280
Nipton, CA, 92364

FACILITY LOCATION (Fac.#3007)

Ivanpah 1
Near Ca/Nev border at Primm
Ivanpah, CA, 92364

SIC: 4911 *Location/UTM(Km): 640E/3933N*

Permit Number	Issue Date	Permit Status	Equipment Name	Fee Sch	Rating	Expire Date
B010375	02/22/2018	PTO	BOILER, Year of Manufacture 2012, Serial Number 2011-07,	2 (f)	249000000 Btu	10/31/2018
B011544	10/16/2017	PTO	BOILER, NIGHTIME PRESERVATION	2 (d)	10000000 Btu	10/31/2018
E010378	04/13/2018	PTO	DIESEL IC ENGINE, FIRE PUMP	7 (g)	1 device	10/31/2018
E010379	04/13/2018	PTO	DIESEL IC ENGINE, EMERGENCY GENERATOR	7 (g)	1 device	10/31/2018
E011546	04/13/2018	PTO	DIESEL IC ENGINE, EMERGENCY GENERATOR	7 (g)	1 device	10/31/2018
E011547	04/13/2018	PTO	DIESEL IC ENGINE, FIRE PUMP	7 (g)	1 device	10/31/2018

PERMIT NUMBER: B010375

Issue Date: 02/22/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: solar energy
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 2(f)	Rating: 249	Permit Status: PTO
SCC: 10300601	Current, On-Site: Yes	Location/Coordinates: +35.535, -115.451

Equipment Description: BOILER, Year of Manufacture 2012, Serial Number 2011-07,

Variance No : _____	Publications : _____
Process Rate : _____	Existing NTC : none
VEE : N	Existing NOV : none
VEE No : _____	Existing Variance : none

1. *Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

2. *The owner/operator (o/o) shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this condition and show compliance; ref.comment section

3. *This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption.*
[40 CFR 60 Subpart Db, Section 60.49b]

O/o is aware of this condition and show compliance; ref.comment section

4. *The o/o shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.*
[40 CFR 60 Subpart Db, Section 60.49b]

O/o is aware of this condition and show compliance; ref.comment section

5. *The owner/operator shall perform compliance tests at least once every twelve (12) months in accordance with the District Compliance Test Procedural Manual. Prior to performing these annual tests, the boiler shall be tuned in accord with the manufacturers specified tune-up procedure, by a qualified technician. Subsequent tests shall demonstrate that this equipment does not exceed the following emission maximums:*

Pollutant	***ppmv***	***Lb/MMBTU***	*****Lb/hr***
**NOx*	*9.0*	*0.011*	*2.7 (Per USEPA Methods 7E and 19)*
SO2	*1.7*	*0.003*	*0.7*
**CO*	*25.0*	*0.018*	*4.5 (Per USEPA Method 10)*
VOC	*12.6*	*0.005*	*1.3 (Per USEPA Methods 25A and 18)*
PM10	*n/a*	*0.007*	*1.7 (Per USEPA Method 5 or 201A, and 202)*

**corrected to 3% oxygen, on a dry basis, averaged over one hour*

Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5

***As indicated in the District Compliance Manual, the District may approve alternatives, modifications and/or deviations to the methods specified in this condition.*

[District Rule 1303(A); BACT]

O/o is aware of this condition and show compliance; ref.comment section

6. *This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Db) including but not limited to recordkeeping and reporting requirements.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

7. *Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits; PUC regulated pipeline quality natural gas meets this requirement.*
[40 CFR 60 Subpart Db, Section 60.48b; Emission monitoring for particulate matter and nitrogen oxides]

O/o is aware of this condition and show compliance; ref.comment section

8. *The o/o shall continuously monitor and record fuel flow rate and flue gas oxygen level.*
[40 CFR 60 Subpart Db, Section 60.49b; Reporting and Recordkeeping Requirements]

O/o is aware of this condition and show compliance; ref.comment section

9. *In lieu of installing CEMs to monitor NOx emissions, and pursuant to 40 CFR 60 Subpart Db, Section 60.49b(c), the owner/operator shall monitor boiler operating conditions and estimate NOx emission rates per a District approved emissions estimation plan. The plan shall be based on the annual source tests required by condition 5. The plan shall include test results, operating parameters, analysis, conclusions and proposed NOx estimating relationship consistent with established emission chemistry and operational effects. Any proposed changes to a District-approved plan shall include subsequent test results, operating parameters, analysis, and any other pertinent information to support the proposed changes. The District must approve any emissions estimation plan or revision for estimated NOx emissions to be considered valid.*
[40 CFR 60 Subpart Db, Section 60.49b(c)]

O/o is aware of this condition and show compliance; ref.comment section

10. *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 525 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010377 and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair.*
[District Rules 204 and 1302(C)(2)(a); CEC Condition Of Certification]

O/o is aware of this condition and show compliance; ref.comment section

11. *The owner/operator must submit a compliance/certification test protocol at least thirty (30) days prior to the compliance/certification test date. The owner/operator must conduct all required compliance/certification tests in accordance with a District-approved test protocol. The owner/operator must notify the District a minimum of ten (10) days prior to the compliance/certification test date so that an observer may be present. The final compliance/certification test results must be submitted to the District within forty-five (45) days of completion of the test. All compliance/certification test notifications, protocols, and results may be submitted electronically to reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

Comments: 04/24/2018 GPS location 35.535170, -115.451226. This unit and operations records are maintained per all permit conditions.

2017 Total operations hours: 3,183.92 hours
2017 Total MMSCF for B010375 & B011544: 423.75mmscf

2017 Total scf for B010375 & B011544: 423,754,647scf

05/01/2018 APIR Completed, TranC W/ JC -------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Unit and operations record are well maintained per permit conditions.

08/03/16 PIR Complete, TranC w/ May Mamari

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: B011544

Issue Date: 10/16/2017	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 2(d)	Rating: 100	Permit Status: PTO
SCC: 10300602	Current, On-Site: Yes	

Equipment Description: BOILER, NIGHTIME PRESERVATION

Variance No : _____	Publications : _____
Process Rate : _____	Existing NTC : none
VEE : N	Existing NOV : none
VEE No : _____	Existing Variance : none

1. *Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.[Rule 204]*

O/o is aware of this condition and show compliance, ref. comment section

2. *The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.[Rule 1302(C)(2)(a)]*

O/o is aware of this condition and show compliance, ref. comment section

3. *This boiler shall use only natural gas as fuel.[Rule 1302(C)(2)(a)]*

O/o is aware of this condition and show compliance, ref. comment section

4. *The owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state, or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.[Rule 204]*

O/o is aware of this condition and show compliance, ref. comment section

5. *The owner/operator shall perform annual tune-ups in accordance with the unit manufacturer's specified tune-up procedure, by a qualified technician.[Rule 204]*

O/o is aware of this condition and show compliance, ref. comment section

6. *Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits; PUC regulated pipeline quality natural gas meets this requirement.[Rule 204]*

O/o is aware of this condition and show compliance, ref. comment section

7. *The owner/operator shall continuously monitor and record fuel flow rate into this power block known as Ivanpah 1.[Rule 204]*

O/o is aware of this condition and show compliance, ref. comment section

8. *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 525 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010377 and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair. [Rule 204; Rule 1302(C)(2)(a); CEC Condition Of Certification]*

O/o is aware of this condition and show compliance, ref. comment section

Comments: 04/24/2018 GPS location 35.535021, -115.451132. This unit and operations records are maintained per all permit conditions.

2017 Total operations hours: 4709.32 hours
2017 Total MMSCF for B010375 & B011544: 423.75mmscf
2017 Total scf for B010375 & B011544: 423,754,647scf

05/01/2018 APIR Completed, TranC W/ JC -------

08/13/2017 Unit and operations record are well maintained per permit conditions. Note that the manometer to the air intake system to the nightime boiler outlet flow is broken. Request O/o to look into replace/fix manometer and maintain this unit per manufacturer or supplier and/or sound engineering principles

08/01/2017 Completed, TranC

08/02/16 Unit and operations record are well maintained per permit conditions.

08/05/16 PIR Complete, TranC w/ May Mamari

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E010378

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.535, -115.451

Equipment Description: DIESEL IC ENGINE, FIRE PUMP

Current Hour Meter Reading: 179.6 Previous Hour Meter Reading: 159

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205 and 60.4211]

O/o is aware of this condition and show compliance; ref.comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this condition and show compliance; ref.comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this condition and show compliance; ref.comment section

4. *This unit shall be limited to use for emergency purposes, defined as in response to a fire. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies.*
[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n); hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]

O/o is aware of this condition and show compliance; ref.comment section

5. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*

a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this condition and show compliance; ref.comment section

6. *These engines may operate in response to fire suppression requirements and needs.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

7. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref.comment section

Comments: 04/24/2018 GPS location: 35.535730, -115.452245. This unit and operations records are well maintained per permit conditions. Current hour meter: 179.6 hrs

2017 Total operations hours: 24.3hrs/ 296.46 gals Diesel fuel (Calculated).
2017 Total Emergency Hours:0hrs
2017 Total Testing and Maintenance: 24.3hrs

05/01/2018 APIR Completed, TranC w/ JC ----------.

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, TranC w/ May Mamari

Prohibitory Rules:	
In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E010379

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.535, -115.451

Equipment Description: DIESEL IC ENGINE, EMERGENCY GENERATOR

Current Hour Meter Reading: 677.4 Previous Hour Meter Reading: 450

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205, and 60.4211]

O/o is aware of this condition and show compliance; ref.comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this condition and show compliance; ref.comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this condition and show compliance; ref.comment section

4. *This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.*
[17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this condition and show compliance; ref.comment section

5. *This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance.*
[NSR and 17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this condition and show compliance; ref.comment section

6. *The o/o shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log).
[17 CCR 93115.10]

O/o is aware of this condition and show compliance; ref.comment section

7. *This genset is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM, the more stringent requirements shall govern.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref.comment section

Comments: 04/24/2018 GPS location 35.535028, -115.452200. This unit and operations records are well maintained per permit conditions. Current hour meter: 677.4 hrs

2017 Total operations hours: 192.6/ 3919.48 gals Diesel fuel.
2017 Total Emergency Hours: 174hrs
2017 Total Testing and Maintenance: 18.6hrs

05/01/2018 APIR Completed, TranC w/ JC ----------.

08/13/2017 Unit and operations record are well maintained per permit conditions.

Note: 03/07/2017 there was repair done to the underground 115kV electrical transmission line an used this unit to keep operations up. Details archived [Corsp-F 2017.pdf/Q1383677.1]

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, TranCw/ May Mamari

Prohibitory Rules:	
In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E011546

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20200102	Current, On-Site: Yes	Location/Coordinates: +35.535, -115.451

Equipment Description: DIESEL IC ENGINE, EMERGENCY GENERATOR

Current Hour Meter Reading: 307.4 Previous Hour Meter Reading: 235.0

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205, and 60.4211]

O/o is aware of this condition and show compliance; ref.comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this condition and show compliance; ref.comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this condition and show compliance; ref.comment section

4. *This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.*
[17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this condition and show compliance; ref.comment section

5. *This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance.*
[NSR and 17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this condition and show compliance; ref.comment section

6. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request.*
The log shall include, at a minimum, the information specified below:
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this condition and show compliance; ref.comment section

7. *If you are an owner or operator of a stationary CI internal combustion engine equipped with a diesel particulate filter to comply with the emission standards in 60.4204, the diesel particulate filter must be installed with a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached.*
[40 CFR 60.4209]

O/o is aware of this condition and show compliance; ref.comment section

8. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

9. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

10. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref.comment section

Comments: 04/24/2018 GPS location 35.535028, -115.452200. This unit and operations records are well maintained per permit conditions. Current hour meter: 307.4 hrs

2017 Total operations hours: 92.9hrs/ 524 gals Diesel fuel.
2017 Total Emergency Hours: 73.56hrs
2017 Total Testing and Maintenance: 19.34hrs

05/01/2018 APIR Completed, TranC w/ JC ----------.

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, TranCw/ May Mamari

Prohibitory Rules:

In Compliance: Y

Warning Issued: N

NTC: N

NOV:	N
Reinspect:	N

PERMIT NUMBER: E011547

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.535, -115.451

Equipment Description: DIESEL IC ENGINE, FIRE PUMP

Current Hour Meter Reading: 140.9 Previous Hour Meter Reading: _____

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205 and 60.4211]

O/o is aware of this condition and show compliance; ref.comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this condition and show compliance; ref.comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this condition and show compliance; ref.comment section

4. *This unit shall be limited to use for emergency purposes, defined as in response to a fire. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. [District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n); hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]*

O/o is aware of this condition and show compliance; ref.comment section

5. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this condition and show compliance; ref.comment section

6. *These engines may operate in response to fire suppression requirements and needs.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

7. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for StationaryCompression Ignition*

Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref.comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref.comment section

Comments: 04/24/2018 GPS location 35.548604, -115.465665. This unit and operations records are well maintained per permit conditions. Current hour meter: 140.9hrs

2017 Total operations hours: 23.3hrs/ 207.37 gals Diesel fuel.
2017 Total Emergency Hours: 73.56hrs
2017 Total Testing and Maintenance: 19.34hrs

05/01/2018 APIR Completed, TranC w/ JC ----------.

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, TranC w/ May Mamari

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 -- 800.635.4617 -- FAX 760.245.2022

GENERAL INSPECTION FORM

33951

Start Date: 04/24/2018 End Date: 04/24/2018 Inspector: Catherine Tran

OWNER OR OPERATOR (Co.#1770)

Solar Partners I, LLC
HCR1 Box 280
Nipton, CA, 92364

FACILITY LOCATION (Fac.#3008)

Ivanpah 2
Ca/Nev border at Primm
Ivanpah, CA, 92364

SIC: 4911 *Location/UTM(Km): 644E/3934N*

Permit Number	Issue Date	Permit Status	Equipment Name	Fee Sch	Rating	Expire Date
B010376	04/13/2018	PTO	BOILER, Year of Manufacture 2012, Serial Number 2011-08,	2 (f)	249000000 Btu	10/31/2018
B011572	04/13/2018	PTO	BOILER, NIGHTTIME PRESERVATION	2 (d)	10000000 Btu	10/31/2018
E010380	04/13/2018	PTO	DIESEL IC ENGINE, FIRE PUMP	7 (g)	1 device	10/31/2018
E010381	04/13/2018	PTO	DIESEL IC ENGINE, EMERGENCY GENERATOR	7 (g)	1 device	10/31/2018

PERMIT NUMBER: B010376

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type:
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 2(f)	Rating: 249	Permit Status: PTO
SCC: 10300601	Current, On-Site: Yes	Location/Coordinates: +35.557, -115.470

Equipment Description: BOILER, Year of Manufacture 2012, Serial Number 2011-08,

Variance No : _____	Publications : _____
Process Rate : _____	Existing NTC : none
VEE : N	Existing NOV : none
VEE No : _____	Existing Variance : none

1. *Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

2. *The owner/operator (o/o) shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this condition and show compliance; ref. comment section

3. *This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption.*
[40 CFR 60 Subpart Db, Section 60.49b]

O/o is aware of this condition and show compliance; ref. comment section

4. *The o/o shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.*
[40 CFR 60 Subpart Db, Section 60.49b]

O/o is aware of this condition and show compliance; ref. comment section

5. *The owner/operator shall perform compliance tests at least once every twelve (12) months in accordance with the District Compliance Test Procedural Manual. Prior to performing these annual tests, the boiler shall be tuned in accord with the manufacturers specified tune-up procedure, by a qualified technician. Subsequent tests shall demonstrate that this equipment does not exceed the following emission maximums:*

Pollutant	***ppmv***	***Lb/MMBTU***	*****Lb/hr***
**NOx*	*9.0*	*0.011*	*2.7 (Per USEPA Methods 7E and 19)*
SO2	*1.7*	*0.003*	*0.7*
**CO*	*25.0*	*0.018*	*4.5 (Per USEPA Method 10)*
VOC	*12.6*	*0.005*	*1.3 (Per USEPA Methods 25A and 18)*
PM10	*n/a*	*0.007*	*1.7 (Per USEPA Method 5 or 201A, and 202)*

**corrected to 3% oxygen, on a dry basis, averaged over one hour*

Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5

***As indicated in the District Compliance Manual, the District may approve alternatives, modifications and/or deviations to the methods specified in this condition.*

[District Rule 1303(A); BACT]

O/o is aware of this condition and show compliance; ref. comment section

6. *This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Db) including but not limited to recordkeeping and reporting requirements.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

7. *Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits; PUC regulated pipeline quality natural gas meets this requirement.*
[40 CFR 60 Subpart Db, Section 60.48b; Emission monitoring for particulate matter and nitrogen oxides]

O/o is aware of this condition and show compliance; ref. comment section

8. *The o/o shall continuously monitor and record fuel flow rate and flue gas oxygen level.*
[40 CFR 60 Subpart Db, Section 60.49b; Reporting and Recordkeeping Requirements]

O/o is aware of this condition and show compliance; ref. comment section

9. *In lieu of installing CEMs to monitor NOx emissions, and pursuant to 40 CFR 60 Subpart Db, Section 60.49b(c), the owner/operator shall monitor boiler operating conditions and estimate NOx emission rates per a District approved emissions estimation plan. The plan shall be based on the annual source tests required by condition 5. The plan shall include test results, operating parameters, analysis, conclusions and proposed NOx estimating relationship consistent with established emission chemistry and operational effects. Any proposed changes to a District-approved plan shall include subsequent test results, operating parameters, analysis, and any other pertinent information to support the proposed changes. The District must approve any emissions estimation plan or revision for estimated NOx emissions to be considered valid.*
[40 CFR 60 Subpart Db, Section 60.49b(c)]

O/o is aware of this condition and show compliance; ref. comment section

10. *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 525 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010377 and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair.*
[District Rules 204 and 1302(C)(2)(a); CEC Condition Of Certification]

O/o is aware of this condition and show compliance; ref. comment section

11. *The owner/operator must submit a compliance/certification test protocol at least thirty (30) days prior to the compliance/certification test date. The owner/operator must conduct all required compliance/certification tests in accordance with a District-approved test protocol. The owner/operator must notify the District a minimum of ten (10) days prior to the compliance/certification test date so that an observer may be present. The final compliance/certification test results must be submitted to the District within forty-five (45) days of completion of the test. All compliance/certification test notifications, protocols, and results may be submitted electronically to reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

12. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref. comment section

Comments: 04/24/2018 GPS location: 35.556667, -115.469791. This unit and operations records are maintained per all permit conditions.

2017 Total Operations hours: 3,377.17hrs
2017 Total Fuel use: 702,302.66 mmBTU
2017 Total MMSCF for B010376 & B011572: 401.64mmscf

05/02/2018 APIR Completed, TranC---------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Unit and operations record are well maintained per permit conditions.

08/03/16 PIR Complete, TranC w/ May Mamari

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: B011572

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 2(d)	Rating: 100	Permit Status: PTO
SCC: 10300602	Current, On-Site: Yes	Location/Coordinates: +35.557, -115.471

Equipment Description: BOILER, NIGHTTIME PRESERVATION

Variance No : _____	Publications : _____
Process Rate : _____	Existing NTC : none
VEE : N	Existing NOV : none
VEE No : _____	Existing Variance : none

1. *Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

2. *The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this condition and show compliance; ref. comment section

3. *This boiler shall use only natural gas as fuel.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this condition and show compliance; ref. comment section

4. *The owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state, or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

5. *The owner/operator shall perform annual tune-ups in accordance with the unit manufacturer's specified tune-up procedure, by a qualified technician.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

6. *Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits; PUC regulated pipeline quality natural gas meets this requirement.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

7. *The owner/operator shall continuously monitor and record fuel flow rate into this power block known as Ivanpah 2.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

8. *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 525 MMSCF of natural*

gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010377 and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair.
[District Rules 204 and 1302(C)(2)(a); CEC Condition Of Certification]

O/o is aware of this condition and show compliance; ref. comment section

9. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

10. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref. comment section

Comments: 04/24/2018 GPS location:35.556592, -115.469617. This unit and operations records are maintained per all permit conditions.

2017 Total Operations hours: 3,099.93hrs
2017 Total Fuel use: 14,753.69 mmBTU
2017 Total MMSCF for B010376 & B011572: 401.64mmscf

05/02/2018 APIR Completed, TranC---------

08/13/2017 Unit and operations record are well maintained per permit conditions.Note that the manometer to the air intake system to the nightime boiler need oil/fluid. Request O/o to look into adding oil/fluid to manometer and maintain this unit per manufacturer or supplier and/or sound engineering principles

08/01/2017 Completed, TranC

08/02/16 Unit and operations record are well maintained per permit conditions.

08/04/16 Requested record submitted and show compliance to condition 5.

08/05/16 PIR Complete and updated, TranC w/ May Mamari

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E010380

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.557, -115.471

Equipment Description: DIESEL IC ENGINE, FIRE PUMP

Current Hour Meter Reading: 159.8

Previous Hour Meter Reading: 139.6

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205 and 60.4211]

O/o is aware of this condition and show compliance; ref. comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this condition and show compliance; ref. comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this condition and show compliance; ref. comment section

4. *This unit shall be limited to use for emergency purposes, defined as in response to a fire. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies.*
[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n); hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]

O/o is aware of this condition and show compliance; ref. comment section

5. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this condition and show compliance; ref. comment section

6. *These engines may operate in response to fire suppression requirements and needs.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

7. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition*

Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref. comment section

Comments: 04/24/2018 GPS location 35.557244, -115.470802. This unit and operations records are maintained per all permit conditions. Current Hour meter reading: 159.8

2017 Total Operations hours and fuel use: 25.2hrs/ 307.44 gals of Diesel (Calculated, if unit is runnning at max consumption)
Total Emergency Hours: 0.5hrs
Total Testing and Maints hours: 24.7hrs

05/02/2018 APIR Completed, Ctran w/ JC----------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, TranC w/ May Mamari

Prohibitory Rules:	
In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E010381

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Marco Tule	Title: EHS Specialist	Phone No: 702-815-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.557, -115.471

Equipment Description: DIESEL IC ENGINE, EMERGENCY GENERATOR

Current Hour Meter Reading: 108.5 Previous Hour Meter Reading: 88.1

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205, and 60.4211]

O/o is aware of this condition and show compliance; ref. comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this condition and show compliance; ref. comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this condition and show compliance; ref. comment section

4. *This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.*
[17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this condition and show compliance; ref. comment section

5. *This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance.*
[NSR and 17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]

O/o is aware of this condition and show compliance; ref. comment section

6. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this condition and show compliance; ref. comment section

7. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this condition and show compliance; ref. comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this condition and show compliance; ref. comment section

Comments: 04/24/2018 GPS location 35.556550, -115.470746. This unit and operations records are maintained per all permit conditions. Current Hour meter reading: 108.5

2017 Total Operations hours and fuel use: 24.6hrs/ 271.53 gals of Diesel (Calculated, if unit is runnning at max consumption)
Total Emergency Hours: 0.64hrs
Total Testing and Maints hours: 23.96hrs

05/02/2018 APIR Completed, Ctran w/ JC----------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, TranCw/ May Mamari

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 -- 800.635.4617 -- FAX 760.245.2022

GENERAL INSPECTION FORM

33952

Start Date: 07/01/2018 End Date: 07/01/2018 Inspector: Catherine Tran

OWNER OR OPERATOR (Co.#1771)

Solar Partners VIII, LLC
HCR1 Box 280
Nipton, CA, 92364

FACILITY LOCATION (Fac.#3009)

Ivanpah 3
Ca/Nev border at Primm
Ivanpah, CA, 92364

SIC: 4911 *Location/UTM(Km): 644E/3934N*

Permit Number	Issue Date	Permit Status	Equipment Name	Fee Sch	Rating	Expire Date
B010377	04/13/2018	PTO	BOILER, Year of Manufacture 2012, Serial Number 2011-09,	2 (f)	249000000 Btu	10/31/2018
B011573	04/13/2018	PTO	BOILER, NIGHTTIME PRESERVATION	2 (d)	10000000 Btu	10/31/2018
E010382	04/13/2018	PTO	DIESEL IC ENGINE, EMERGENCY GENERATOR	7 (g)	1 device	10/31/2018
E010384	04/13/2018	PTO	DIESEL IC ENGINE, FIRE PUMP	7 (g)	1 device	10/31/2018

PERMIT NUMBER: B010377

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: solar energy
Contact: Timothy Higdon	Title: Higdon	Phone No: 702-805-2016
Fee Schedule: 2(f)	Rating: 249	Permit Status: PTO
SCC: 10300601	Current, On-Site: Yes	Location/Coordinates: +35.576, -115.482

Equipment Description: BOILER, Year of Manufacture 2012, Serial Number 2011-09,

Variance No : _____	Publications : _____
Process Rate : _____	Existing NTC : none
VEE : N	Existing NOV : none
VEE No : _____	Existing Variance : none

1. *Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

2. *The owner/operator (o/o) shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this permit condition and show compliance ref. comment section

3. *This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption.*
[40 CFR 60 Subpart Db, Section 60.49b]

O/o is aware of this permit condition and show compliance ref. comment section

4. *The o/o shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.*
[40 CFR 60 Subpart Db, Section 60.49b]

O/o is aware of this permit condition and show compliance ref. comment section

5. *The owner/operator shall perform compliance tests at least once every twelve (12) months in accordance with the District Compliance Test Procedural Manual. Prior to performing these annual tests, the boiler shall be tuned in accord with the manufacturers specified tune-up procedure, by a qualified technician. Subsequent tests shall demonstrate that this equipment does not exceed the following emission maximums:*

Pollutant	***ppmv***	***Lb/MMBTU***	*****Lb/hr***
**NOx*	*9.0*	*0.011*	*2.7 (Per USEPA Methods 7E and 19)*
SO2	*1.7*	*0.003*	*0.7*
**CO*	*25.0*	*0.018*	*4.5 (Per USEPA Method 10)*
VOC	*12.6*	*0.005*	*1.3 (Per USEPA Methods 25A and 18)*
PM10	*n/a*	*0.007*	*1.7 (Per USEPA Method 5 or 201A, and 202)*

**corrected to 3% oxygen, on a dry basis, averaged over one hour*

Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5

***As indicated in the District Compliance Manual, the District may approve alternatives, modifications and/or deviations to the methods specified in this condition.*

[District Rule 1303(A); BACT]

O/o is aware of this permit condition and show compliance ref. comment section

6. *This boiler shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Db) including but not limited to recordkeeping and reporting requirements.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

7. *Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits; PUC regulated pipeline quality natural gas meets this requirement.*
[40 CFR 60 Subpart Db, Section 60.48b; Emission monitoring for particulate matter and nitrogen oxides]

O/o is aware of this permit condition and show compliance ref. comment section

8. *The o/o shall continuously monitor and record fuel flow rate and flue gas oxygen level.*
[40 CFR 60 Subpart Db, Section 60.49b; Reporting and Recordkeeping Requirements]

O/o is aware of this permit condition and show compliance ref. comment section

9. *In lieu of installing CEMs to monitor NOx emissions, and pursuant to 40 CFR 60 Subpart Db, Section 60.49b(c), the owner/operator shall monitor boiler operating conditions and estimate NOx emission rates per a District approved emissions estimation plan. The plan shall be based on the annual source tests required by condition 5. The plan shall include test results, operating parameters, analysis, conclusions and proposed NOx estimating relationship consistent with established emission chemistry and operational effects. Any proposed changes to a District-approved plan shall include subsequent test results, operating parameters, analysis, and any other pertinent information to support the proposed changes. The District must approve any emissions estimation plan or revision for estimated NOx emissions to be considered valid.*
[40 CFR 60 Subpart Db, Section 60.49b(c)]

O/o is aware of this permit condition and show compliance ref. comment section

10. *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 525 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010377 and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair.*
[District Rules 204 and 1302(C)(2)(a); CEC Condition Of Certification]

O/o is aware of this permit condition and show compliance ref. comment section

11. *The owner/operator must submit a compliance/certification test protocol at least thirty (30) days prior to the compliance/certification test date. The owner/operator must conduct all required compliance/certification tests in accordance with a District-approved test protocol. The owner/operator must notify the District a minimum of ten (10) days prior to the compliance/certification test date so that an observer may be present. The final compliance/certification test results must be submitted to the District within forty-five (45) days of completion of the test. All compliance/certification test notifications, protocols, and results may be submitted electronically to reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

12. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this permit condition and show compliance ref. comment section

Comments: 04/24/2018 GPS location: 35.575271, -115.482323. This unit and operations records are maintained per all permit conditions.

2017 Total Operations hours: 3,183.67hrs
2017 Total Fuel use: 401,520 mmBTU
2017 Total MMSCF for B010377 & B011573: 407.1mmscf

05/02/2018 APIR Completed, TranC---------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/2016
Unit and operations record are well maintained per permit conditions.

08/03/16 PIR Complete, May Mamari under the supervision of TranC

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: B011573

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Timothy Higdon	Title: Higdon	Phone No: 702-805-2016
Fee Schedule: 2(d)	Rating: 100	Permit Status: PTO
SCC: 10300602	Current, On-Site: Yes	Location/Coordinates: +35.576, -115.483

Equipment Description: BOILER, NIGHTTIME PRESERVATION

Variance No : _____	Publications : _____
Process Rate : _____	Existing NTC : none
VEE : N	Existing NOV : none
VEE No : _____	Existing Variance : none

1. *Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

2. *The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this permit condition and show compliance ref. comment section

3. *This boiler shall use only natural gas as fuel.*
[District Rule 1302(C)(2)(a)]

O/o is aware of this permit condition and show compliance ref. comment section

4. *The owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state, or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

5. *The owner/operator shall perform annual tune-ups in accordance with the unit manufacturer's specified tune-up procedure, by a qualified technician.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

6. *Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits; PUC regulated pipeline quality natural gas meets this requirement.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

7. *The owner/operator shall continuously monitor and record fuel flow rate into this power block known as Ivanpah 3.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

8. *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 525 MMSCF of natural*

gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair, B010377 and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair.
[District Rule 204; Rule 1302(C)(2)(a); CEC Condition Of Certification]

O/o is aware of this permit condition and show compliance ref. comment section

9. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

10. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this permit condition and show compliance ref. comment section

Comments: 04/24/2018 GPS location: 35.575271, -115.482323. This unit and operations records are maintained per all permit conditions.

2017 Total Operations hours: 3,900.37hrs
2017 Total Fuel use: 21,066 mmBTU
2017 Total MMSCF for B010377 & B011573: 407.1mmscf

05/02/2018 APIR Completed, TranC---------

08/13/2017 Unit and operations record are well maintained per permit conditions.Note that the manometer to the air intake system to the nightime boiler need oil/fluid. Request O/o to look into adding oil/fluid to manometer and maintain this unit per manufacturer or supplier and/or sound engineering principles

08/01/2017 Completed, TranC

08/02/16 Unit and operations record are well maintained per permit conditions.

08/05/16 PIR Completed, May Mamari under the supervision of TranC

Prohibitory Rules:	
In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E010382

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Timothy Higdon	Title: Higdon	Phone No: 702-805-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.576, -115.483

Equipment Description: DIESEL IC ENGINE, EMERGENCY GENERATOR

Current Hour Meter Reading: 98.6 Previous Hour Meter Reading: _____

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205, and 60.4211]

O/o is aware of this permit condition and show compliance ref. comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this permit condition and show compliance ref. comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this permit condition and show compliance ref. comment section

4. *This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.*
[17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this permit condition and show compliance ref. comment section

5. *This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance.*
[NSR and 17 CCR 93115; hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements]

O/o is aware of this permit condition and show compliance ref. comment section

6. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this permit condition and show compliance ref. comment section

7. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this permit condition and show compliance ref. comment section

Comments: 04/24/2018 GPS location 35.575295, -115.483411. This unit and operations records are maintained per all permit conditions. Current Hour meter reading: 98.6

2017 Total Operations hours and fuel use: 31.3hrs/ 264.79gals of Diesel
Total Emergency Hours: 0.95hrs
Total Testing and Maints hours: 30.35hrs

05/02/2018 APIR Completed, Ctran w/ JC----------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, May Mamari under the supervision of TranC

Prohibitory Rules:

In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

PERMIT NUMBER: E010384

Issue Date: 04/13/2018	Expiration Date: 10/31/2018	Last Inspected: 2017-07-13 00:00:00.000
Attached: _____ Copies	Inspection Type: Annual	Facility Type: Solar Plant
Contact: Timothy Higdon	Title: Higdon	Phone No: 702-805-2016
Fee Schedule: 7(g)	Rating: 1	Permit Status: PTO
SCC: 20100102	Current, On-Site: Yes	Location/Coordinates: +35.576, -115.483

Equipment Description: DIESEL IC ENGINE, FIRE PUMP

Current Hour Meter Reading: 200.5 Previous Hour Meter Reading: _____

1. *This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.*
[40 CFR Part 60 Subparts 60.4205 and 60.4211]

O/o is aware of this permit condition and show compliance ref. comment section

2. *This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements.*
[17 CCR 93115; 60.4207(b)]

O/o is aware of this permit condition and show compliance ref. comment section

3. *A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time.*
[Title 17 CCR 93115.10(e)(1); 60.4209(a)]

O/o is aware of this permit condition and show compliance ref. comment section

4. *This unit shall be limited to use for emergency purposes, defined as in response to a fire. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies.*
[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n); hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]

O/o is aware of this permit condition and show compliance ref. comment section

5. *The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:*
a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.)
[17 CCR 93115.10]

O/o is aware of this permit condition and show compliance ref. comment section

6. *These engines may operate in response to fire suppression requirements and needs.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

7. *This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition*

Engines (17 CCR 93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

8. *All Facility reports including but not limited to; Annual (every twelve months) Compliance Certifications, Monitoring and Deviations Reports, Source Test Protocols and Reports and Comprehensive Emission Inventory (CEI) reports, shall be submitted electronically to the MDAQMD at reporting@mdaqmd.ca.gov.*
[District Rule 204]

O/o is aware of this permit condition and show compliance ref. comment section

9. *A facility wide Comprehensive Emission Inventory (CEI) for all emitted criteria and toxic air pollutants must be submitted to the District, in a format approved by the District, upon District request.*
[District Rule 107(b), H&S Code 39607 & 44341-44342, and 40 CFR 51, Subpart A]

O/o is aware of this permit condition and show compliance ref. comment section

Comments: 04/24/2018 GPS location 35.575988, -115.483425. This unit and operations records are maintained per all permit conditions. Current Hour meter reading: 200.5

2017 Total Operations hours and fuel use: 19.60hrs/ 239.12 gals of Diesel (Calculated, if unit is runnning at max consumption)
Total Emergency Hours: 0hrs
Total Testing and Maints hours: 19.6hrs

05/02/2018 APIR Completed, Ctran w/ JC----------

08/13/2017 Unit and operations record are well maintained per permit conditions.

08/01/2017 Completed, TranC

08/02/16 Engine and operations records are well maintained per permit conditions.

08/03/16 PIR Completed, May Mamari under the supervision of TranC

Prohibitory Rules:	
In Compliance:	Y
Warning Issued:	N
NTC:	N
NOV:	N
Reinspect:	N

Section 2

Post Certification Changes by the CEC, BLM ROW Grants or Approved POD by BLM

(COMP-7 Item 4)

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an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 10, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Post-Certification Changes by the CEC or changes to the BLM Right-of-Way Grant or Approved POD by BLM, COMPLIANCE 07 Item 4

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification COMPLIANCE-07 Item 4 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

There are no petitions to amend submitted or post-certification changes approved by the CEC, and there are no changes to the BLM ROW grant or approved plan of development by BLM during the reporting period. The list of previously approved post-certification changes and BLM ROW grants is attached for reference.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

LIST OF POST CERTIFICATION CHANGES BY CEC OR BLM ROW GRANT OR APPROVED POD BY BLM

In accordance with COC COMP-07 Item 4, the following include cumulative listing of all post-certification changes by the Energy Commission or changes to the BLM ROW grant or approved POD by BLM, or cleared by BLM's Authorized Officer and the CPM

PTA No.	Description	Submittal Date	Approval Date
1	Petition To Amend - Equipment Change to Reduce Emissions and modify several Air Quality Conditions of certifications. The Petition to Amend modified, deleted and added several Air Quality Conditions of Certification. The modifications proposed in the petition include several equipment changes to make the project operations more effective and efficient.	3/8/2012	2/13/2013
2	Petition To Amend - Condition of Certification BIO-20. The modifications proposed in the petition would amend Condition of Certification BIO-20 to allow the owner to pay in-lieu fees to the California Department of Fish and Game (DFG) for acquisition and/or restoration of habitat under DFG's Advanced Mitigation Land Acquisition Grants program.	11/26/2012	2/13/2013
3	Petition To Amend - CEC Condition of Certification AQ-12, AQ-34 and AQSC-10. The modifications proposed in the petition would allow ISEGS to increase the maximum allowable annual fuel usage limit for boilers from 328 to 525 million standard cubic feet (MMSCF) per power block. The requested change would require modification of the annual fuel use limits in Air Quality Conditions of Certification AQ-12 and AQ-34. Additionally, the petition requests conforming changes to Air Quality Condition of Certification AQ-SC10, which limits total annual natural gas fuel heat input to each of the three ISEGS power plants to no more than 5 percent of the total heat input from the sun. According to the petition, the proposed revisions to condition AQSC-10 are necessary to make the condition consistent with the proposed changes to conditions AQ-12 and AQ-34.	3/26/2014	9/15/2014
4	Petition To Amend - to modify several Air Quality Conditions of Certifications. The modifications proposed include minor alterations to the ISEGS Air Quality Conditions of Certification to revise the description of engines used for emergency generators and fire pumps to match the existing engines. The Mojave Desert Air Quality Management District (District or MDAQMD) has reviewed the proposed changes and has incorporated the revised descriptions into district permit language. The purpose of this application is to update the equipment descriptions contained in the Air Quality Conditions of Certification to reflect the as-built engine information. Additionally, the District has made minor changes to permit conditions, consolidating redundant conditions, eliminating obsolete conditions, and making minor simplifications and corrections - those changes are reflected in the amended Decision.	3/17/2015	11/19/2015

ISEGS LIST OF BLM ROW GRANTS

Right-of-Way Grant No.	LOCATION	DATE ISSUED	TOTAL ACREAGE
CACA 049502	Construction Logistics Area	07-Oct-2010	245.89
CACA 049504	Ivanpah 1	07-Oct-2010	914.03
CACA 048668	Ivanpah 2	07-Oct-2010	1,076.51
CACA 049503	Ivanpah 3	07-Oct-2010	1,234.93
CACA 049502 Amendment #1	CLA - Modify certain boundaries of the CLA and shared ancillary facilites (Amend. #1)	14-Mar-2011	29.70
CACA 049502 Amendment #2	CLA - Construction of a Tortoise Pen along I-15 (Amend. #2)	09-Mar-2012	9.70
CACA 049502 Amendment #3	CLA - Installation of additional tortoise exclusion fence, two tortoise guards on Yates Well Rd from PVGC to I-15 and 3 tortoise guards along Colosseum Rd. (Amend. #3)	02-May-2012	5.40
CACA 049502 Amendment #4	CLA - Installation of Automated Data Logging Weather Stations (Amend. #4)	26-Mar-2013	0.10
CACA 049502 Amendment #5	CLA - Continued operation, maintain and decommissioning of the heliostat assembly building (HAB) (Amend. #5)	16-Apr-2013	22.50
CACA 055108*	Solar/Ecological Interpretive Center	25-Jul-2014	4.59
CACA 055666**	50 Miles of Desert Tortoise Exclusion Fencing along Interstate 15 and Interstate 40	02-Sep-2015	99.71

NOTES:

* This ROW Grant is a Land-Use permit issued by BLM which allows the use of public land to construct the Solar/Ecological Interpretive Center.

** Right-of-Way Grant for the right to install, monitor and maintain desert tortoise exclusion fence on public lands managed by the Bureau of Land Management.

Section 3

Explanation for Any Submittal Deadlines That Were Missed

(COMP-7 Item 5)

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364 Ph:
702-815-2021 Fax: 702-815-2030

January 7, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Explanation for any Submittal Deadlines that were Missed to fulfill California Energy Commission Conditions of Certification, COMPLIANCE-7 Item 5

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification COMPLIANCE-7 Item 5 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

There are no submission deadlines that were missed on record during the 2018 reporting period.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Section 4

List of Filings Submitted and Permits Issued During the Reporting Year

(COMP-7 Item 6)

IVANPAH SOLAR ELECTRIC GENERATING FACILITY LIST OF FILINGS & ACTIVE PERMITS

In accordance with CEC Condition of Certification COMP-07 Item 6, the following are listings of filings submitted to, or permits issued by other governmental agencies during the year.

LIST OF FILINGS SUBMITTED DURING THE REPORTING PERIOD

TN #	DESCRIPTION	DOCKETED DATE	SUBMITTED TO
222356	Ivanpah Solar Electric Generating System; Avian and Bat Monitoring Plan-2017 Summer Report	25-Jan-2018	California Energy Commission
222357	Ivanpah Solar Electric Generating System; Avian and Bat Monitoring Plan- 2017 Spring Report	25-Jan-2018	California Energy Commission
223073	Ivanpah Solar Electric Generating System Avian & Bat Technical Advisory Committee Meeting December 2017	28-Mar-2018	California Energy Commission
223723	2017 Annual Compliance Report - Ivanpah Solar Electric Generating System	07-Jun-2018	California Energy Commission / Bureau of Land Management. Submitted on 1/25/2018, docketed on 6/7/2018.
223780	Ivanpah Solar Electric Generating System Avian & Bat Technical Advisory Committee Meeting, February 15, 2018 - Meeting Notes	12-Jun-2018	California Energy Commission
224646	Ivanpah Solar Electric Generating System; Avian and Bat Monitoring Plan - 2016-2017 Annual Report	05-Sep-2018	California Energy Commission
226138	Ivanpah Solar Electric Generating System; Avian & Bat Monitoring Plan - 2017 Fall Report	17-Dec-2018	California Energy Commission
226139	Avian & Bat Technical Advisory Committee (TAC) Meeting - August 9, 2018 Meeting Notes	17-Dec-2018	California Energy Commission

LIST OF PERMITS ISSUED BY OTHER GOVERNMENTAL AGENCIES

PERMIT NO.	PERMIT NAME	EXPIRATION DATE	ISSUING AGENCY
PT0030636	Potable Water Permit	31-Jan-2019	San Bernardino County - Department of Public Health
07-AFC-05	Certificate of Occupancy	N/A	Department of Building Inspection, Bureau Veritas
FA0014691	Certified Unified Program Agency (CUPA)	28-Feb-2019	San Bernardino County - Fire Protection District (Hazardous Materials Division)
070714550071W	Hazardous Materials Certificate of Registration	30-Jun-2019	U. S. Department of Transportation - Pipeline and Hazardous Materials Safety Administration
CAS 000001	NPDES Industrial General Permit for Storm Water Discharges	30-Jun-2020	State Water Resources Control Board
CAS000001	Storm Water NOI/Annual Fee	02-Feb-2019	State Water Resources Control Board
	DTSC ANNUAL MANIFEST VERIFICATION FEES	31-Jul-2019	USEPA
B010375	Ivanpah 1 Authority to Construct (ATC) Permit B010375 - Auxiliary Boiler	31-Oct-2019	Mojave Desert Air Quality Management District
B011544	Ivanpah 1 Authority to Construct (ATC) Permit B011544 - Nighttime Preservation Boiler	31-Oct-2019	Mojave Desert Air Quality Management District
E010378	Ivanpah 1 Authority To Construct (ATC) Permit E010378 - Diesel IC Engine Fire Pump	31-Oct-2019	Mojave Desert Air Quality Management District
E010379	Ivanpah 1 Authority to Construct (ATC) Permit E010379 - Diesel IC Engine - Emergency Generator	31-Oct-2019	Mojave Desert Air Quality Management District
B010376	Ivanpah 2 Authority to Construct (ATC) Permit B010376 - Auxiliary Boiler	31-Oct-2019	Mojave Desert Air Quality Management District
B011572	Ivanpah 2 Authority to Construct (ATC) Permit B011572 - Nighttime Preservation Boiler	31-Oct-2019	Mojave Desert Air Quality Management District
E010380	Ivanpah 2 Authority To Construct (ATC) Permit E010380 - Diesel IC Engine Fire Pump	31-Oct-2019	Mojave Desert Air Quality Management District
E010381	Ivanpah 2 Authority To Construct (ATC) Permit E010381 - Diesel IC Engine - Emergency Generator	31-Oct-2019	Mojave Desert Air Quality Management District
B010377	Ivanpah 3 Authority to Construct (ATC) Permit B010377 - Auxiliary Boiler)	31-Oct-2019	Mojave Desert Air Quality Management District
B011573	Ivanpah 3 Authority to Construct (ATC) Permit B011573 - Nighttime Preservation Boiler	31-Oct-2019	Mojave Desert Air Quality Management District
E010382	Ivanpah 3 Authority To Construct (ATC) Permit E010382 - Diesel IC Engine - Emergency Generator	31-Oct-2019	Mojave Desert Air Quality Management District
E010384	Ivanpah 3 Authority to Construct (ATC) Permit E010384 - Diesel IC Engine Fire Pump	31-Oct-2019	Mojave Desert Air Quality Management District
E011547	Ivanpah Common Area Authority to Construct (ATC) Permit E011547 - Diesel IC Engine Fire Pump	31-Oct-2019	Mojave Desert Air Quality Management District
E011546	Ivanpah Common Area Authority to Construct (ATC) Permit E011546 - Diesel IC Engine Emergency Gen	31-Oct-2019	Mojave Desert Air Quality Management District
FOP #17693007	Federal Operating Permit (Title IV and Title V)	19-May-2021	Mojave Desert Air Quality Management District

Section 5

Projection of Project Compliance Activities Scheduled During the Next Year – 2019

(COMP-7 Item 7)

Ivanpah SEGS Operations Projection of Project Compliance Activities for 2019

In accordance with CEC Condition of Certification COMP-07 Item 7, the following is the projection of project compliance activities scheduled during the next year, 2019

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Air Quality Auxilliary Boilers	**AQ-01**	Equipment operation to be conducted in compliance with all data and specifications submitted with the application. Any non-compliant operations shall be listed in the Annual Compliance Report (COMPLIANCE-7).	Daily	31-Dec-2019	To be submitted with the annual compliance report
Air Quality Auxilliary Boilers	**AQ-02**	To operate equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application. As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include information on the date, time, and duration of any violation of this permit condition.	Daily	31-Dec-2019	Violation of this permit condition shall be reported in the annual compliance test report
Air Quality Auxilliary Boilers	**AQ-03**	Only natural gas shall be used for the boilers and equipped with a meter measuring fuel consumption. To include proofs that only pipeline quality, or Public Utility Commission regulated gas are used for the boilers. As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include proofs that only pipeline quality, or Public Utility Commission regulated natural gas are used for the boilers.	Daily	31-Dec-2019	To be submitted with the annual compliance report
Air Quality Auxilliary Boilers	**AQ-04**	To maintain log for boilers for 5 years which shall be provided to the District, state or federal personnel upon request.	Monthly	31-Dec-2019	To be submitted with the annual compliance report
Air Quality Auxilliary Boilers	**AQ-06**	Notify MDAQMD and CEC before execution of annual compliance tests	Annually	15-Feb-2019	30 days prior scheduled performance tests
Air Quality Auxilliary Boilers	**AQ-06**	Perform boiler tune-up in accord with manufacturer's specified tune-up procedure.	Annually	10-Feb-2019	
Air Quality Auxilliary Boilers	**AQ-06**	Perform annual compliance tests for auxiliary boilers Ivanpah 1, Ivanpah 2 and Ivanpah 3.	Annually	02-Apr-2019	
Air Quality Auxilliary Boilers	**AQ-06**	Submit compliance test results to MDAQMD and CEC.	Annually	17-May-2019	45 days from the date of the tests
Air Quality Auxilliary Boilers	**AQ-07**	This boiler (Boilers 1, 2, and 3) shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Db).	Monthly	31-Dec-2019	
Air Quality Auxilliary Boilers	**AQ-08**	Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.	Monthly	31-Dec-2019	

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Air Quality Auxilliary Boilers	**AQ-09**	The owner/operator shall continuously monitor and record fuel flow rate and flue gas oxygen level.	Monthly	31-Dec-2019	
Air Quality Auxilliary Boilers	**AQ-12**	Monitor and record fuel consumption for each auxiliary boiler and nighttime preservation boiler pair not to exceed 525 mmscf.	Monthly	31-Dec-2019	To be submitted with the annual compliance report
Air Quality Fire Pumps	**AQ-14**	To ensure that the units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis.	Monthly	31-Dec-2019	
Air Quality Fire Pumps	**AQ-16**	To monitor operation of this equipment will not exceed 1.0 hour per day for a total of 50 hours per year for testing and maintenance.	Monthly	31-Dec-2019	
Air Quality Fire Pumps	**AQ-17**	To maintain operations log for these equipment.	Monthly	31-Dec-2019	
Air Quality Emergency Generators	**AQ-21**	To ensure that the units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis.	Monthly	31-Dec-2019	
Air Quality Emergency Generators	**AQ-24**	To monitor operation of this equipment will not exceed 1.0 hour per day for a total of 50 hours per year for testing and maintenance.	Monthly	31-Dec-2019	
Air Quality Emergency Generators	**AQ-25**	To maintain operations log for these equipment.	Monthly	31-Dec-2019	
Air Quality - Nighttime Preservation Boilers	**AQ-27**	Equipment operation to be conducted in compliance with all data and specifications submitted with the application.	Daily	31-Dec-2019	To be submitted with the annual compliance report
Air Quality - Nighttime Preservation Boilers	**AQ-28**	To operate equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application.	Daily	31-Dec-2019	Violation of this permit condition shall be reported in the annual compliance test report
Air Quality - Nighttime Preservation Boilers	**AQ-29**	Only natural gas shall be used for the boilers and equipped with a meter measuring fuel consumption. To include proofs that only pipeline quality, or Public Utility Commission regulated gas are used for the boilers.	Daily	31-Dec-2019	To be submitted with the annual compliance report
Air Quality - Nighttime Preservation Boilers	**AQ-30**	To maintain log for boilers for 5 years.	Monthly	31-Dec-2019	To be submitted with the annual compliance report
Air Quality - Nighttime Preservation Boilers	**AQ-31**	Perform boiler tune-up in accord with manufacturer's specified tune-up procedure.	Annually	10-Feb-2019	
Air Quality - Nighttime Preservation Boilers	**AQ-32**	To maintain records of fuel supplier sulfur certification.	Monthly	31-Dec-2019	

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Air Quality - Nighttime Preservation Boilers	**AQ-33**	The owner/operator shall continuously monitor and record fuel 'flow rate.	Monthly	31-Dec-2019	
Air Quality - Nighttime Preservation Boilers	**AQ-34**	Monitor and record fuel consumption for each auxiliary boiler and nighttime preservation boiler.	Monthly	31-Dec-2019	To be submitted with the annual compliance report
Air Quality - Common Area Emergency Generator	**AQ-36**	To ensure that the units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis.	Monthly	31-Dec-2019	
Air Quality - Common Area Emergency Generator	**AQ-39**	To monitor operation of this equipment will not exceed 1.0 hour per day for a total of 50 hours per year for testing and maintenance.	Monthly	31-Dec-2019	
Air Quality - Common Area Emergency Generator	**AQ-40**	To maintain operations log for these equipment.	Monthly	31-Dec-2019	
Air Quality - Common Area Emergency Fire Pump	**AQ-43**	To ensure that the units shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis.	Monthly	31-Dec-2019	
Air Quality - Common Area Emergency Fire Pump	**AQ-45**	To monitor operation of this equipment will not exceed 1.0 hour per day for a total of 50 hours per year for testing and maintenance.	Monthly	31-Dec-2019	
Air Quality - Common Area Emergency Fire Pump	**AQ-46**	To maintain operations log for these equipment.	Monthly	31-Dec-2019	
Air Quality General	**AQSC-6**	***Off-road Vehicles for Mirror Washing:*** The plan shall be updated every other year and submitted in the Annual Compliance Report (COMPLIANCE-7). The plan was originally submitted on 8/22/2013.	Every other year	23-Aug-2019	To be submitted with the annual compliance report - 1/31/2020.
Air Quality General	**AQSC-7**	Recordkeeping and annual reporting in association with the Dust Control Plan	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-02**	***Designated Biologist Duties:*** The Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.	Annually	31-Dec-2019	To be submitted with the annual compliance report

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Biological Resources	**BIO-04**	***Biological Monitor Duties:*** The Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-06**	***Worker Environmental Awareness Program (WEAP):*** The worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-06**	During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-10**	***Desert Tortoise Compliance Verification:*** 6. No later than January 31 of every year the ISEGS facility remains in operation, provide BLM's Authorized Officer and the CPM an annual Listed Species Status Report	Annually	31-Jan-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-11**	***Impact Avoidance and Minimization Measures:*** The Designated Biologist shall report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-12**	***Raven Management Plan:*** Submit annual monitoring reports to CDFG, BLM, and USFWS no later than December 31st of each raven management year.	Annually	Completed in 2016	This condition of certification has been completed in 2016 based on 2-year monitoring period.
Biological Resources	**BIO-13**	Submit Weed Management Plan Annual Report in the Annual Compliance Report.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-14**	Submit Revegetation Annual Monitoring Report in the Annual Compliance Report.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-17**	Submit the results of the annual inspection of fencing and rehabilitated routes; a summary of fence repairs and maintenance of reclaimed routes completed during the year; and recommendations and a cost estimate for repairs and maintenance activities needed for the upcoming year. The reports will be submitted in the 2017 Annual Compliance Report.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-18**	***Special Status Plant Impact Avoidance and Minimization:*** On January 31st of each year following construction, the owner's qualified botanist shall submit a report, including CNDDB field survey forms, describing results of off-site plant surveys for Mojave milkweed and Rusby's desert-mallow to the BLM's authorized officer, the CPM, CDFG, and CNDDB.	Annually	31-Dec-2019	To be submitted with the annual compliance report

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Biological Resources	**BIO-18**	During operation, the DB shall submit record summaries in the Annual Compliance Report for a period not < 10 years for the Gas Pipeline Revegetation Plan, and for the life of the project for the SSPP and Monitoring Plan, and the SSP Remedial Action Plan, including funding for the seed storage.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-19**	***Nelson's Bighorn Sheep:*** The SCBC will provide the project owner an annual report no later than January 15th of each year, and the project owner will provide to the CEC and BLM the annual report no later than January 31st of each year.	Annually	15-Jan-2019	To be submitted with the annual compliance report
Biological Resources	**BIO-20**	Streambed Impact Minimization and Compensation Measure change of condition report. To be submitted in the Annual Compliance Report	As Needed	31-Dec-2019	
Biological Resources	**BIO-21**	***Avian and Bat Monitoring and Management Plan:*** For one year following the beginning of power plant operation, the Designated Biologist shall submit quarterly reports to the CPM, CDFG, and USFWS. describing the results of monitoring.	Quarterly		
Biological Resources	**BIO-21**	***Avian and Bat Monitoring and Management Plan:*** Following the completion of the fourth quarter of monitoring, the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any Project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed.	Annually	31-Dec-2019	
Biological Resources	**BIO-21**	***Avian and Bat Monitoring and Management Plan:*** No later than January 31st of every year the Annual Report shall be provided to the CPM, CDFG, and USFWS. Quarterly reporting shall continue until the CPM, in consultation with CDFG and USFWS determine whether more years of monitoring are needed, and whether mitigation and adaptive management measures are necessary.	Annually	31-Dec-2019	
Biological Resources	**BIO-21**	***Avian and Bat Monitoring and Management Plan:*** After two years of data collection, the project owner or contractor shall prepare a report that describes the study design and monitoring results of the Avian and Bat Monitoring and Management Plan. The report shall be submitted to the CPM, CDFG and USFWS no later than the third year after onset of Project operation.	Annually	31-Dec-2019	
Biological Resources	**BIO-23 (BLM)**	The applicant shall conduct visual biweekly surveys for bird and bat mortalities throughout the project site. In addition to the photo documentation of bird mortalities (Item #14 in BIO-11), mortalities and injuries to bats and other wildlife shall be photo documented. Additionally, data would document the species affected and any overt signs of injury resulting in death (e.g., scorched feathers). This information would be compiled and provided to the BLM on quarterly intervals for the first three years, then annually thereafter, unless otherwise requested by the BLM.	Quarterly for the first 3 years; then, annually thereafter.		
Compliance Conditions	**COMP-04**	During Operations, an annual compliance report must be submitted.	Annually	31-Jan-2019	

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Compliance Conditions	**COMP-05**	***Compliance Matrix:*** A compliance matrix shall be submitted by the project owner to BLM's Authorized Officer and the CPM along with each annual compliance report. The compliance matrix is intended to provide BLM's Authorized Officer and the CPM with the current status of all conditions of certification in a spreadsheet format.	Annually	31-Jan-2019	To be submitted with the annual compliance report
Compliance Conditions	**COMP-07**	***Annual Compliance Report:*** After construction of each power plant is complete or when a power plant goes into commercial operation, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.	Annually	31-Jan-2019	
Compliance Conditions	**COMP-08**	***Confidential Information:*** Any information that the project owner deems confidential shall be submitted to the Energy Commission's Dockets Unit with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq. Any information the ROW holder deems confidential shall be submitted to the BLM Authorized Officer with a written request for said confidentiality along with a justification for the request. All confidential submissions to BLM should be clearly stamped "proprietary information" by the holder when submitted.	As Needed	As Needed	
Compliance Conditions	**COMP-09**	***Annual Facility Compliance Fee:*** Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay the Energy Commission an annual compliance fee	Annually	01-Jul-2019	
Compliance Conditions	**COMP-10**	***Reports of Complaints, Notices, and Citations:*** In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to BLM's Authorized Officer and the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the NOISE conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).	As Needed	As Needed	
Compliance Conditions	**COMP-14**	Submit Petition to Amend to CEC	As Needed		
Hazardous Materials	**HAZ-1**	Provide to BLM's Authorized Officer and the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.	Annually	31-Jan-2019	To be submitted with the annual compliance report
Hazardous Materials	**HAZ-5**	In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.	Annually	31-Dec-2019	To be submitted with the annual compliance report

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Land Use	**LAND-3**	***Solar / Ecological Interpretive Center:*** In each Annual Compliance Report, the project owner shall provide a summary of estimated public use of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.	Annually	31-Dec-2019	To be submitted with the annual compliance report - 1/31/2020
Recreation	**REC-1**	***Solar / Ecological Interpretive Center:*** After commercial operation and in each Annual Compliance Report for the life of the ISEGS project, the project owner shall provide a summary of estimated public utilization of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.	Annually	31-Dec-2019	To be submitted with the annual compliance report - 1/31/2020
Soil & Water	**S&W-1**	***Drainage Erosion ans Sediment Control Plan:*** c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Soil & Water	**S&W-2**	***In accordance with Storm Water Pollution Prevention Plan (SWPPP) Sect. 6.4:*** • **Annual Comprehensive Site Compliance Evaluation:** The Environmental Specialist, Environmental Health and Safety Officer, or the Environmental Specialist III, with the assistance of SWPPT team and/or designated contractor, shall perform one comprehensive site evaluation or ACSCE during each report period (July 1-June 30). The evaluation shall be conducted a minimum of 8 months from the previous ACSCE and shall include review of all records, a visual inspection of all potential pollutant sources, review and evaluation of all BMPs, revision of the SWPPP as necessary to revise existing or include additional BMPs, visual inspection of all equipment needed to implement the SWPPP, and preparation of a report of the evaluation. Dischargers shall implement SWPPP revisions resulting from the ACSCE within 90 days of the evaluation.	Annually	01-Jul-2019	
Soil & Water	**S&W-2**	***In accordance with Storm Water Pollution Prevention Plan (SWPPP) Sect. 7:*** Records of all storm water monitoring information and copies of all reports required by this Permit will be retained for a period of at least 5 years from the date of the sample, observation, measurement or report. The following records will be kept: • SWPPP, • Quarterly Visual Observations – NSWDs, • Monthly Visual Observations – Storm Water Discharges, • Annual Visual Observations – ACSCE, • ACSCE Summary Report, • Personnel Training, • Significant Spills and Leaks, and • Documentation of Dangerous Weather Preventing Inspection or Sampling (Flood conditions, high winds, lightning, dust storms).	Monthly	31-Dec-2019	

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Soil & Water	**S&W-2**	***In accordance with Storm Water Pollution Prevention Plan (SWPPP) Sect. 7.1:*** The Permit requires an annual report to be submitted to the Lahontan Regional Water Quality Control Board (LRWQCB) on an annual basis. The annual report is to encompass the period of July 1 through June 30 and is due July 1 of each year. A copy of the report must be retained in the SWPPP with for a minimum of 5 years from the date of submittal. The annual report shall include:	Annually	01-Jul-2019	
Soil & Water	**S&W-3**	***Project Groundwater Wells:*** 8. Annual Montioring Reports will be submitted which include Quarterly monitoring data as described in the Approved Groundwater Monitoring and Management Plan. The First Annual Report will be a Baseline Report which includes the Well Network and level monitoring report and plan	Annually	31-Dec-2019	
Soil & Water	**S&W-4**	***Operations Water Consumption:*** The project owner shall prepare an annual summary, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term “year” will correspond to the date established for the annual compliance report submittal.	Annually	31-Dec-2019	
Soil & Water	**S&W-5**	***Storm Water Damage Monitoring and Response Plan:*** The project owner shall prepare an annual summary of the number of heliostats failed, cause of the failure,and cleanup and mitigation performed for each failed heliostat.	Annually	31-Dec-2019	
Soil & Water	**S&W-6**	***Groundwater Monitoring and Reporting Plan:*** 5. After project construction and during project operations, the project owner shall submit the monitoring data annually to both BLM’s Authorized Office and the CPM.The summary shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up waterlevel trends. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall), and a comparison and assessment of water level data relative to the assumptions and spatial levels simulated by the applicant's groundwater model.	Annually	15-Aug-2019	
Traffic & Transport.	**TRANS-3**	***Heliostat Positioning Plan:*** 4. The monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, CHP, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.	Annually for the first 5 years and every 2 years thereafter	10-Dec-2020	
Transm. Lines	**TLSN-3**	During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report to be provided to BLM’s Authorized Officer and the CPM.	Annually Completed - 2018 is the 5th year of Operation	Completed in 2018	To be submitted with the annual compliance report

TECHNICAL AREA	COC No.	DESCRIPTION	FREQUENCY	TENTATIVE COMPLIANCE DATE	REQUIRED SUBMITTAL DATE
Visual Resources	**VIS-1**	***Surface Treatment of Project Structures and Buildings:*** The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Visual Resources	**VIS-2**	***Landscape Screening of Golf Course:*** The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Waste Mgmt	**WASTE-6**	***Operations Waste Management Plan:*** The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.	Annually	31-Dec-2019	To be submitted with the annual compliance report
Waste Mgmt	**WASTE-7**	Ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are reported, cleanedup, and remediated as necessary, in accordance with all applicable federal, state, and local requirements.	As Needed	As Needed	
Worker Safety & FP	**WS-2**	Implement Project Operations and Maintenance Safety Program	Monthly	31-Dec-2019	
Worker Safety & FP	**WS-5**	The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During operations, all power plant employees shall be trained in its use.	Annually	31-Dec-2019	

Section 6

Listing of the years Addition to the Onsite Compliance File

(COMP-7 Item 8)

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January 8, 2019

Mr. Leonidas Payne
Compliance Project Manager
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Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Listing of the Year's Additions to the On-site Compliance File, to fulfill California Energy Commission Condition of Certification, COMPLIANCE-7 Item 8

Dear Mr. Payne and Mr. Ahrens,

Pursuant to the requirements of Conditions of Certification COMPLIANCE-07 Item 8 of the Commission's approval of the Ivanpah Solar Electric Generating System, a listing of the year's additions to the on-site compliance file must be provided in the Annual Compliance Report.

The Risk Management Plan (RMP) was added to the on-site compliance file on record during the 2018 reporting period. The RMP was submitted to San Bernardino County CUPA on November 11, 2017 and was approved on November 27, 2017. The RMP was implemented in 2018. A list of all ISEGS compliance files is attached for your reference.

Please feel free to contact me with any questions.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

ISEGS LIST COMPLIANCE FILES

In accordance with COC COMP-07 Item 8, the Ivanpah SEGS on-site compliance files are maintained at the project site Administration Building. At the end of the reporting period, the onsite compliance files contain the following information:

Ref. No.	Description	Document Date	Revision Date
07-AFC-5C	CEC Final Decision	9/22/2010	2/13/2013; 9/15/2014; 11/19/2015
07-AFC-5C	CEC Notice to Proceed	10/8/2010	
CACA 48668, 49502, 49503, 49504	BLM Record of Decision	10/7/2010	
CACA 48668, 49502, 49503, 49504	BLM ROW Notices to Proceed	Varies	
81440-2010-F-0096	USFWS Biological Opinion and any Revisions	6/10/2011	
CACA 48668, 49502, 49503, 49504	All approved BLM Verification Change Request Forms	Varies	
Biological Opinion	Animal Husbandry Plan	11/1/2010	11/3/2012
AQSC-02	AQCMP-Air Quality Compliance and Mitigation Plan	7/14/2010	1/27/2011
BIO-02, 04, 10, 11, 18, 20 &21	Annual Biological Summary Reports	Varies	
BIO-06	WEAP Training Booklet, Training Sheets, and Training Log	6/24/2010	
BIO-07	BRMIMP- Biological Resources Mitigation, Implementation and Monitoring Plan	7/15/2010	Rev. 1: 10/6/2010; Rev. 2: 4/11/2012
BIO-09	Desert Tortoise Translocation Plan	3/19/2009	Rev. 1: 3/2009; Rev. 2C: 9/23/2010; Rev. 3: 10/5/2010; Rev. 4:: 10/13/2010; Rev. 5.1: 10/2011
BIO-09	BIO-9 Compliance Status Reports-included in MCRs	11/29/2010	
BIO-12	Raven Management Plan	July 2010	Rev. 3: 10/4/2010; Rev. 4: 10/17/2012
BIO-13/WS-06	Weed Management Plan	7/12/2010	10/6/2010
BIO-14/BIO-18 /COMP-11	Closure, Rehabilitation, and Revegetation Plan - Includes Gas Pipeline Revegetation and Monitoring Plan		Rev. 3: 7/13/2010; Rev. 4: 9/29/2010
BIO-16	Burrowing Owl Mitigation and Monitoring Plan,	July 2010	Rev. 1: 10/4/2010; Rev. 2: 10/15/2010
BIO-18	Special-status Plant Protection and Monitoring Plan		Rev. 1: 10/26/2010
BIO-18	Special-status Plant Remedial Action Plan	11/9/2010	
BIO-18	Special-Status Plants Annual Reports	January 2012	3/7/2012
BIO-19	Big Horn Sheep Mitigation Plan	1/20/2012	9/27/2012
BIO-21	Avian and Bat Monitoring and Management Plan	September 2010	Rev. 1: 10/21/2010; Rev. 2: 5/23/2011; Rev. 3: 2/24/2012; Rev. 10:: 10/31/2013; Rev. 11: 11/5/2013; Rev. 12: 11/12/2013; Rev. 13: 12/23/2015 Rev. 14: October 2017

Ref. No.	Description	Document Date	Revision Date
COMP-06	All Monthly Compliance Reports	Varies	
	DOE Annual Summary Environmental Compliance Report	Varies	
COMP-12/ COMP-13	On-Site Contingency Plan for Unplanned Temporary or Permanent Closure	1/31/2011	
CUL-03	CRMMP- Cultural Resources Mitigation and Monitoring Plan	8/13/2010	
HAZ-02	Hazardous Materials Business Plan	2/13/2013	2/14/2017; 1/29/2018
HAZ-03	Safety Management Plan	4/25/2013	
NOISE-03	Noise Control Plan	8/11/2010	
PAL-03	PRMMP- Paleontological Resources Mitigation and Monitoring Plan	August 2010	Rev. 1: 10/4/2010
S&W-02	Storm Water Pollution Prevention Plan (SWPPP)	July 2013	Rev. 1: 10/24/2014; Rev. 2: 6/24/2015; Rev. 3: 9/8/2015; Rev. 4: 8/10/2016; Rev. 5: 12/5/2016; Rev. 10/27/2017; 10/5/2018
S&W-02	SWPPP Annual Reports	Varies	
S&W-04	Semi-Annual Groundwater Usage Reports	Varies	
S&W-06	Groundwater Monitoring and Reporting Plan	7/15/2010	October 2010
S&W-06	Annual Groundwater Monitoring Reports	Varies	
TRANS-01	Traffic Control Plan	6/15/2010	
TRANS-03	Heliostat Positioning Plan-Rev 1	1/14/2013	September 2013; Rev. 1: 12/10/2014; Rev. 2: 12/10/2015; Rev. 3: 12/7/2016 Rev. 4: 12/10/2017; Rev. 5: 12/10/2018
TRANS-04	Power Tower Luminance Plan	9/12/2013	Updated on 3/28/2014
VIS-01	Surface Treatment Plan	6/29/2010	Rev. 1: 5/24/2011;
VIS-04	Visual Resources Mitigation Plan (Lighting Plan w/Nighttime Amendment)	12/14/2011	
WORKER SAFETY-02	Project Operations and Maintenance Safety and Health Program	Varies	
FA0014961	CUPA (Certified Unified Program Agency) Annual Permit for Facility #FA0014961 from San Bernardino County Fire Protection District	3/1/2015	Renewed every February each year
	Spill Prevention Control and Countermeasure Plan (SPCC)	10/27/2014	Rev. 1: 5/13/2015; Rev. 2: 9/3/2015; Rev. 3: 8/25/2016; Rev. 4: 12/22/2016; Rev. 5: 8/27/2018
CAL000389737	Hazardous Waste Generation Identification Number issued by Department of Toxic Substances Control	9/23/2013	
WASTE-06	Operations Waste Management Plan	9/23/2013	
S&W-05	Storm Water Damage Monitoring and Response Plan and Reports	8/7/2013	
40 CFR 98	Greenhouse Gas (GHG) Monitoring Plan and Annual Reports	3/10/2014	6/15/2015; Rev. 4/25/2017
Varies	MDAQMD Permits To Operate (changed from ATC to PTO on March 2, 2015.	Varies	11/19/2015; 4/23/2018
12-3601181-001	Domestic Water Supply Permit No. 14-3601181-001 from San Bernardino County Department of Public Health	1/28/2014	

Ref. No.	Description	Document Date	Revision Date
AQ-06	Annual Compliance Test Reports	10/2/2014; 6/11/2015; 5/16/2016; 3/28/2017; 2/20/2018	
COMP-07	Annual Compliance Report (COMP-7)	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	
40 CFR 75.53(a)	Acid Rain Monitoring Plan	November 2015	
FOP #17693007	Federal Operating Permit (Title IV and Title V)	19-May-2016	
CHSC 6.95 Art. 2	Risk Management Plan	October 2017	

Section 7

Evaluation of the On-site Contingency Plan for Unplanned Facility Closure

(COMP-7 Item 9)

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January 8, 2019

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Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Evaluation of On-site Contingency Plan for Unplanned Facility Closure, Including Suggestions for Bringing the Plan up to Date, to fulfill California Energy Commission Conditions of Certification, COMPLIANCE-07 Item 9

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification COMPLIANCE-07 Item 9 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

The On-site Contingency Plan for Unplanned Facility Closure, in accordance with COMPLIANCE-12 and COMPLIANCE-13, is currently in force and no changes were made during the reporting period.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Section 8

Listing of Complaints, Notice of Violations, Official Warnings and Citations Received During the Year

(COMP-7 Item 10)

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January 7, 2019

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Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C)
Listing of Complaints, Notices of Violations, Official Warnings and Citations Received during the Year, to fulfill California Energy Commission Conditions of Certification, COMPLIANCE-7 Item 10

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification COMPLIANCE-7 Item 10 of the Commission's approval of the Ivanpah Solar Electric Generating System (ISEGS), we are providing the following information as a requirement in the Annual Compliance Report:

The California Energy Commission (CEC) Condition of Certification COMPLIANCE-7, Annual Compliance Report requires "A listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters."

ISEGS did not receive any official warnings, complaints or pilot reports of glare from the facility, notices of violation, or citations during the reporting period.

Please feel free to contact me with any questions.

Thank you.

William Dusenbury

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Document Control Specialist – NRG.

Section 9

Table 1 – List of Conditions of Certifications That Were Satisfied During the Reporting Period

(COMP-7)

The following **TABLE 1** includes Actions including plan or report submittals that were made up to the end of this reporting period in compliance with the project's **Conditions of Certification**.

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Auxilliary Boilers	**AQ-01**	Equipment operation to be conducted in compliance with all data and specifications submitted with the application. Any non-compliant operations shall be listed in the Annual Compliance Report (COMPLIANCE-7).	Submitted with the annual compliance report - 1/25/2018
Air Quality Auxilliary Boilers	**AQ-02**	To operate equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application. As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include information on the date, time, and duration of any violation of this permit condition.	Submitted with the annual compliance report - 1/25/2018
Air Quality Auxilliary Boilers	**AQ-03**	Only natural gas shall be used for the boilers and equipped with a meter measuring fuel consumption. To include proofs that only pipeline quality, or Public Utility Commission regulated gas are used for the boilers. As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include proofs that only pipeline quality, or Public Utility Commission regulated natural gas are used for the boilers.	Submitted with the annual compliance report - 1/25/2018
Air Quality Auxilliary Boilers	**AQ-04**	To maintain log for boilers for 5 years which shall be provided to the District, state or federal personnel upon request.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Auxilliary Boilers	**AQ-06**	Submitted 30 days notification prior the annual compliance test for Unit 1, Unit 2 and Unit 3 Auxiliary Boilers.	7/11/2014; 3/13/2015; 2/24/2016; 1/5/2017; 12/13/2017
Air Quality Auxilliary Boilers	**AQ-06**	Performed annual tune-up for Unit 1, Unit 2 and Unit 3 Auxiliary Boilers	4/15/2015; 3/23/2016; 2/13/2017; 1/10/2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Auxilliary Boilers	**AQ-06**	Unit 1 Auxiliary Boiler annual compliance test.	9/18/2014; 4/13/2015; 3/30/2016; 2/16/2017; 1/16/2018
Air Quality Auxilliary Boilers	**AQ-06**	Unit 2 Auxiliary Boiler annual compliance test.	9/18/2014; 4/17/2015; 3/31/2016; 2/15/2017; 1/17/2018
Air Quality Auxilliary Boilers	**AQ-06**	Unit 3 Auxiliary Boiler annual compliance test.	9/18/2014; 4/18/2015; 4/1/2016; 2/14/2017; 1/18/2018
Air Quality Auxilliary Boilers	**AQ-06**	Unit 1, Unit 2, and Unt 3 Auxiliary Boilers annual compliance test report submittal.	10/3/2014; 6/15/2015; 5/16/2016; 3/28/2017; 2/20/2018
Air Quality Auxilliary Boilers	**AQ-07**	This boiler (Boilers 1, 2, and 3) shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Db).	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Auxilliary Boilers	**AQ-08**	Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Auxilliary Boilers	**AQ-09**	The owner/operator shall continuously monitor and record fuel flow rate and flue gas oxygen level.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Auxilliary Boilers	**AQ-10**	Submitted Petition for Low Mass Emissions Certification to predict NOx emissions. Conducted Low Mass Emissions Testing on 4/4-6/2016 and 5/11-13/2016. The LME report was submitted on 6/16/2016.	11/12/2015; 6/16/2016
Air Quality Auxilliary Boilers	**AQ-10**	An updated Emissions Estimation Plan was submitted on 6/21/2016. Approval from MDAQMD was received on 6/21/2016	6/21/2016

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Auxilliary Boilers	**AQ-12**	Annual fuel use for the Auxiliary Boilers and Nighttime Preservation Boilers was amended from 328 mmscf to 525 mmscf on 9/15/2014. Annual fuel use for each Aux. Boiler and Nighttime Preservation Boiler did not exceed 525 mmscf of natural gas in 2015. Record logs are being kept and monitored. Records are submitted in the annual compliance report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Air Quality Fire Pumps	**AQ-13**	This engine, certified in accordance with 40 Code of Federal Regulations (CFR) part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufaturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by 40 CFR 60 Subparts 60.4205 and 60.4211. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Fire Pumps	**AQ-14**	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per ARB Diesel or equivalent requirements. [17 California Code of Regulations (CCR) 93115; 60.4207(b)]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Fire Pumps	**AQ-15**	This unit shall be limited to use for emergency purposes. In addition, this unit shall be operated no more than 1.0 hours per day for a total of 50 hours per year for testing and maintenance.	MDAQMD verified and certified in compliance during the site audit on: 7/13/2017; 4/24/2018
Air Quality Fire Pumps	**AQ-16**	This unit shall be limited to use for emergency purposes. In addition, this unit shall be operated no more than 1.0 hours per day for a total of 50 hours per year for testing and maintenance. The 50 hour can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel dueled CI engine when operated per and in accord with the National Fire protection Association (NFPA) 25 - "Standard for the Insopection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies.[[District Rule 1302(C)(2)(a) and Rule 1304(D)(1)(a)] and 17CCR93115.3(n)] [Hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Fire Pumps	**AQ-17**	The owner/operator shall maintain an operations log for this units current and on-site, (either at the engine location or at a on-site location), for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing, etc.); c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and, d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log. [17 CCR 93115]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Fire Pumps	**AQ-18**	These engines may operate in response to fire suppression requirements and needs. [Rule 204].	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Fire Pumps	**AQ-19**	This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR § 93115) and 40 Code of Federal Regulations (CFR) Part 60, Subpart III (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Emergency Generators	**AQ-20**	This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205, and 60.4211]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Emergency Generators	**AQ-21**	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Emergency Generators	**AQ-23**	This unit shall not be used to provide power during a voluntary power outage and/or power reduction initiated under an Interruptible Service Contract (ISC), Demand Response Program (DRP), Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier. [17 CCR 93115] [40 CFR 60 Subpart IIII allowance for DRP streamlined out.]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Emergency Generators	**AQ-24**	This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 1.0 hours per day of 50 hours per year for testing and maintenance [NSR and 17 CCR 93115] [Hours allowed by 60.42 (f) stremlined out.]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Emergency Generators	**AQ-25**	The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing, etc.); c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and, ~~d.~~ Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log) [17 CCR 93115]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Emergency Generators	**AQ-26**	This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR §93115) and 40 CFR 60 Part 60, Subpart III (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Nighttime Preservation Boilers	**AQ-27**	Any non-compliant operations shall be listed in the Annual Compliance report (COMPLIANCE-7).	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Air Quality Nighttime Preservation Boilers	**AQ-28**	As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include information on the date, time, and duration of any violation of this permit condition.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Air Quality Nighttime Preservation Boilers	**AQ-29**	As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include proof that only pipeline quality, or Public Utility Commission requlated natural gas is used in these boilers.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Air Quality Nighttime Preservation Boilers	**AQ-30**	The owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state, or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Nighttime Preservation Boilers	**AQ-31**	The owner/operator shall perform annual tune-ups in accordance with the unit manufacturer's specified tune-up procedure, by a qualified technician.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Nighttime Preservation Boilers	**AQ-32**	Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Nighttime Preservation Boilers	**AQ-33**	The owner/operator shall continuously monitor and record fuel 'flow rate.	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Nighttime Preservation Boilers	**AQ-34**	The combined fuel use from the auxiliary boiler and the nighttime preservation boiler shall not exceed 525 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers; B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair; B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair; B01 0377, and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Air Quality Common Area Emergency Generators	**AQ-35**	This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205, and 60.42111	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Common Area Emergency Generators	**AQ-36**	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115;.60.4207(b)]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Common Area Emergency Generators	**AQ-38**	This unit shall not be used to provide power during a voluntary power outage and/or power reduction initiated under an Interruptible Service Contract (ISC), Demand Response Program (ORP), Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier. [17 CCR 93115] [40 CFR 60 Subpart IIII allowance for DRP streamlined out.]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Common Area Emergency Generators	**AQ-39**	This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. [NSR and 17 CCR 93115] [Hours allowed by 60.42(f) streamlined out.]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Common Area Emergency Generators	**AQ-40**	The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing, etc.); c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and, d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.) [17 CCR 93115}	Completed for 2014; Completed for 2015; Completed for 2016; Completed for 2017; Completed for 2018
Air Quality Common Area Fire Pumps	**AQ-45**	This unit shall be limited to use for emergency purposes. In addition, this unit shall be operated no more than 1.0 hours per day for a total of 50 hours per year for testing and maintenance.	MDAQMD verified and certified in compliance during the site audit on 4/24/2018.
Air Quality Common Area Fire Pumps	**AQ-42**	This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205 and 60.4211]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Common Area Fire Pumps	**AQ-43**	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Air Quality Common Area Fire Pumps	**AQ-45**	This unit shall be limited to use for emergency purposes. In addition, this unit shall be operated no more than 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. [[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n)] [Hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Common Area Fire Pumps	**AQ-46**	The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. . The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testinq, etc.); c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR93115]; and, d. Fuel sulfur concentration (the % may use the supplier's certification of sulfur content if it is maintained as part of this log.) [17 CCR 93115].	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality Common Area Fire Pumps	**AQ-47**	These engines may operate in response to fire suppression requirements and needs. [Rule 204].	In Compliance for 2014; In Compliance for 2015; In Compliance for 2016; In Compliance for 2017; In Compliance for 2018
Air Quality General	**AQSC-06**	Dedicated Off-road Vehicles for Mirror Washing Activities Plan - The Plan shall be updated every other year and submitted in the Annual Compliance Report. The updated Plan was submitted withn the Annual Compliance Report.	1/29/2016; 1/25/2018
Air Quality General	**AQSC-07**	Revised Operations Dust Control Plan was submitted to CEC and BLM.	7/30/2014
Air Quality General	**AQSC-07**	Submit dust control annual report with the annual compliance report	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Air Quality General	**AQSC-08**	Submitted copy of all modified MDAQMD Permits To Operate to CEC and BLM.	12/10/2015; 10/24/2017; 4/23/2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Biological Resources	**BIO-02**	During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-04**	During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-07**	Submitted Construction Termination Report (within 30 days after completion of project construction. Project construction officially completed on 5/31/2014.	6/30/2014
Biological Resources	**BIO-10**	Submitted Annual Listed Species Status Report with the Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-11**	The Designated Biologist shall report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year. This report was submitted in the Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-12**	Annual Monitoring Report per the Raven Mangement Plan was submitted on 12/31/2014. Resubmitted on 1/5/2015 with maps. The Raven Management Plan (Rev. 2) Semi-annual Report was submitted on 6/27/2016. The Raven Management Plan has been completed and was closed in October 2016.	12/31/2014; 12/30/2015; 6/27/2016
Biological Resources	**BIO-12**	Report identifying which items of the Raven Management Plan (Post Construction Raven Management Report) have been completed was submitted to CEC and BLM on 7/31/2014.	7/31/2014
Biological Resources	**BIO-13**	Submitted Weed Management Plan Annual Report in the Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-14**	Submitted post-construction Closure, Revegetation and Rehabilitation Plan Report	7/1/2014
Biological Resources	**BIO-14**	Submitted Revegetation Annual Monitoring Report in the Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-14**	Report identifying which items of the Post-construction Closure, Revegetation and Rehabilitation Plan have been completed was submitted to CEC and BLM on 6/30/2014	6/30/2014
Biological Resources	**BIO-16**	Submitted Construction Termination Report (within 30 days after completion of project construction. Project construction officially completed on 5/31/2014.	6/30/2014
Biological Resources	**BIO-17**	Submitted post-construction analysis with the final accounting of the amount of habitat disturbed during project construction.	8/29/2014

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Biological Resources	**BIO-17**	Submitted the results of the annual inspection of fencing and rehabilitated routes; a summary of fence repairs and maintenance of reclaimed routes completed during the year; and recommendations and a cost estimate for repairs and maintenance activities needed for the upcoming year. The reports were submitted in the 2015 Annual Compliance Report.	1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-17**	The construction of 50 Miles of Tortoise Fencing along Interstates 15 and 40 were completed on 3/18/2016. The post construction report was submitted to BLM and CalTrans on 4/18/2016	4/18/2016
Biological Resources	**BIO-18**	Submitted Special Status Plants Annual Report in the Annual Compliance Report	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-18**	Mojave Milkweed Land Acquisition Annual Report	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-18**	Submitted Special Status Plants Natural Gas Line Monitoring Report in the Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-19**	SCBS Nelson's Bighorn Sheep Annual Report	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-20**	Streambed Impact Minimization and Compensation Measure change of condition report was submitted in the 2015 Annual Compliance Report	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biological Resources	**BIO-21**	Revised Spring Avian and Bat Monitoring and Management Plan quarterly reports were submitted on 12/16/2014.	12/16/2014;
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan - 2015 Summer Report; 2016 Summer Report	3/16/2016; 6/16/2017
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan - 2014-2015 Annual Report; 2015-2016 Annual Report	6/30/2016; 8/15/2017
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan - 2015 Winter Report	10/4/2016
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan - 2016 Spring Report	9/30/2016
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan - 2016 Fall Report	6/16/2017

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan Revision 13 dated November 2015	12/23/2015
Biological Resources	**BIO-21**	Submitted Avian & Bat Monitoring Plan Revision 14	10/3/2017
Biological Resources	**BIO-22**	Submitted post-construction analysis of the amount of habitat disturbed during project construction.	8/29/2014
Biological Resources	**BIO-23 (BLM)**	Revised Spring and Summer Avian and Bat Monitoring and Management Plan quarterly reports were submitted on 12/16/2014	12/16/2014
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2015 Summer Report; 2016 Summer Report	3/16/2016; 6/16/2017
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2014-2015 Annual Report; 2015-2016 Annual Report	6/30/2016; 8/15/2017
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2015 Winter Report	10/4/2016
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2016 Spring Report	9/30/2016
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2016 Fall Report	6/16/2017
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2017 Spring Report	1/25/2018
Biological Resources	**BIO-23 (BLM)**	Submitted Avian & Bat Monitoring Plan - 2017 Summer Report	1/25/2018
Biological Resources	**BIO-23 (BLM)**	Avian and Bat Monitoring Plan - 2016-2017 Annual Report	9/5/2018
Compliance Conditions	**COMP-2**	Compliance Record: As-built drawings are maintained at the ISEGS facility. These files were hand-delivered to CEC on 12/8/2014 by Doug Davis.	12/8/2014
Compliance Conditions	**COMP-4/ COMP-7**	Submit annual compliance report during project operations.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Compliance Conditions	**COMP-05**	***Compliance Matrix:*** A compliance matrix shall be submitted by the project owner to BLM's Authorized Officer and the CPM along with each annual compliance report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Compliance Conditions	**COMP-08**	***Confidential Information:*** Any information that the project owner deems confidential shall be submitted to the Energy Commission's Dockets Unit with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq. Any information the ROW holder deems confidential shall be submitted to the BLM Authorized Officer with a written request for said confidentiality along with a justification for the request. All confidential submissions to BLM should be clearly stamped "proprietary information" by the holder when submitted.	6/16/2016
Compliance Conditions	**COMP-9**	Paid annual facility compliance fee to CEC pursuant to the provisions of the Public Resources Code.	7/1/2014; 7/1/2015; 7/1/2016; 7/1/2017; 7/1/2018
Compliance Conditions	**COMP-10**	***Reports of Complaints, Notices, and Citations:*** In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to BLM's Authorized Officer and the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the NOISE conditions of certification. All other complaints shall berecorded on the complaint form (Attachment A).	Notice of Violation (NOV) from SBC CUPA was submitted to CEC/BLM on 8/4/2016; Response to Glare complaint Pilot Report ACN 1390751 was submitted to CEC/BLM/FAA on 11/10/2016.
Facility Design	**GEN-1**	The project owner shall provide BLM's Authorized Officer and the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO (2007 CBC, Appendix Chapter 1, section 110, Certificate of Occupancy).	1/22/2015
Facility Design	**GEN-1**	Notified CEC/BLM on 4/27/2016 for repair/replacement of Unit 2 STG Stator Active Parts.	4/27/2016
Facility Design	**GEN-8**	Electronic copies of the final approved engineering plans were hand-delivered by Doug Davis to CEC on 12/8/2014.	12/8/2014
Hazardous Materials	**HAZ-1**	A list of hazardous materials contained in the facility was submitted with the annual compliance report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Hazardous Materials	**HAZ-5**	Provided statement with the annual compliance report that all employees and contractors have been performed and vendor certifications and employee background investigations were appended in the Operations Security Plan.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Hazardous Materials	**HAZ-6**	Notified CEC/BLM on 7/29/2016 on the lube oil release on 7/29/2016 at Unit 1. The Spill Report was submitted on 8/15/2016.	7/29/2016; 8/15/2016
Hazardous Materials	**HAZ-6**	Notified CEC/BLM on 10/2/2016 on the lube oil release at Unit 3. The Spill Report was submitted on 10/13/2016.	10/2/2016; 10/13/2016
Hazardous Materials	**HAZ-6**	Submitted Spill Report on 8/21/2017 for lube oil release at Unit 3 Main Boiler Feed Pump Turbine on 8/2/2017	8/21/2017
Hazardous Materials	**HAZ-6**	Submitted Spill Report on 9/11/2017 for lube oil release at Unit 3 Main Boiler Feed Pump Turbine on 8/14/2017	9/11/2017
Hazardous Materials	**HAZ-6**	Submitted Spill Report on 11/3/2017 for lube oil release at Unit 3 access road due to mobile crane roll over on 10/18/2017	11/3/2017
Land Use	**LAND-3**	Upon completion the project owner shall submit notice to BLM and the Energy Commission that it has completed construction of the Solar / Ecological Interpretive Center. The notification was submitted to BLM and CEC and accepted on 5/13/2015 and 5/19/2015 respectively.	5/13/2015; 5/19/2015
Land Use	**LAND-3**	Submitted Solar Ecological Interpretive Center Post Construction Report on 6/22/2015.	7/16/2015
Land Use	**LAND-3**	In each Annual Compliance Report, the project owner shall provide a summary of estimated public use of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Land Use	**LAND-3**	Submitted information kiosk panel design to BLM for review and approval.	12/19/2016
Land Use	**LAND-3**	BLM approved kiosk panel design on 2/22/2018	2/22/2018
Land Use	**LAND-3**	ISEGS submitted pre-payment for kiosk panel fabrication/production to BLM on 4/2/2018	4/2/2018
Land Use	**LAND-3**	BLM accepted that the mitigation requirement for LAND-3 and RECREATION-1 as complete.	11/14/2018
Noise & Vibration	**NOISE-5**	Submitted noise survey report that was conducted on 10/3/2014	10/23/2014
Geology & Paleontology	**PAL-7**	CH2M Hill submitted Paleontological Resources Report.	1/9/2014
Recreation	**REC-1**	Prior to commercial operation, the project owner shall submit notice to BLM and the Energy Commission that it has completed construction of the Solar / Ecological Interpretive Center and shall request final approval by both BLM's Authorized Officer and the CPM.	5/13/2015; 5/19/2015
Recreation	**REC-1**	After commercial operation and in each Annual Compliance Report for the life of the ISEGS project, the project owner shall provide a summary of estimated public utilization of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Recreation	**REC-1**	Submitted information kiosk panel design to BLM for review and approval.	12/19/2016

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Soil & Water	**S&W-01**	Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Soil & Water	**S&W-02**	Submitted SWPPP Annual Report electronically to State Water Resources Control Board.	6/30/2014; 6/30/2015; 7/15/2016; 7/5/2017; 7/12/2018
Soil & Water	**S&W-03**	Annual Montioring Reports will be submitted which include Quarterly monitoring data as described in the Approved Groundwater Monitoring and Management Plan. The First Annual Report will be a Baseline Report which includes the Well Network and level monitoring report and plan	11/17/2014; 8/13/2015; 12/19/2016; 7/6/2017; 10/24/2017; 9/26/2018
Soil & Water	**S&W-04**	For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term “year” will correspond to the date established for the annual compliance report submittal.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Soil & Water	**S&W-05**	The project owner shall prepare an annual summary of the number of heliostats failed, cause of the failure,and cleanup and mitigation performed for each failed heliostat.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Soil & Water	**S&W-06**	Submitted annual groundwater monitoring report to CEC, BLM and San Bernardino County.	11/17/2014; 8/13/2015; 12/19/2016; 7/6/2017; 10/24/2017; 9/26/2018
Traffic & Transportion	**TRANS-2**	Solar Partners/NRG coordinated with appropriate agencies to complete the inspections along the ROW to identify sections to be repaired.	7/31/2014
Traffic & Transportion	**TRANS-3**	Submitted Heliostat Positioning Plan addendum/update to CEC and BLM.	12/10/2014; 12/10/2015; 12/7/2016; 12/11/2017; 12/10/2018
Transmission Lines	**TLSN-2**	Pre and post energization measurement report was submitted to CEC and BLM.	7/31/2014

TECHNICAL AREA	COC No.	TABLE 1 2018 ACTIONS THAT SATISFIED THE CONDITIONS OF CERTIFICATION	SUBMITTAL DATE
Transmission Lines	**TLSN-3**	During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report to be provided to BLM's Authorized Officer and the CPM.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Visual Resources	**VIS-1**	The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Visual Resources	**VIS-2**	The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Waste Management	**WASTE-6**	Documentation of actual volume of wastes generated and the waste management methods used during the year. This report is submitted with the annual compliance report.	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018
Biolgical Opinion		Submitted Ivanpah 5-year Final EMP Report to USFWS, BLM and CEC: Process- and Scale-based Determinants of Survival for Translocated Mojave Desert Tortoises in the Ivanpah Valley, California; April 2011 through May 2017	11/29/2017

Exhibit 2

ISEGS Compliance Matrix

(COMP-7 Item 1)

Ivanpah SEGS Operations Compliance Matrix rev 01/9/2019

In accordance with CEC Condition of Certification COMP-05 and COMP-07 Item 7, the following is the updated Compliance Matrix showing the status of all conditions of certification during the reporting period.

Amendment approved by CEC on 2/13/2013
Amendment approved by CEC on 9/15/2014
Amendment approved by CEC on 11/19/2015

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality Auxiliary Boilers	AQ-01	Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below	Any non-compliant operations shall be listed in the Annual Compliance Report (COMPLIANCE-7).	In Progress	Annually	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted in the Annual Compliance Report
Air Quality Auxiliary Boilers	AQ-02	The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.	As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include information on the date, time, and duration of any violation of this permit condition.	On-going	Annually	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted in the Annual Compliance Report
Air Quality Auxiliary Boilers	AQ-03	This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption. ~~in standard cubic feet.~~	As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include proofs that only pipeline quality, or Public Utility Commission regulated natural gas are used for the boilers.	On-going	Annually	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018		11/19/2015	Gas consumption monitoring in progress. NG supply comes from KRGT pipeline that meets this requirement. Submitted in the Annual Compliance Report
Air Quality Auxiliary Boilers	AQ-04	The owner owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTU's, and daily hours of operation.	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or Energy Commission staff.	On-going	N/A				Operations logs for each Boiler is maintained and up to date.

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality Boilers	AQ-06	The owner/operator shall perform **Annual Compliance Tests** in accordance with the District Compliance Test Procedural Manual. Prior to performing these annual tests, the boiler shall be tuned in accord with the manufacturer's specified tune-up procedure, by a qualified technician. Subsequent tests shall demonstrate that this equipment does not exceed the following emission maximums: Pollutant / ppmvd / Lb/MMBtu / Lb/hr *NOx 9.0 0.011 ~~2.5~~ 2.7 (per USEPA Methods 7E and 19 ~~and 20~~) SOx~~2~~ 1.7 0.003 ~~0.6~~ 0.7 *CO 25.0 0.018 ~~4.2~~ 4.6 4.5 (per USEPA Method 10) VOC 12.6 0.0054 ~~1.2~~ 1.3 (per USEPA Methods 25A and 18) PM10 n/a 0.007 1.7 (per USEPA Methods 5 or 201A, and 202 ~~5 & 202 or CARB Method 5~~) *corrected to 3% oxygen, on a dry basis, averaged over one hour Opacity shall be conducted per Method 9; Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5.	The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the performance compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests. The owner or operator of an affected facility shall provide the Administrator at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the Administrator the opportunity to have an observer present [40 CFR 60.8 (d)].	2015 Completed; 2016 Completed; 2017 Completed; 2018 Completed; Upcoming for 2019	**ANNUALLY** Notification Required 15 working days (30 days) prior compliance tests. Report Submittal within 60 days from the date of tests	• Notification prior Annual Compliance Test was submitted on 2/24/2016. • Annual Compliance Tests was completed on 3/30/2016 - Unit 1; 3/31/2016 - Unit 2; 4/01/2016 - Unit 2; Test Results submitted on 5/16/2016. • Notification prior Annual Compliance Test was submitted on 1/5/2017. • Unit 1 Annual Compliance Test was completed on 2/16/2017; Test Result submitted on 3/28/2017. • Unit 2 Annual Compliance Test was completed on 2/15/2017; Test Result submitted on 3/28/2017. • Unit 3 Annual Compliance Test was completed on 2/14/2017; Test Result submitted on 3/28/2017. • Notification prior Annual Compliance Test was submitted on 12/3/2017. • Unit 1 Annual Compliance Test was completed on 1/16/2018; • Unit 2 Annual Compliance Test was completed on 1/17/2018; • Unit 3 Annual Compliance Test was completed on 1/18/2018; Test Results submitted on 2/20/2018.		2/13/2013; **11/19/2015**	Auxiliary Boilers Annual Tune-up was completed on 3/23/2016. Auxiliary Boilers Annual Tune-up was completed on 2/13/2017. Auxiliary Boilers Annual Tune-up was completed on 1/10/2018.
Air Quality Auxiliary Boilers	AQ-07	This boiler *(Boilers 1, 2, and 3)* shall be operated in compliance with all applicable requirements of 40 CFR 60 Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (NSPS Db).	The project owner shall complete and submit to the CPM a **COMPLIANCE PLAN** that provides a list of the 40 CFR 60 Subpart Db plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the ISEGS Boilers 1, 2 and 3 at least 30 days prior to first fire of the boilers or earlier as necessary for compliance with Subpart Db.	COMPLETED (CONSTRUCTION)	30 days prior to First Fire	22-Aug-2012			Plan submitted for Unit 1 8-22-12, First Fire Unit 1 took place 11/18/12; Actual First Fire Notification Dates: 11/28/12 (Unit 1); 1/30/13 (Unit 2) & 4/9/13 (Unit 3)
Air Quality Auxiliary Boilers	AQ-08	Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.	Complying with Condition of Certification AQ-3 shall be used to demonstrate compliance with this condition.	On-going	N/A	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Natural Gas Sulfur contents are maintained and up to date.
Air Quality Boilers	AQ-09	The owner/operator shall continuously monitor and record fuel flow rate and flue gas oxygen level.	At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval, and the CPM for review, a detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system	Submitted	120 days prior construction of boiler stacks	28-Aug-2011			Fuel Flow rates and flue gas oxygen level are recorded and monitored. Download from the system occurs every quarter.

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality Auxiliary Boilers	AQ-10	In lieu of installing CEMs to monitor NOx emissions, and pursuant to 40 CFR 60 Subpart Db, Section 60.49b(c), the owner/operator shall monitor boiler operating conditions and estimate NOx emission rates per a District approved emissions estimation plan. The plan shall be based on the initial source tests as required by condition AQ-5, and annually pursuant to condition AQ-6. The plan shall include test results, operating parameters, analysis, conclusions and proposed NOx estimating relationship consistent with established emission chemistry and operational effects.	This initial plan shall be submitted to the District for approval, and the CPM for review, within 360 days of the initial startup. Any proposed changes to a District-approved plan shall include subsequent test results, operating parameters, analysis, and any other pertinent information to support the proposed changes. The District must approve any emissions estimation plan or revision for estimated NOx emissions to be considered valid.	Submitted	360 days from Initial Start-up	11/18/2013; 11/12/2015; 6/21/2016	21-Jun-2016		Submitted Petition for Low Mass Emissions Certification to predict Nox emissions on 11/12/2015. An updated Emissions Estimation Plan was submitted on 6/21/2016. Approval from MDAQMD was received on 6/21/2016
Air Quality Auxiliary Boilers	~~AQ-11~~	~~The owner/operator shall comply with all applicable recordkeeping and reporting requirements of NSPS Db.~~	~~During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.~~	~~On-going~~	N/A			**11/19/2015**	
Air Quality Auxiliary Boilers	AQ-12	~~This boiler shall not burn more than 0.9 MMSCF of natural gas in any single day, and no more than~~ *The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed* ~~328~~ 525 MMSCF *of natural gas* in any calendar year*; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers; B010375, and B011544 (Ivanpah 1)* ***and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair*** *; B010376 and B011572 (Ivanpah 2)* ***, and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair*** *; B010377 and B011573 (Ivanpah 3)* ***and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair*** *.* ~~a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.~~	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	Completed for 2015. On-going for 2016	NA	1/31/2014; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	2/13/2013; **9/15/2014**		AQ amendments approved by CEC on 3/13/2013. Subsequent amendment was approved by CEC on 9/15/2014. Submitted with the Annual Compliance Report
CONDITIONS APPLICABLE TO IVANPAH 1,2, & 3 EMERGENCY FIRE PUMPS. MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; 0009312 (E010380), 00009315 (E010378) AND 00009319 (E010384)									
Air Quality Fire Pumps	AQ-13	This ~~system~~ *engine, certified in accordance with 40 Code of Federal Regulations (CFR) part 89, and after treatment control device (if any)* shall be installed, operated and maintained ~~in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants~~ *according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by 40 CFR 60 Subparts 60.4205 and 60.4211.* Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. ~~*(Note reference to Model 2010 Tier III engine)*~~	During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Fire Pumps	~~AQ-16~~ *AQ-14*	~~These~~ *This* ~~units~~ shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per ~~CARB~~ Diesel or equivalent requirements. *[17 California Code of Regulations (CCR) 93115; 60.4207(b)]*	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Sulfur certifications from diesel supplier are being maintained on site.
Air Quality Fire Pumps	~~AQ-18~~ *AQ-16*	~~These~~ *This* ~~units~~ shall be limited to use for emergency *purposes.* ~~power, defined as in response to a fire or when commercially available power has been interrupted.~~ In addition, this unit shall be operated no more than ~~0.5~~ *1.0 hours per day for a total of* 50 hours per year for testing and maintenance, ~~excluding compliance source testing. Time required for source testing will not be counted toward the~~ *The* 50 hour ~~per year~~ limit. *can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel dueled CI engine when operated per and in accord with the National Fire protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies.[District Rule 1302(C)(2)(a) and Rule 1304(D)(1)(a)] and 17CCR93115.3(n)] [Hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]*	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			2/13/2013; **11/19/2015**	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Fire Pumps	~~AQ-20~~ *AQ-17*	The owner/operator shall maintain a*n* operations log for ~~these~~ *this* units current and on-site~~,~~ *(* either at the engine location or at a on-site location*)*~~,~~ for a minimum of ~~two (2)~~ *five (5)* years, ~~and for another year where it can be made available to the District staff within 5 working days from the District's request,~~ and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing*, etc.*); c. *Monthly and* C*a*lendar year operation in terms of fuel consumption (in gallons) and total hours *[17 CCR 93115]* ; and, d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log)~~.~~ *[17 CCR 93115]* ~~e. Documentation of maintenance as per manufacturer's recommendations and good maintenance practices.~~	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality Fire Pumps	AQ-18	These engines may operate in response to fire suppression requirements and needs. [Rule 204].	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Fire Pumps	~~AQ-21~~ AQ-19	~~These fire protection~~ This ~~units are~~ is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (~~Title~~ 17 CCR § 93115) and 40 Code of Federal Regulations (CFR) Part 60, Subpart III (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.	~~Not necessary.~~ The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet the ATCM and NSPS emission limit requirements at the time of engine purchase.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
CONDITIONS APPLICABLE TO IVANPAH 1,2, & 3 EMERGENCY GENERATORS. MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; 0009313 (E010381), 00009316 (E010379) AND 00009317 (E010382)									
Air Quality Emergency Generators	~~AQ-23~~ AQ-20	~~Engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect. (Refers to three (3) Model Year 2010, Tier II engines)~~ This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205, and 60.4211]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	AQ amendments approved by CEC on 3/13/13. Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Emergency Generators	~~AQ-24~~ AQ-21	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Emergency Generators	AQ-23	This unit shall not be used to provide power during a voluntary power outage and/or power reduction initiated under an Interruptible Service Contract IISC), Demand Response Program (DRP), Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier. [17 CCR 93115] [40 CFR 60 Subpart IIII allowance for DRP streamlined out.]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality Emergency Generators	~~AQ-27~~ AQ-24	This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than ~~0.5~~ 1.0 hours per day of 50 hours per year~~, and no more than 0.5 hours per day~~ for testing and maintenance~~, excluding compliance source testing. Time required for source testing will not be counted toward the 50 hour per year limit.~~ [NSR and 17 CCR 93115] [Hours allowed by 60.42 (f) streamlined out.]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			2/13/2013; **11/19/2015**	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Emergency Generators	~~AQ-28~~ AQ-25	The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing, etc.); c. Monthly and ~~C~~calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115] ; and, ~~d.~~ Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log) [17 CCR 93115] ~~and,~~ ~~e. Documentation of maintenance as per manufacturer's recommendations and good maintenance practices.~~	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality Emergency Generators	~~AQ-29~~ AQ-26	This ~~genset~~ unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR §93115) and 40 CFR 60 Part 60, Subpart III (NSPS) . In the event of conflict between these conditions and the ATCM or NSPS , the more stringent requirements shall govern.	~~Not necessary.~~ The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet the ATCM and NSPS emission limit requirements at the time of engine purchase.	On-going	N/A			13-Feb-2013	
CONDITIONS APPLICABLE TO IVANPAH 1,2, & 3 (Three -3) NIGHTTIME PRESERVATION BOILERS. MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; MD100000063 (B011544). MD100000064 (B011572) & MD100000065 (B011573)									
Air Quality - Nighttime Preservation Boilers	AQ-27	Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.	Any non-compliant operations shall be listed in the Annual Compliance report (COMPLIANCE-7).	On-going	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018		13-Feb-2013	Submitted with the Annual Compliance Report
Air Quality - Nighttime Preservation Boilers	AQ-28	The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.	As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include information on the date, time, and duration of any violation of this permit condition.	On-going	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018		13-Feb-2013	Submitted with the Annual Compliance Report
Air Quality - Nighttime Preservation Boilers	AQ-29	This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption in standard cubic feet.	As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include proof that only pipeline quality, or Public Utility Commission regulated natural gas is used in these boilers.	On-going	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018		13-Feb-2013	Submitted with the Annual Compliance Report NG supply comes from KRGT pipeline that meets this requirement.
Air Quality - Nighttime Preservation Boilers	AQ-30	The owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state, or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or Energy Commission staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality - Nighttime Preservation Boilers	AQ-31	The owner/operator shall perform annual tune-ups in accordance with the unit manufacturer's specified tune-up procedure, by a qualified technician.	During site inspection, the project owner shall make all records arid reports available to the District, ARB, U.S. EPA or Energy Commission staff.	Completed in 2015, 2016, 2017, 2018. Upcoming in 2019	N/A			13-Feb-2013	Completed in 2015. Completed in 2016; Completed in 2017; Completed in 2018 Upcoming in 2019
Air Quality - Nighttime Preservation Boilers	AQ-32	Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.	Condition of Certification AQ-29 shall be used to demonstrate compliance with this condition.	On-going	N/A			13-Feb-2013	Natural Gas Sulfur contents are maintained and up to date. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017.

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality - Nighttime Preservation Boilers	AQ-33	The owner/operator shall continuously monitor and record fuel 'flow rate.	At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval, and the CPM for review, a , detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.	On-going	120 day prior construction of the Boiler Stacks	21-Aug-2011		13-Feb-2013	Fuel Flow rates are recorded and monitored. Download from the system occurs every quarter. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on4/24/2018.
Air Quality - Nighttime Preservation Boilers	AQ-34	The combined fuel use from the auxiliary boiler and the nighttime preservation boiler shall not exceed ~~328~~ , 525 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers: B010375 and B011544 (Ivanpah 1) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair ; B010376 and B011572 (Ivanpah 2) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair ; B01 0377, and B011573 (Ivanpah 3) and shall not exceed a total of 525 mmscf in any calendar year in that boiler pair .	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	Completed in 2013. On-going for 2014	N/A	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018		2/13/2013; **9/15/2014**	Submitted with the Annual Compliance Report in 2016 & 2017. Gas consumption log for each equipment pair is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018.
CONDITIONS APPLICABLE TO COMMON AREA EMERGENCY GENERATOR, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS MD100000061 (E011546)									
Air Quality - Common Area Emergency Generator	AQ-35	This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205, and 60.42111	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality - Common Area Emergency Generator	AQ-36	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Sulfur certification from the diesel supplier is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality - Common Area Emergency Generator	AQ-38	This unit shall not be used to provide power during a voluntary power outage and/or power reduction initiated under an Interruptible Service Contract (ISC), Demand Response Program (DRP), Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier. [17 CCR 93115] [40 CFR 60 Subpart IIII allowance for DRP streamlined out.]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Air Quality - Common Area Emergency Generator	AQ-39	This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than ~~0.5~~ 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. [NSR and 17 CCR 93115] [Hours allowed by 60.42(f) streamlined out.]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			2/13/2013; **11/19/2015**	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality - Common Area Emergency Generator	AQ-40	The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing, etc.); c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and, d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.) [17 CCR 93115]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
CONDITIONS APPLICABLE TO THE COMMON AREA EMERGENCY FIRE PUMP, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; MD100000062 (E011547)									
Air Quality - Common Area Emergency Fire Pump	AQ-42	This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205 and 60.4211]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	
Air Quality - Common Area Emergency Fire Pump	AQ-43	This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Sulfur certification from the diesel supplier is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality - Common Area Emergency Fire Pump	AQ-45	This unit shall be limited to use for emergency **purposes.** ~~power, defined as in response to a fire or when commercially available power has been interrupted.~~ In addition, this unit shall be operated no more than ~~0.5~~ 1.0 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. [[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n)] [Hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			2/13/2013; **11/19/2015**	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018

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Air Quality - Common Area Emergency Fire Pump	AQ-46	The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. . The log shall include, at a minimum, the information specified below: a. Date of each use and duration of each use (in hours); b. Reason for use (testing & maintenance, emergency, required emission testing, etc.); c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR93115]; and, d. Fuel sulfur concentration (the % may use the supplier's certification of sulfur content if it is maintained as part of this log.) [17 CCR 93115].	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality - Common Area Emergency Fire Pump	AQ-47	These engines may operate in response to fire suppression requirements and needs. [Rule 204].	During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.	On-going	N/A			13-Feb-2013	Operations log for each equipment is maintained on site and up to date. MDAQMD verified and certified in compliance during the site audit on 8/2/2016. Verified and certified in compliance during MDAQMD site inspection on 7/13/2017. Verified and certified in compliance during MDAQMD site inspection on 4/24/2018
Air Quality General	AQSC-06	**The project owner, when obtaining dedicated on or off-road vehicles for mirror washing activities and other facility maintenance activities, shall only obtain new model year vehicles that meet California on-road vehicle emission standards or appropriate U.S.EPA/California off-road engine emission standards for the model year when obtained.**	**At least 60 days prior to the start of commercial operation, the project owner shall submit to the CPM a copy of the plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report (COMPLIANCE-7).**	**Submitted**	60 days prior start of commercial operations	8/22/2013; 1/29/2016; 1/25/2018			Off-road vehicles for mirror washing activities plan submitted to CEC/BLM on 8/22/13; Updated in 2015 and submitted with the ACR on 1/29/2016. Updated in 2017 and submitted with the ACR in January 2018.
Air Quality General	AQSC-07	**The project owner shall provide a site operations dust control plan, including all applicable fugitive dust control measures identified in the verification of AQ-SC3 that would be applicable to reducing fugitive dust from ongoing operations; that: A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and B. identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions. The site Operations Fugitive Dust Control Plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas, or alternative methods for stabilizing disturbed off-road areas, within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation. The performance and application of the fugitive dust controls shall also be measured against and meet the performance requirements of condition AQ-SC4. The performance requirements of AQ-SC4 shall also be included in the Operations Dust Control Plan.**	**At least 60 days prior to start of commercial operation, the project owner shall submit to the BLM's Authorized Officer and the CPM for review and approval a copy of the Site Operations Dust Control Plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. Within 60 days after commercial operation, the project owner shall provide to the BLM's Authorized Officer and the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training manual that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.**	**Submitted**	60 days prior start of commercial operations. 60 days after commercial operations	8/27/2013; **7/30/2014; 1/29/2016; 1/27/2017; 1/25/2018**			**Site Operations Dust Control Plan submitted to CEC/BLM on 8/27/13; Revised Operations Dust Control Plan was submitted to CEC/BLM on 7/30/2014. Dust Control Annual Report was submitted in the Annual Compliance Report**

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Air Quality General	AQSC-08	**The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) for the facility. The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit.**	**The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the District or U.S. Environmental Protection Agency (U.S. EPA), and any revised permit issued by the District or U.S. EPA, for the project. The project owner shall submit any ATC, PTO, and proposed air permit modification to the CPM within 5 working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.**	Submitted	Within 5 days of submittal; Within 15 days of receipt.	11/19/2013; 12/10/2015; 10/24/2017; 4/23/2018			MDAQMD ATC Permits - exp. 10/31/14 was submitted to CEC on 11/19/13. 2014 - 2015 Revised ATC/PTO (exp. 10/31/2015) were received from MDAQMD on 12/18/2014. Submittal was hold-off due to impending revisions/submittal of PTA to be consistent with CEC Conditions of Certifications. Submitted revised PTO for 3 Auxiliary Boilers with an additional condition having different requirements with AQ-6. Submitted 12 revised PTO's with additional conditions having different requirements with AQ-6
~~Air Quality General~~	~~AQSC-10~~	~~The ISEGS 1, ISEGS 2, and ISEGS 3 boilers shall not exceed a total annual natural gas fuel heat input that is more than 5 percent of the total annual heat input from the sun for ISEGS1, ISEGS2, and ISEGS 3, respectively.~~	~~Annual natural gas fuel heat input data and annual solar heat input data for the ISEGS 1, ISEGS 2, and ISEGS 3 units showing compliance with this condition shall be provided in the Annual Compliance Report (COMPLIANCE 7). The Annual Compliance Report shall include information separately for ISEGS 1, ISEGS 2, and ISEGS 3. The initial Compliance Report shall include documentation of the methodology used to verify compliance with this condition. The documentation shall include a heat balance diagram, engineering analysis, assumptions and supporting data.~~	Deleted	~~Annually beginning 2015~~			**9/15/2014**	AQ amendment was approved by CEC on 9/15/2014.
Biological Resources	BIO-02	***Designated Biologists Duties:*** **The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner, BLM's Authorized Officer and the CPM. The Designated Biologist Duties shall include the following:** **1. Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;** **2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;** **3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat;** **4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;**	**The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Authorized Officer and the CPM and copies of all written reports and summaries that document biological resources compliance activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting.** **During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.**	Completed at End of Construction (5/31/2014). **ONGOING for Operations beginning June 2014.**	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			The submittal of the final Monthly Compliance Report was in June 2014 for the month of May 2014. The first Annual Compliance Report was submitted on January 30, 2015. Submitted in the Annual Compliance Report
Biological Resources	BIO-02 (Continued)	**5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm's way;** **6. Notify the project owner and BLM's Authorized Officer and the CPM of any non-compliance with any biological resources condition of certification;** **7. Respond directly to inquiries of BLM's Authorized Officer and the CPM regarding biological resource issues;** **8. Maintain written records of the tasks specified above and those include in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report;** **9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>; and** **10. Maintain the ability to be in regular, direct communication with representatives of CDFG, USFWS, BLM's Authorized Officer and the CPM, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.**	**The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Authorized Officer and the CPM and copies of all written reports and summaries that document biological resources compliance activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting.** **During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by BLM's Authorized Officer and the CPM.**	Completed at End of Construction (5/31/2014). **ONGOING for Operations beginning June 2014.**	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			The submittal of the final Monthly Compliance Report was in June 2014 for the month of May 2014. The first Annual Compliance Report was submitted on January 30, 2015. Submitted in the Annual Compliance Report

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Biological Resources	BIO-04	***Biological Monitor Duties:*** **The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist shall remain the contact for the project owner, BLM's Authorized Officer and the CPM.**	**The Designated Biologist shall submit in the Monthly Compliance Report to BLM's Authorized Officer and the CPM and copies of all written reports and summaries that document biological resources compliance activities, including those conducted by Biological Monitors. If actions may affect biological resources during operation a Biological Monitor, under the supervision of the Designated Biologist, shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties cease, as approved by BLM's Authorized Officer and the CPM.**	Completed at End of Construction (5/31/2014). **ONGOING for Operations beginning June 2014.**	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			The submittal of the final Monthly Compliance Report was in June 2014 for the month of May 2014. The first Annual Compliance Report was submitted on January 30, 2015. Submitted in the Annual Compliance Report
Biological Resources	BIO-06	***Workers Environmental Awareness Program (WEAP):*** **The project owner shall develop and implement an Ivanpah SEGS-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from BLM's Authorized Officer and the CPM. The USFWS and CDFG shall be provided a copy of the WEAP for review and comment. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall: 1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants. 2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that Gila monsters are venomous and should not be handled, and that no snakes, reptiles, or other wildlife shall be harmed; 3. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures; 4. Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers dispose of cigarettes and cigars appropriately and not leave them on the ground or buried; 5. Present the meaning of various temporary and permanent habitat protection measures; 6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and 7. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines. The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist.**	**At least 60 days prior to the start of any project-related site disturbance activities, the project owner shall provide to BLM's Authorized Officer and the CPM a copy of the draft WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program. The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to site and related facilities mobilization, the project owner shall submit two copies of the BLM- and CPM-approved final WEAP. Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the start of commercial operation. Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to BLM's Authorized Officer and the CPM and upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training. During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.**	Approved - COMPLETED (CONSTRUCTION) **ONGOING DURING OPERATIONS**	60 prior Start of Site Disturbance Activities. **ANNUALLY DURING OPERATIONS.**	7/6/2010; Revised WEAP training program was submitted to CEC & BLM on 6/7/2018.	10/3/2010; BLM - 6/11/2018; CEC - 6/19/2018		Approved and WEAP reported in the MCR during construction. ONGOING DURING OPERATIONS;
Biological Resources	BIO-07	***Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP):*** **The project owner shall develop a BRMIMP and submit two copies of the proposed BRMIMP to the BLM-Authorized Officer and the CPM (for review and approval) and shall implement the measures identified in the approved BRMIMP. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Desert Tortoise Translocation Plan, the Raven Management Plan, the Closure, Revegetation and Rehabilitation Plan, the Burrowing Owl Mitigation and Monitoring Plan, the Weed Management Plan and the Special Status Plant Remedial Action Plan. The BRMIMP shall be prepared in consultation with the Designated Biologist and include the following: 1. All biological resources mitigation, monitoring, and compliance measures proposed and agreed to by the project owner; 2. All biological resources conditions of certification identified as necessary to avoid or mitigate impacts; 3. All biological resource mitigation, monitoring and compliance measures required in federal agency terms and conditions, such as those provided in the USFWS Biological Opinion; 4. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure; 5. All required mitigation measures for each sensitive biological resource; 6. A detailed description of measures that shall be taken to avoid or mitigate temporary disturbances from construction activities; 7. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction and operation;**	**Owner shall submit the BRMIMP to the BLM Authorized Officer and the CPM at least 60 days prior to start of any project-related site disturbance activities. The BRMIMP shall contain all of the required measures included in all biological Conditions of Certification. No ground disturbance may occur prior to approval of the final BRMIMP by BLM's Authorized Officer and the CPM. BLM's Authorized Office and the CPM, in consultation with other appropriate agencies, will determine the BRMIMP's acceptability within 45 days of receipt. If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to BLM's Authorized Office and the CPM within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within at least 10 days of their receipt by the project owner. Ten days prior to site and related facilities mobilization the revised BRMIMP shall be resubmitted to BLM's Authorized Officer and the CPM.**	Approved - COMPLETED (CONSTRUCTION) **ONGOING DURING OPERATIONS**	60 prior Start of Site Disturbance Activities.	7/16/2010; REVISION 2-UPDATED 4/11/2012 PER CEC REQUEST/ Revised Biological Opinion USFWS 4/22/12 added Re:Translocation			As a living document with many plans, approvals are given as revisions and updates are made to any of the plans, the latest revisions are kept on-site hard copy and electronically

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Biological Resources	BIO-07 (continued)	**8. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Provide planned timing of aerial photography and a description of why times were chosen. Provide a final accounting of the before/after acreages and a determination of whether additional habitat compensation is necessary in the Construction Termination Report;** **9. Duration for each type of monitoring and a description of monitoring methodologies and frequency;** **10. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;** **11. All performance standards and remedial measures to be implemented if performance standards are not met;** **12. A discussion of biological resources-related facility closure measures including a description of funding mechanism(s); and** **13. A process for proposing plan modifications to BLM's Authorized Officer and the CPM and appropriate agencies for review and approval; and**	**Owner shall notify BLM's Authorized Officer and the CPM and no less than five working days before implementing any modifications to the approved BRMIMP to obtain BLM's Authorized Officer and CPM approval. Any changes to the approved BRMIMP must also be approved by BLM's Authorized Officer and the CPM and in consultation with appropriate agencies to ensure no conflicts exist. Implementation of BRMIMP measures (construction activities that were monitored, species observed) will be reported in the Monthly Compliance Reports by the Designated Biologist.**	Approved - COMPLETED (CONSTRUCTION) **ONGOING DURING OPERATIONS**	Monthly MCR	7/16/2010; REVISION 2-UPDATED 4/11/2012 PER CEC REQUEST/ Revised Biological Opinion USFWS 4/22/12 added Re:Translocation			As a living document with many plans, approvals are given as revisions and updates are made to any of the plans, the latest revisions are kept on-site hard copy and electronically
Biological Resources	BIO-07 (continued-1)	**8. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Provide planned timing of aerial photography and a description of why times were chosen. Provide a final accounting of the before/after acreages and a determination of whether additional habitat compensation is necessary in the Construction Termination Report;** **9. Duration for each type of monitoring and a description of monitoring methodologies and frequency;** **10. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;** **11. All performance standards and remedial measures to be implemented if performance standards are not met;** **12. A discussion of biological resources-related facility closure measures including a description of funding mechanism(s); and** **13. A process for proposing plan modifications to BLM's Authorized Officer and the CPM and appropriate agencies for review and approval; and**	***Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.***	**Submitted**	30 days after completion of Project Construction	6/30/2014; 7/1/2014			Project Construction was completed and approved by CEC on 5/31/2014. Construction Termination Report was submitted on 6/30/14. Post-Construction Closure, Revegetation and Rehabilitation Plan Report was submitted on 7/1/2014.
Biological Resources	BIO-09	***Desert Tortoise Translocation Plan:*** **The project owner shall develop and implement a final Desert Tortoise Relocation/Translocation Plan (Plan) that is consistent with current USFWS approved guidelines, including the recently released "Translocation of Desert Tortoises (Mojave Population) from Project Sites: Plan Development Guidance, US Fish and Wildlife Service, August 2010" and meets the approval of BLM's Authorized Officer, USFWS, and CPM in consultation with CDFG. The final Plan shall be based on the draft Desert Tortoise Relocation/Translocation Plan prepared by the applicant dated May 2009 and modifications to this plan identified in the BA amendment dated June 21, 2010, and shall include all revisions deemed necessary by BLM's Authorized Officer, USFWS, and the CPM in consultation with the CDFG. Translocation of tortoise into the Mojave National Preserve will require fencing of roads within 10 km (6.2 miles) of receptor sites. Since this fencing is required as part of the translocation, it would not count towards the fencing identified in BIO-17, desert tortoise compensatory mitigation.**	**Within 60 days of publication of the Energy Commission Decision the project owner shall provide BLM's Authorized Officer and the CPM with the final version of a Desert Tortoise Relocation/Translocation Plan that has been reviewed and approved by BLM's Authorized Officer, USFWS and CPM in consultation with CDFG. BLM's Authorized Officer and the CPM will determine the plan's acceptability within 15 days of receipt of the final plan. All modifications to the approved translocation must be made only after consultation with BLM's Authorized Officer, USFWS, and the CPM, in consultation with CDFG.** **Within 30 days after initiation of translocation activities, the Designated Biologist shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Plan have been completed, and a summary of all modifications to measures made during implementation of the Plan.**	Approved - COMPLETED (CONSTRUCTION)	Within 60 days of publication of CEC Decision	9/27/2010; Final DT Translocation Plan was submitted to BLM on 7/29/2016.	11/4/2010 (rev. 4 - BLM); Final DT Translocation Plan approved on 8/2/2016.		Revised Husbandry Plan Rev 1 Submitted Dec 3, 2012. Juvenile Desert Tortoises were translocated on Oct. 4, 2016. Juvenile Tortoises Annual Report was submitted with the Annual Compliance Report.
Biological Resources	BIO-10 (Continued-1)	**3. Remain onsite daily while vegetation salvage, grubbing, grading and heliostat installation activities are taking place to avoid or minimize take of listed species, to check for compliance with all impact avoidance and minimization measures, and to check all exclusion zones to ensure that signs, stakes, and fencing are intact and that human activities are restricted in these protective zones.** **4. Maintain and check desert tortoise exclusion fences on a daily basis to ensure the integrity of the fence is maintained. The Designated Biologist shall be present onsite to monitor construction and determine fence placement during fence installation.** **5. Conduct compliance inspections at a minimum of once per month after clearing, grubbing, grading, and heliostat installation activities are completed and submit a monthly compliance report to BLM's Authorized Officer and the CPM ;** **6. No later than January 31 of every year the ISEGS facility remains in operation, provide BLM's Authorized Officer and the CPM an annual Listed Species Status Report, which shall include, at a minimum:** **1) a general description of the status of the project site and construction activities, including actual or projected completion dates, if known;** **2) a copy of the table in the BRMIMP with notes showing the current implementation status of each mitigation measure; and** **3) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for project impacts;**	**No later than 2 calendar days following the above required notification of a sighting, kill, or relocation of a listed species, the project owner shall deliver to BLM's Authorized Officer, the CPM, CDFG, and USFWS via FAX or electronic communication the written report from the Designated Biologist describing all reported incidents of injury, kill, or relocation of a listed species, identifying who was notified, and explaining when the incidents occurred. In the case of a sighting in an active construction area, the project owner shall, at the same time, submit a map (e.g., using Geographic Information Systems) depicting both the limits of construction and sighting location to BLM's Authorized Officer, the CPM, CDFG and USFWS.**	**ONGOING DURING OPERATIONS**	Annually beginning January 2015	1/31/2011; 2011 Special Status Plants Annual Compliance Report submitted January 2012, revised March 7, 2012 and submitted; Annual Compliance Report submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			The submittal of the final Monthly Compliance Report was in June 2014 for the month of May 2014. The first Annual Compliance Report was submitted on January 30, 2015. Submitted in the Annual Compliance Report

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Biological Resources	BIO-11 (Continued-3)	**11. Avoid Wildlife Pitfalls:** **a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the area fenced with desert tortoise exclusion fencing have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically throughout the day and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Relocation/Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.** **b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried or capped.** **As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed. c. Cap Heliostat Holes.** **All holes drilled for heliostats shall be capped the same day they are drilled. Caps shall remain on the holes until heliostats are inserted into the holes, and shall be securely fastened and sufficiently sturdy to cover the heliostat holes indefinitely. The caps shall exclude all wildlife, and shall be inspected weekly by the Designated Biologist or Biological Monitors to ensure that the caps remain in place and that birds and terrestrial wildlife have not become trapped.** **12. Minimize Standing Water. Water applied to construction areas and dirt roads for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises, common ravens and coyotes to construction sites.**	**All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM, for review and approval, a written construction termination report identifying how measures have been completed.** **The Designated Biologist shall report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year.**	**Submitted**	30 days after completion of Project Construction	6/30/2014; 7/1/2014			Project Construction was completed and approved by CEC on 5/31/2014. Construction Termination Report was submitted on 6/30/14. Post-Construction Closure, Revegetation and Rehabilitation Plan Report was submitted on 7/1/2014.
				ONGOING	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted in the Annual Compliance Report
Biological Resources	BIO-11 (Continued-4)	**13. Dispose of Road killed Animals. Road killed animals or other carcasses detected in the project area or on roads near the project area shall be picked up immediately and delivered to the Biological Monitor. Within 1 working day of receipt of the carcass the Biological Monitor shall contact CDFG and/or USFWS for guidance on disposal or storage of the carcass.** **14. Photographic Documentation of Bird Carcasses. On-site personnel shall photograph and record the location of all bird carcasses encountered and location data to the Designated Biologist. The Designated Biologist shall identify the bird, ascertain a cause of death if possible, maintain a database of this information for all bird carcasses, and each year of operation shall provide a report summarizing this information to the CPM, BLM's Authorized Officer, CDFG, and USFWS.** **15. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.** **16. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project site.** **Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.** **Vehicular traffic shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. The speed limit when traveling on Colosseum Road and other dirt access routes within desert tortoise habitat shall not exceed 20 miles per hour.** **17. Monitor Ground Disturbing Activities Prior to Site Mobilization. If ground disturbing activities are required prior to site mobilization, such as for geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.**	**All mitigation measures and their implementation methods shall be included in the BRMIMP. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to BLM's Authorized Officer and the CPM, for review and approval, a written construction termination report identifying how measures have been completed.** ***The Designated Biologist shall report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year.***	**ONGOING DURING OPERATIONS - ANNUALLY**	Annually beginning January 2015	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Information to be reported annually in the Annual Compliance Report

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Biological Resources	BIO-12	***Raven Management Plan:*** **The project owner shall implement a Raven Management Plan that is consistent with the most current USFWS-approved raven management guidelines, and which meets the approval of USFWS, BLM Authorized Officer, and the CPM in consultation with CDFG. The draft Raven Management Plan submitted by The applicant (CH2M Hill 2008f) shall provide the basis for the final plan, subject to review and revisions from USFWS, BLM Authorized Officer and the CPM in consultation with CDFG. The project owner shall submit payment to the project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the USFWS Regional Raven Management Program. The amount shall be a one-time payment of $105 per acre of permanent disturbance.**	**Within 60 days after completion of project construction, the project owner shall provide to the CPM for review and approval, a written report identifying which items of the Raven Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.**	Submitted ONGOING REPORTING DURING OPERATIONS	60 days after completion of project construction. Not later than Dec. 31st each Raven Management Year	7/31/2014; 12/31/2014; 1/5/2015; 12/30/2015; 6/27/2016			Report identifying which items of the Raven Management Plan (Post Construction Raven Management Report) have been completed was submitted to CEC and BLM on 7/31/2014. Annual Monitoring Report per the Raven Management Plan was submitted on 12/31/2014. Resubmitted on 1/5/2015 with maps. **The implementation of the Raven Management Plan has been completed and awaiting for approval from BLM.**
Biological Resources	BIO-14	***Closure, Revegetation and Rehabilitation Plan:*** **The project owner shall develop and implement a revised Closure, Revegetation and Rehabilitation Plan (Plan) in cooperation with BLM and Energy Commission staff, to guide site restoration and closure activities, including methods proposed for revegetation of disturbed areas immediately following construction and rehabilitation and revegetation upon closure of the facility. This plan must address preconstruction salvage and relocation of succulent vegetation from the site to an onsite nursery facility for storage and propagation of material to reclaim disturbed areas. In the case of unexpected closure, the plan assumes restoration activities could possibly take place prior to the anticipated lifespan of the plant. The Plan shall address all issues discussed in Biological Resources Appendix-B: Issues to Address in the *Closure, Revegetation and Rehabilitation Plan,* and shall include but is not limited to the following elements in the revised plan:** **1. Plan Purpose: The plan shall explicitly identify the objective of the revegetation plan to be re-creation of the types of habitats lost during construction and operation of the proposed solar energy facility. The final revegetation plan shall include introduction of mid- to late-successional species.** **2. Standards/Monitoring: Performance standards for success thresholds, weed cover, performance monitoring methods and schedule, and maintenance monitoring in the revised Plan shall be conducted as described in Biological Resources Appendix B.** **3. Baseline Surveys – Baseline vegetation surveys for planning restoration efforts shall be conducted as described in Biological Resources Appendix B.** **4. Vegetation Clearing: Clearing of vegetation shall be limited to areas for which final maps are provided to BLM before approval of the ROW. Clearing of vegetation will be permitted on roads, utility routes, heliostat maintenance pathways, building and parking areas, and temporary staging areas provided these are specifically documented on a georeferenced construction alignment drawing or aerial photo or shape file, showing the exact locations of soil disturbance. BLM will consider relocating specific installations prior to the beginning of construction and during construction on a case by case basis but will not approve additional acreage beyond that addressed in the current application.** **5. Vegetation Mowing; Vegetation mowing shall be limited to areas adjoining vehicle pathways used for heliostat installation to allow installation of the heliostat pylon and allow for tracking clearance under the heliostat. Vegetation mowing may be repeated during the life of the facility to maintain appropriate clearance for heliostat tracking.**	**Within 30 days after completion of project construction for each phase of development, the project owner shall provide to BLM's Authorized Officer and the CPM for review and approval, a written report identifying which items of the Closure, Revegetation and Rehabilitation Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.**	Submitted; Annually	30 days after completion of construction; Annually beginning 2015	6/30/2014; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Report identifying which items of the Closure, Revegetation and Rehabilitation Plan have been completed was submitted to CEC and BLM on 6/30/2014. Revegetation Annual monitoring Report submitted in the Annual Compliance Report
			At least one year prior to planned closure and decommissioning the project owner shall submit to the BLM-Authorized Officer and the CPM a final Closure Plan for review to determine if revisions are needed. The project owner shall incorporate all required revisions to the final Closure Plan and submit to the BLM-Authorized Officer and the CPM no less than 90 days prior to the start of ground disturbing activities associated with closure and decommissioning activities.	Not Yet Started	1 year prior planned closure and decommissioning of the project				

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Biological Resources	BIO-14 (Continued-1)	**6. Succulent Salvage: The revised Plan shall include a table that shows proposed succulent salvage by species the number of plants onsite, the lower threshold height for salvage, the number in each size class, and the fate of plants not salvaged. An inventory and map of proposed succulent transplants shall be provided as described in Appendix A. Information gained from succulent transplant experience gained in ISEGS 1 shall be applied to future salvage operations, as described in Biological Resources Appendix B.** **7. Seed Handling: Seed collection, testing and application shall be conducted as described in Biological Resources Appendix B, with collection areas within 10 miles of the project boundaries and on similar terrain, soil, exposure, slope, and elevation to the project site.** **8. Soil Preparation: Soil descriptions, compaction measurements, mulch application, soil storage, seed farming, mycorrhizal inoculation, and biological crust collection and storage shall be conducted as described in Biological Resources Appendix B. Soil stockpiles shall not be placed on areas that support special-status plant species or other sensitive biological resources.** **9. Weed Management. Weed management activities needed to control weeds resulting from mirror washing shall be conducted as described in Biological Resources Appendix B.** **10. Final Closure Plan. A Final Closure Plan, which addresses the final revegetation and rehabilitation activities upon closure and decommissioning of the project, shall be completed as part of the revised Plan.** **The Final Closure Plan shall include a cost estimate, adjusted for inflation, reflecting the costs of the revegetation, rehabilitation, and monitoring for the duration of time estimated to achieve the objective of recreating plant communities impacted by the project** **11. The project owner shall implement the Closure, Revegetation, and Rehabilitation Plan, Revision 3, dated July 6, 2010, with the following modifications.** **a. The long-term soil stockpiles, as discussed in Table 5-2 of the Plan, shall be no higher than 6 feet.**	**See above sections**	In Progress					
Biological Resources	BIO-14 (Continued-2)	**b. The Preliminary Seeding Plan for Short-Term Disturbed Areas, and to be used as the basis for the seeding during final project decommissioning, shall be based upon the species list provided in Table 7-1 of the Plan rather than the species list in Table 7-2. The list may be modified at the time of decommissioning based on seed availability.** **c. Concrete will be removed to a minimum depth of 6 feet unless it is shown that a particular area is prone to flood hazards and a greater depth for concrete removal should be required. All concrete removed shall be hauled off the project site and disposed of in an approved facility. Crushed concrete shall not be used as backfill on the site during decommissioning.** **d. Succulents salvaged during project construction shall not be sold by the project owner. Should excess succulents be removed that cannot be transplanted in the Succulent Nursery Area, their disposition will be managed by BLM.**	**See above sections**	In Progress					
Biological Resources	BIO-16	**5. Submit a Burrowing Owl Mitigation and Monitoring Plan to the CPM and CDFG for review and approval prior to relocation of owls (and incorporate it into the project's BRMIMP) as well as a construction termination report with results to CDFG and CPM 30 days after completing owl relocation and monitoring and at least 30 days prior to the start of commercial operation.**	**Within 30 days after completion of owl relocation and monitoring, and the start of ground disturbance or at least 90 days prior to the sale of power, the project owner shall provide to the CDFG, CPM and BLM a written construction termination report identifying how measures have been completed.**	Submitted	30 days after completion of project construction	6/30/2014; 7/1/2014			Construction Termination Report was submitted to CEC and BLM on 6/30/2014. Post-Construction Closure, Revegetation and Rehabilitation Plan Report was submitted on 7/1/2014.

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Biological Resources	BIO-17	***Desert Tortoise Compensatory Mitigation:*** **To fully mitigate for habitat loss and potential take of desert tortoise, the project owner shall provide Compensatory Mitigation at a 3:1 ratio for impacts to 3,582 acres or the area disturbed by the final project footprint. At least two thirds of the 3:1 mitigation requirement shall be achieved by acquisition, in fee title or in easement, of no less than 7,146 acres of land suitable for desert tortoise or twice the area disturbed by the final project footprint. The Energy Commission's compensatory mitigation requirement consists of habitat acquisition at a 2:1 ratio as well as the BLM's 1:1 desert tortoise mitigation approach of habitat enhancement. The project owner shall provide financial Security as specified in this condition in an amount sufficient to ensure the entire 3:1 mitigation requirement, including acquisition, initial habitat improvements and long-term management for the compensation lands to be acquired and the mitigation to be provided through BLM. The 1:1 compensatory mitigation, that will satisfy both the BLM's mitigation requirements and a portion of the Energy Commission's mitigation requirements, shall be developed in accordance with BLM's desert tortoise mitigation requirements as described in the Northern and Eastern Mojave Desert Management Plan (BLM 2002). BLM's compensatory mitigation plan, serving as one third of the 3:1 mitigation ratio consists of desert tortoise habitat enhancement including installation of at least 50 miles of desert tortoise exclusion fencing on roadways in the Northeastern Mojave Recovery Unit, and habitat restoration of at least 50 routes within the Desert Wildlife Management Area. The project owner may elect to satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF) [Deposit of Funds to a NFWF Account] as described in #4 of this condition.** **The Energy Commission requirements for acquisition of 7,164 acres of compensation lands and habitat enhancements through BLM shall include all of the following:** **BLM's compensatory mitigation plan, serving as one third of the 3:1 mitigation ratio required to satisfy CESA, shall consist of desert tortoise habitat enhancement, including installation of at least 50 miles of desert tortoise exclusion fencing on roadways in the Northeastern Mojave Recovery Unit, and habitat restoration of at least 50 routes within the Desert Wildlife Management Area. Areas identified for fencing include: the boundary of the town**	**The Project owner shall provide the CPM with written notice prior to the start of ground-disturbing activities on the Project site.** **If purchase of 7,164 acres of mitigation lands as described in this condition, or as described in BIO-22 (phasing), is not completed prior to the start of ground disturbing activities, the Project owner shall provide the CPM with approved Security prior to the start of ground-disturbing activities. The Security shall be in accordance with Item # 4 of this condition and other requirements of this condition, allowing for either Acquisition of Mitigation Lands by the project owner or use of the NFWF Account to satisfy this condition, and with BIO-22 (phasing) if the project owner elects to use that option.** **If the project owner elects to Deposit Funds to the NFWF Account, it shall provide documentation of deposit of the required security to the REAT-NFWF Account prior to start of ground-disturbing activities on the project site. Within 6 months of the Energy Commission decision, the project owner shall provide to the CPM for review and approval a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount for the long-term maintenance fee to fund maintenance of the proposed enhancement actions (desert tortoise exclusion fencing and DWMA route restoration). The project owner shall deposit the long-term maintenance fee into the REAT-NFWF account or another third-party recipient acceptable to the CPM in consultation with CDFG and BLM within 18 months of the Energy Commission decision.** **Starting with the first year following construction and continuing for the duration of project impacts, the project owner shall provide to the CPM, BLM and CDFG an annual report describing: the results of the annual inspection of fencing and rehabilitated routes; a summary of fence repairs and maintenance of reclaimed routes completed during the year; and recommendations and a cost estimate for repairs and maintenance activities needed for the upcoming year.**	COMPLETED (CONSTRUCTION)	prior to ground disturbing activities	10/4/2010, Rev 1 June 2011			Under Review, ROW GRANT EXTENSION granted until Oct 7, 2013 ongoing negotiations. BLM granted 1 year extension to 10/07/2013
Biological Resources	BIO-17 (Continued-1)	**of Nipton, Nipton Road between the California-Nevada border and the junction of I-15, Ivanpah Road, Interstate 15 from Nipton Road to the Ivanpah Dry Lake, US Highway 95 through Piute Valley from the California-Nevada border to the town of Goffs, opr the boundary for the community of Goffs. Some of these roads (e.g. portions of Nipton Road and Ivanpah Road) may require fencing associated with the tortoise translocation plan. Any fencing deemed necessary for tortoise translocation would be above and beyond the 50 miles required by this mitigation measure. In lieu of acquiring lands and implementing habitat enhancement or rehabilitation activities itself, the project owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF) in an amount equivalent to the sum of: 1) BLM's compensatory mitigation cost to cover the cost of fencing and route restoration, calculated using formulas for biological Resource Compensation/Mitigation Cost Estimate Breakdown for use with the REAT-NFWF Mitigation Account Table of Estimated Costs dated July 13, 2010; 2) the Energy Commission's Complementary Mitigation Security for acquisition; and 3) the Long-Term Maintenance of Fencing and Habitat Restoration Fee; and 3) the NFWF administrative fee calculation, as shown in the following table:** **Biological Resources Mitigation/Compensation Cost Estimate Table - July 13, 20101 corrected Desert Tortoise Compensation** **Number of Acres 3582** **Estimated number of parcels to be acquired, at 40 acres per parcel2 90** **Land cost at $1000/acre3 $ 3,582,000.00** **Level 1 Environmental Site Assessment at $3000/parcel $ 270,000.00** **Appraisal at no less than $5,000/parcel $ 450,000.00** **Initial site work - clean-up, restoration or enhancement, at $250/acre4 $ 895,500.00** **Closing and Escrow Cost at $5000/parcel5 $ 450,000.00** **Biological survey for determining mitigation value of land (habitat based with species specific augmentation) at $5000/parcel $ 450,000.00**	**A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, USFWS and BLM describing the parcels intended for purchase.** **No later than 18 months following the publication of the Energy Commission Decision the project owner shall provide written verification to the CPM and CDFG that the Energy Commission compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient(s).** **The project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of project ground disturbing activities. If NFWF or another approved third party is being used for the acquisition, the project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline. Within six months of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide CDFG and the CPM with a management plan for the Energy Commission compensation lands and associated funds. The CPM shall review and approve the management plan, in consultation with CDFG, BLM and the USFWS. Within 90 days after completion of project construction, the project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of habitat disturbed during project construction. If habitat disturbance exceeds 3,582 acres, the project owner shall provide a compensation plan to the CMP and CDFG for their review and approval, in consultation with CDFG, BLM and the USFWS. The compensation plan shall be submitted no later than 90 days from the CPM's receipt of the final accounting, and shall include a description of additional funds required or lands that must be purchased to compensate for the unanticipated habitat disturbances, and a schedule for that acquisition or funding inclusive of all associated long-term management and maintenance and enhancement costs.**	Submitted	90 days after completion of project construction	29-Aug-2014			

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Biological Resources	BIO-17 (Continued-2)	3rd Party Administrative Costs (Land Cost x 10%)6 $ 358,200.00 Agency cost to accept land donation7 (Land Cost x 15%) x 1.17 (17% of the 15% for overhead) $ 628,641.00 SUBTOTAL - Acquisition and Initial Site Work $ 7,084,341.00 Long-term Management and Maintenance Fund (LTMM) fee at $1450/acre 8 $ 5,193,900.00 NFWF Fees Establish Project Specific Account $ 12,000.00 NFWF Management fee[3] for Acquisition and Enhancement Actions (Subtotal x 3%) $ 212,530.23 NFWF Management Fee for LTMM account (LTMM x 1%) $ 51,939.00 Subtotal of NFWF Fees $ 276,469.23 TOTAL Estimated cost for deposit in project specific REAT-NFWF Account $ 12,554,710.23 acquisition of 7,164 acres of compensation lands and maintenance of fencing and habitat enhancements shall include the following: 1. Responsibility for Acquisition of Lands: The project owner may delegate its responsibility for acquisition of compensation lands to a third party, such as a non-governmental organization supportive of Mojave Desert habitat conservation. Such delegation shall be subject to approval in writing by the CPM, in consultation with BLM, CDFG and USFWS, prior to land acquisition, enhancement or management activities. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for funding acquisition, habitat improvements and long-term management of additional compensation lands or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. Water and mineral rights shall be included as part of the land acquisition. Agreements to delegate land acquisition to CDFG or an approved third party and to manage compensation lands shall be implemented within 18 months of the Energy Commission's decision.	If the project owner elects to satisfy its mitigation obligations by paying an in-lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099 or any other applicable in-lieu fee provision, the Project owner shall notify the Commission that it would like a determination that the Project's in-lieu fee proposal meets CEQA and CESA requirements. No more than 60 days prior to ground-disturbing project activities, the project owner shall provide to the CPM for review and approval a PAR or PAR-like analysis to establish the appropriate amount for the long-term maintenance fee to fund maintenance of the proposed enhancement actions (desert tortoise exclusion fencing and DWMA route restoration). No more than 30 days prior to ground-disturbing project activities, the project owner shall deposit the long-term maintenance fee to the REAT-NFWF account or another third-party recipient approved by the CPM in consultation with CDFG. Starting with the first year following construction and continuing for the duration of project impacts, the project owner shall provide to the CPM and CDFG an annual report describing: the results of the annual inspection of fencing and rehabilitated routes; a summary of fence repairs and maintenance of reclaimed routes completed during the year; and recommendations and a cost estimate for repairs and maintenance activities needed for the upcoming year. If the project owner elects to satisfy its mitigation obligations by paying an in-lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099 or any other applicable in-lieu fee provision, the Project owner shall notify the Commission that it would like a determination that the Project's in-lieu fee proposal meets CEQA and CESA requirements.	IN PROGRESS	**Annually beginning January 2015**	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted in the Annual Compliance Report. The construction of 50 Miles of Tortoise Fencing along Interstates 15 and 40 were completed on 3/18/2016. Annual inspection report will be submitted with the Annual Compliance Report.
Biological Resources	BIO-18 (continued-1)	3. Identify and Establish Special-Status Plant Protection Areas: The project owner shall identify Special-Status Plant Protection Areas for exclusion from the project footprint and avoidance of project-related impacts of any kind to facilitate achieving the 75 % protection goal. To accurately identify the boundaries of these areas, pre-construction floristic surveys shall be conducted by a qualified botanist at the appropriate time of year for special-status plant identification including both spring and summer/fall blooming periods. Summer/fall surveys will be conducted after rains that are likely to cause plant germination and may be suspended in years where no such rains occurs. The surveys shall encompass at a minimum the three areas totaling 476 acres and labelled "Rare Plant Mitigation Area" in Project Description Figure 13 and shall extend 150 feet on both sides of the proposed gas pipeline alignment and 250 feet out from the project fence line. The locations of the Special-Status Plant Protection Areas shall be clearly depicted on all final maps and project drawings and descriptions for exclusions of all project activities.	On January 31st of each year following construction the owner's qualified botanist shall submit a report, including CNDDB field survey forms, describing results of off-site plant surveys for Mojave milkweed and Rusby's desert-mallow to the BLM's authorized officer, the CPM, CDFG, and CNDDB. Submittal of survey reports shall continue for a maximum of 10 years until the same number of occurrences in the project area excluding the occurrences of Special-Status Plant Protection Areas.	**ONGOING DURING OPERATIONS**	Annual Reporting required in the Annual Compliance Report Beginning Jan. 2015	2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			
Biological Resources	BIO-18 (continued-2)	4. Protection of Adjacent Occurrences: The project owner shall identify special-status plants occurrences within 250 feet of the project fence line during the pre-construction plant surveys described above. A qualified botanist shall delineate the boundaries of these special status plant occurrences prior to the initiation of ground disturbing activities. These flagged special status plant occurrences shall be designated as Environmentally Sensitive Areas on plans and specifications, and shall be protected from accidental impacts during construction (e.g. vehicle traffic, temporary placement of soils or vegetation) and from the indirect impacts of project operation (e.g., herbicide spraying, changes in upstream hydrology, etc.).	The project owner's qualified botanist shall submit a completion report documenting fulfillment of target goals & which describe the number of new, previously undiscovered occurrences identified & mapped using GIS techniques for each species. Mapping results shall include GPS coordinates of the plants found. The DB shall maintain written & photographic records of the tasks described above, and summaries of these records shall be submitted along with the MCR to the CPM, BLM AA, and CDFG. During operation, the DB shall submit record summaries in the Annual Compliance Report for a period not < 10 years for the Gas Pipeline Revegetation Plan, and for the life of the project for the SSPP and Monitoring Plan, and the SSP Remedial Action Plan, including funding for the seed storage. No less than 90 days prior to acquisition of the parcel (s) containing or adjacent to a known Mojave milkweed occurrence, the project owner, or a third-party approved by the CPM, in consultation with CDFG, shall submit a formal acquisition proposal to the CPM and CDFG describing the parcel(s) intended for purchase.	Approved **ONGOING DURING OPERATIONS**	Annually beginning January 2015	7/2/2010 (Gas Pipeline Plan) 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) . 2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	Nov 9, 2010 rev 0		6/18/10 Gas Pipeline Plan 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) Designated Biologist shall submit record summaries in the ACR beginning January 2015

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Biological Resources	BIO-18 (continued-2a)	**5. Develop and Implement a Special-Status Plant Protection and Monitoring Plan: The project owner shall develop and implement a Special-Status Plant Protection and Monitoring Plan for special-status plants occurring within the Special-Status Plant Protection Areas and on-site areas designated for impact minimization. The goal of the Special-Status Plant Protection and Monitoring Plan shall be to maintain the special-status plant species as healthy, reproductive populations that can be sustained in perpetuity. At a minimum, the Special-Status Plant Protection and Monitoring Plan shall:** **• establish baseline conditions and numbers of the plant occurrences in all protected areas (i.e., those to be excluded from the footprint and on-site ares to be protected) and success standards for protection of special-status plant occurrences;** **• provide information about microhabitat preferences and fecundity, essential pollinators, reproductive biology, and propagation and culture requirements for each special-status species;** **• describe measures (e.g., fencing, signage) to avoid direct construction and operation impacts to special-status plants within all protected areas;** **• describe measures to avoid or minimize indirect construction and operations impacts to special-status plants within protected areas (e.g., runoff from mirror-washing, use of soil stabilizers/tackifiers, alterations of hydrology from drainage diversions, erosion/sedimentation from disturbed soils upslope, herbicide drift, the spread of non-native plants, etc.).** **• provide a monitoring schedule and plan for assessing the numbers and condition of special-status plants; and** **• identify specific triggers for remedial action (e.g., numbers of plants dropping below a threshold);**	**Draft agreements to delegate land acquisition to CDFG or an approved third party and agreements to manage compensation lands shall be submitted to Energy Commission staff for review and approval (in consultation with CDFG) prior to land acquisition. Such agreements shall be mutually approved and executed at least 60 days prior to start of any project-related ground disturbance activities. The project owner shall provide written verification to the CPM that the compensation lands have been acquired and recorded in favor of the approved recipient(s). Alternatively, before beginning project ground disturbing activities, the project owner shall provide Security in accordance with this condition. Within 90 days after the land purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, for the compensation lands and associated funds.**	Approved **ONGOING DURING OPERATIONS**	Annually beginning January 2015	7/2/2010 (Gas Pipeline Plan) 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) . 2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	Nov 9, 2010 rev 0		6/18/10 Gas Pipeline Plan 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) Designated Biologist shall submit record summaries in the ACR beginning January 2015
Biological Resources	BIO-18 (continued-3)	**6. Develop Special-Status Plant Remedial Action Plan: The project owner shall develop a detailed Special-Status Plant Remedial Action Plan to be implemented if special-status plants within the 476 acres of protected area and on-site minimization "halos" fail to meet success standards described in the Special-Status Plant Protection and Monitoring Plan. The Plant Remedial Action Plan shall include specifications for ex-situ/offsite conservation of seed and other propagules, and the seed bank and other symbionts contained in the topsoil where these plants occur. The remedial measures described in the Plant Remedial Action Plan shall not substitute for plant protection or other mitigation measures. The Special-Status Plant Remedial Action Plan shall include, at a minimum:** **• guidelines for pre-construction seed collection (and/or other propagules) for each species;** **• specifications for collecting, storing, and preserving the upper layer of soil containing seed and important soil organisms;** **• detailed replacement planting program with biologically meaningful quantitative and qualitative success criteria (see Pavlik 1996), monitoring specifications, and triggers for remedial action; and** **• ecological specifications for suitable planting sites.** **7. Seed Collection : Implementation of the Special-Status Plant Remedial Action Plan would require a source of local source of seeds/propagules. In addition, seed collection would serve to preserve germplasm in the event that all mitigation fails. The project owner shall develop and implement a Seed Collection Plan to collect and store seed for Mojave milkweed, Rusby's desert-mallow, desert pincushion, nine-awned pappus grass, and Parish's club-cholla. The source of these seeds shall be from plants proposed for removal within the project footprint. The project owner shall engage the services of a qualified contractor approved by the CPM to undertake seed collection and storage.**	**See above sections**	Approved **ONGOING DURING OPERATIONS**	Annually beginning Jan. 2015	7/2/2010 (Gas Pipeline Plan) 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) . 2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	Nov 9, 2010 rev 0		6/18/10 Gas Pipeline Plan 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) Designated Biologist shall submit record summaries in the ACR beginning January 2015
Biological Resources	BIO-18 (continued-4)	**8. Gas Pipeline Revegetation and Monitoring: In the natural gas pipeline construction corridor where disturbed soils will be revegetated, the topsoil excavated shall be segregated, kept intact, and protected, under conditions shown to sustain seed bank viability. At a minimum, the top 2 cm of the soil shall be separately stored and preserved. Topsoil salvage, storing, and replacement shall be replaced in its original vertical orientation following pipeline installation ensuring the integrity of the top 2 cm in particular. The project owner shall prepare a Gas Pipeline Revegetation and Monitoring Plan targeted at re-establishment of Rusby's desert-mallow, desert pincushion, Mojave milkweed, and potentially other special-status plant species. The Gas Pipeline Revegetation and Monitoring Plan shall identify success criteria for re-establishment and shall continue for a period of no less than 10 years until the defined success criteria are achieved. The Gas Pipeline Revegetation and Monitoring Plan shall include measures for seeding or other remedial actions. If no individuals of Rusby's desert-mallow, desert pincushion, or Mojave milkweed, are located during the first year of monitoring, the project owner shall conduct supplemental seeding or other remedial measures in the area disturbed by natural gas pipeline installation.**	**See above sections**	Approved **ONGOING DURING OPERATIONS**	Annually beginning January 2015	7/2/2010 (Gas Pipeline Plan) 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) . 2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016	Nov 9, 2010 rev 0		6/18/10 Gas Pipeline Plan 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) Designated Biologist shall submit record summaries in the ACR beginning January 2015

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Biological Resources	BIO-18 (continued-5)	**9. Surveys on Acquired and Public Lands: The project owner shall conduct floristic surveys for Rusby's desert-mallow and Mojave milkweed on all lands that will be acquired as part of the desert tortoise compensatory mitigation requirements (see Condition of Certification BIO-17). The goal of the surveys shall be to identify at least the same number of occurrences on off-site compensation or public lands as the number of occurrences in the project area excluding the occurrences in the Special-Status Plant Protection Areas in Project Description Figure 13. If this goal is not met by surveys on proposed acquisition lands, additional surveys shall be conducted within suitable habitat on public lands. To be counted toward fulfillment of the goal the occurrences must reflect new data not previously documented in other survey efforts. The survey requirements shall include the following:** **• All surveys shall be conducted by a qualified botanist in accordance with BLM, CDFG, and CNPS plant survey guidelines;** **• Surveys shall occur the first spring after construction begins and continue each year for a maximum of ten years until the same number of Mojave Milkweed and Rusby's desert-mallow occurrences are identified on acquisition lands and/or public lands as located outside Special-Status Plant Protection Areas;** **• For each year surveys are conducted yearly survey results shall be provided to the CPM, BLM's Authorized Officer and CDFG, and shall include CNDDB field survey forms for all special-status plant species encountered during the surveys; and** **• All field survey forms shall be submitted to the CNDDB at the time of submittal to the CPM, BLM and CDFG; and**	**See above sections**	Approved **ONGOING DURING OPERATIONS**	Annually beginning January 2015	7/2/2010 (Gas Pipeline Plan) 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) . 2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	Nov 9, 2010 rev 0		6/18/10 Gas Pipeline Plan 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) Designated Biologist shall submit record summaries in the ACR beginning January 2015
Biological Resources	BIO-18 (continued-6)	**• The project owner's qualified botanist shall submit a completion report documenting fulfillment of the target goals and which describe the number of new, previously undiscovered occurrences identified and mapped. Locations shall be reported with GPS coordinates compatible with inclusion in a GIS database.** **10. Security for Implementation of Plans : The project owner shall provide security adequate to fund implementation of the Special-Status Plant Protection and Monitoring Plan, the the Special-Status Plant Remedial Action Plan for the life of the project, as well as the Seed Collection Plan, and the Gas Pipeline Revegetation Monitoring Plan.** **11. Acquire Off-Site Occurrence of Mojave Milkweed or Adjacent Land: The project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes at least 30 acres supporting a viable occurrence of Mojave milkweed (or suitable habitat adjacent to a known occurrence). The terms and conditions of this acquisition or easement shall be as described in Condition of Certification BIO-17with the additional criteria that the Mojave milkweed mitigation lands:** **1) provide habitat for the special-status plant species that is of similar or better quality (e.g., in terms of native plant composition) than that impacted; 2) contain OR abut a known occurrence of Mojave milkweed, ideally with populations that are stable, recovering, or likely to recover, that shares the same watershed as the land; and 3) be adequately sized and buffered to support self-sustaining special-status plant populations. These mitigation lands may be included with the desert tortoise mitigation lands ONLY if the above criteria are met. If sufficient new Mojave milkweed occurrences are discovered on desert tortoise compensation lands (not public lands) in accordance with item 9 above prior to acquiring this land, the associated security shall be refunded to the project owner.**	**See above sections**	Approved **ONGOING DURING OPERATIONS**	Annually beginning Jan. 2015	7/2/2010 (Gas Pipeline Plan) 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) . 2014 Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	Nov 9, 2010 rev 0		6/18/10 Gas Pipeline Plan 11/1/2010 SS Plant Plan 11/10/2010 SS Plant Remedial Action Plan (Seed Collection Plan included) Designated Biologist shall submit record summaries in the ACR beginning January 2015 **The Mojave Milkweed Parcel (Hudgen's parcel) has been transferred to NPS on March 17, 2017.**
Biological Resources	BIO-19	***Nelson's Bighorn Sheep Mitigation:*** **To compensate for project impacts to Nelson's bighorn sheep the project owner shall finance, construct and manage an artificial water source in the eastern part of the Clark Mountain range or in the State Line Hills outside of designated Wilderness. The project owner shall monitor and control noxious and invasive weeds within 100 feet of the artificial water source. Control of weeds shall be coordinated with the CPM and BLM staff and shall consist of removal by mechanical methods, rather than herbicides. To minimize potential impacts to Nelson bighorn sheep, the project owner shall not use barbed wire fence on the northern perimeter of the Ivanpah 3 site, unless the project owner provides evidence that such fencing is essential for security reasons.**	**Within 60 days of publication of the Energy Commission Decision the project owner shall submit to the BLM's Authorized Officer, the CPM and CDFG a Draft Bighorn Sheep Mitigation Plan identifying a proposed location for the artificial water source and providing plans for its construction and management. At least 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide BLM's Authorized Officer and the CPM with the final version of the Bighorn Sheep Mitigation Plan that has been reviewed and approved by the CPM. BLM, and CDFG, BLM's Authorized Officer and the CPM will determine the plan's acceptability within 30 days of receipt of the final plan.** **No later than 18 months following the publication of the Energy Commission Decision, the project owner shall provide written verification to BLM's Authorized Officer and the CPM that the construction of the artificial water source has been completed. At the same time, the project owner shall provide evidence of an agreement (Memorandum of Understanding) and a funding mechanism to provide ongoing maintenance of the water source by CDFG or some other party approved by BLM's Authorized Office and the CPM.**	APPROVED **ANNUAL REPORTING BY SCBC DURING OPERATIONS**	60 days of publication of Energy Commission Decision; 60 days prior start of ground disturbance; 18 months following publication of Energy Commission Decision	7/30/2010; Jan 2012 Rev 1 submitted; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	2-Oct-2012		Rev 1 dated January 2012, Approved CEC 10/2/12 email The SCBC will provide the project owner an annual report no later than January 15th of each year, and the project owner will provide to the CEC and BLM the annual report no later than January 31st of each year. ISEGS reached out to SCBS and requested an annual report but no feedback was received from SCBS since 2014.

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Biological Resources	BIO-20 (Continued-1)	4. Right of Access and Review for Compliance Monitoring: The CPM reserves the right to enter the project site or allow CDFG to enter the project site at any time to ensure compliance with these conditions. The project owner herein grants to the CPM and to CDFG employees and/or their representatives the right to enter the project site at any time, to ensure compliance with the terms and conditions and/or to determine the impacts of storm events, maintenance activities, or other actions that might affect the restoration and revegetation efforts. The CPM and CDFG may, at the CPM's discretion, review relevant documents maintained by the operator, interview the operator's employees and agents, inspect the work site, and take other actions to assess compliance with or effectiveness of mitigation measures. 5. Notification: The project owner shall notify the CPM and CDFG, in writing, at least five days prior to initiation of project activities in jurisdictional areas as noted and at least five days prior to completion of project activities in jurisdictional areas. The project owner shall notify the CPM and CDFG of any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts, if the conditions at the site of a proposed project change in a manner which changes risk to biological resources that may be substantially adversely affected by the proposed project. The notifying report shall be provided to the CPM and CDFG no later than seven days after the change of conditions is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project as defined below. *A copy of the notifying change of conditions report shall be included in the annual reports.* a. Biological Conditions: a change in biological conditions includes, but is not limited to, the following: 1) the presence of biological resources within or adjacent to the project area, whether native or non-native, not previously known to occur in the area; or 2) the presence of biological resources within or adjacent to the project area, whether native or nonnative, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.	No less than 90 days prior to acquisition of the parcel (s) containing 175 acres of waters of the state, the project owner, or a third-party approved by the CPM, in consultation with CDFG, shall submit a formal acquisition proposal to the CPM and CDFG describing the parcel(s) intended for purchase. Draft agreements to delegate land acquisition to CDFG or an approved third party and agreements to manage compensation lands shall be submitted to Energy Commission staff for review and approval (in consultation with CDFG) prior to land acquisition. Such agreements shall be mutually approved and executed at least 60 days prior to start of any project-related ground disturbance activities. The project owner shall provide written verification to the CPM that the compensation lands have been acquired and recorded in favor of the approved recipient(s). Alternatively, before beginning project ground disturbing activities, the project owner shall provide Security in accordance with this condition. Within 90 days after the land purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG, for the compensation lands and associated funds. No fewer than 30 days prior to the start of work potentially affecting waters of the state, the project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM that the above best management practices will be implemented and provide a discussion of work in waters of the state in Compliance Reports for the duration of the project.	ONGOING	90 days prior acquisition of parcels Annual submittal required in the Annual Compliance Report	Submitted JD to CDFG, CEC, RWQCB, and BLM on 6/8/2011; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			ongoing negotiations. BLM granted 1 year extension to 10/07/2013; The notifying change of conditions report was submitted in the annual compliance report.
Biological Resources	BIO-21-CEC	***Avian and Bat Monitoring and Management Plan:*** The Project owner shall prepare and implement an Avian and Bat Monitoring and Management Plan (Plan) to monitor death and injury of birds and bats from collisions with facility features including the solar receiver tower and reflective heliostat mirrors, and exposure to bright light and heat from concentrating sunlight. The Project owner shall use the monitoring data to inform and develop an adaptive management program that would avoid and minimize Project-related avian or bat impacts. Any Project-related bird or bat deaths or injuries shall be reported to the CPM, CDFG and USFWS, and then the CPM in consultation with CDFG and USFWS, shall then determine if the Project-related bird or bat deaths or injuries warrant implementation of adaptive management measures contained in the Plan. The study design for the Plan shall be approved by the CPM in consultation with CDFG and USFWS, and, once approved, shall be incorporated into the project's BRMIMP and implemented. During construction, bird and bat deaths or injuries shall be reported in the Monthly Compliance Report. For one year following the beginning of power plant operation, the Designated Biologist shall submit quarterly reports to the CPM, CDFG, and USFWS. describing the results of monitoring. The monthly and quarterly reports shall provide a detailed description of any Project-related bird or bat deaths or injuries detected during the monitoring study or at any other time, including describing the dates, species found injured or dead, where found, expected cause of injury or death, other appropriate results of monitoring, and a description of adaptive management measures proposed or implemented in accordance with any applicable CDFG or USFWS guidelines to avoid or minimize deaths or injuries. Following the completion of the fourth quarter of monitoring, the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any Project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed.	No later than January 31st of every year the Annual Report shall be provided to the CPM, CDFG, and USFWS. Quarterly reporting shall continue until the CPM, in consultation with CDFG and USFWS determine whether more years of monitoring are needed, and whether mitigation and adaptive management measures are necessary.	ONGOING	Annually & Quarterly	Revised Spring & Summer 2014 Reports submitted on 12/16/2014; 1/30/2015; 4/20/2015; 8/14/2015; 12/23/2015; 3/16/2016; 6/30/2016; 9/30/2016; 10/4/2016; 6/16/2017; 6/16/2017; 1/25/2018 (2017 Summer & Spring Reports); 12/17/2018 (2017 Fall Report)			Revised Spring & Summer 2014 Reports submitted on 12/16/2014; 2013-2014 Annual Report and 2014 Fall Report submitted on 4/20/2015; 2013-2014 Winter Report submitted on 8/14/2015; 2015 Spring Report submitted on 12/23/2015; ABMP Rev. 13 submitted on 12/23/2015; 2015 Summer Report submitted on 3/16/2016; 2015 Annual Report submitted on 6/30/2016; 2016 Avian Report submitted on 9/30/2016 2015 Winter Report submitted on 10/4/2016; 2016 Summer and Fall Avian Reports submitted on 6/16/2017; 2017 Summer and Spring Reports submitted on 1/25/2018; 2017 Fall eport submitted on 12/17/2018
			After two years of data collection, the project owner or contractor shall prepare a report that describes the study design and monitoring results of the Avian and Bat Monitoring and Management Plan. The report shall be submitted to the CPM, CDFG and USFWS no later than the third year after onset of Project operation.	Upcoming	Upcoming in 2016	6/30/2016; 8/15/2017; 10/3/2017			ISEGS Avian & Bat Monitoring Plan 2014-2015 Annual Report was submitted on 6/30/2016 ISEGS Avian & Bat Monitoring Plan 2015-2016 Annual Report was submitted on 8/15/2017. Avian and Bat Monitoring and Management Plan Rev. 14 was submitted on 10/3/2017.

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Biological Resources	BIO-22-CEC (continued-1)	Overview of Project Phases Phase 1 includes the following components (1,282 acres): a. Fence Colosseum Road; b. Fence the Construction Logistics Area (CLA) and Construct Holding Pens in the CLA; c. Fence, Conduct Clearance Surveys, and Construct Ivanpah 1 d. Fence Access Road and Power Block for Ivanpah 2, and Perform Construction Within Ivanpah 2 Power Block. Phase 1 would include 1,282 acres of desert tortoise mitigation, as well as 10 of the 30 acres of rare plant mitigation, and 58 of the 175 acres of state waters mitigation.	The Project Owner shall provide written verification to the CPM, CDFG, BLM and USFWS of the compensation lands acquisition, protection, and transfer requirements and satisfaction of associated funding requirements as set forth in BIO-17, BIO-18 and BIO-20 within the following time frames: (1) For Phase 1 mitigation, verification shall be provided no later than 18 months after the start of construction of Phase 1, and (2) for Phase 2 mitigation, such verification shall be provided no later than 18 months after the start of construction of Phase 2. Other verification, notification and reporting requirements and other deadlines set forth in BIO-17, BIO-18 and BIO-20 that relate to compensation land requirements, to the option of funding mitigation through the NFWF account, or to use of approved third parties to carry out mitigation requirements also apply to Phase 1 and to Phase 2. Within 90 days after completion of all project related ground disturbance for each project phase, the project owner shall provide to the CPM, CDFG, BLM and USFWS an analysis, based on aerial photography, with the final accounting of the amount of habitat disturbed during Project construction.	Submitted	90 days after Project Completion	29-Aug-2014			
Biological Resources	BIO-22-CEC (continued-1)	Phase 2 includes the following components (2,300 acres): a. Construct Ivanpah 2 – Consists of the diagonal access roads, perimeter road for fence, channel crossings as needed, and solar field including grading of approximately 90 acres in the southwest and central regions of the solar field area; b. Construct Ivanpah 3 - Consists of the diagonal access roads, perimeter road for fence, channel crossings as needed, power block, and solar field including grading of approximately 120 acres in the southern and western regions of the solar field area; c. Other external features including roads and gas line. Phase 2 would include 2,300 acres of desert tortoise mitigation, as well as 20 of the 30 acres of rare plant mitigation, and 117 of the 175 acres of state waters mitigation. General Requirements At no time may the project owner cause ground-disturbance to any location outside of the area that has been approved for construction according to the phasing plan identified in this Condition of Certification.	The Project Owner shall provide written verification to the CPM, CDFG, BLM and USFWS of the compensation lands acquisition, protection, and transfer requirements and satisfaction of associated funding requirements as set forth in BIO-17, BIO-18 and BIO-20 within the following time frames: (1) For Phase 1 mitigation, verification shall be provided no later than 18 months after the start of construction of Phase 1, and (2) for Phase 2 mitigation, such verification shall be provided no later than 18 months after the start of construction of Phase 2. Other verification, notification and reporting requirements and other deadlines set forth in BIO-17, BIO-18 and BIO-20 that relate to compensation land requirements, to the option of funding mitigation through the NFWF account, or to use of approved third parties to carry out mitigation requirements also apply to Phase 1 and to Phase 2. Within 90 days after completion of all project related ground disturbance for each project phase, the project owner shall provide to the CPM, CDFG, BLM and USFWS an analysis, based on aerial photography, with the final accounting of the amount of habitat disturbed during Project construction.	Submitted	90 days after Project Completion	29-Aug-2014			Phase 1 and Phase 2 securities paid, Land Acquisition in progress
Biological Resources	BIO-22-CEC (continued-2)	Prior to initiating construction in either phase of the Project, the project owner shall comply with all pre-construction requirements in this and other Conditions of Certification and shall notify the CPM that it has obtained a Notice to Proceed for the particular phase from the BLM. Construction activities, including work on linear and non-linear features, shall not occur outside desert tortoise exclusion areas that have been fenced and cleared in accordance with USFWS protocols and as described in Condition of Certification BIO-8 (Desert Tortoise Clearance and Exclusion Fencing). The project owner shall provide security to ensure implementation of the mitigation requirements in Conditions of Certification BIO-17 (Desert Tortoise Compensatory Mitigation), BIO-18 (Special-Status Plant Impact Avoidance and Minimization) and BIO-20 (Streambed Impact Minimization and Compensation Measures) for each of the two phases prior to any project construction associated with that phase. Phasing of security only applies to security required by the Conditions listed above. If the project owner elects to phase payments of security under either a Project Owner Acquisition or NFWF option and if the commencement of construction is delayed beyond June 1, 2011, the amount of the security (including payments to NFWF if applicable [see definition of security above]) will be adjusted by the CPM in consultation with DFG, BLM and USFWS prior to each phase to reflect the CPM's best estimate at that time of the estimated costs of land acquisition, long-term management and maintenance costs, and other costs that are included in the security computation. Those costs may be greater than the costs identified in the conditions of certification.	See above sections	Phase 1 and Phase 2 securities paid, Land Acquisition in progress	90 days after Project Completion	Rev. 2 submitted 6/28/2011			Phase 1 and Phase 2 securities paid, Land Acquisition in progress

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Biological Resources	BIO-22-CEC (continued-3)	**Even when security has been provided, the project owner shall complete the acquisition, protection and transfer of all compensation lands required in the conditions of certification listed above, as well as all funding requirements associated with those lands, within the time periods identified in those conditions of certification. Additional requirements within the project's conditions of certification that are not expressly phased in this condition shall be phased as necessary to carry out the purpose of this condition, and to ensure that no project construction occurs in an area for which the project owner has not provided security and obtained permission to begin construction. Examples may include such activities as construction and location of desert tortoise exclusion fencing or timing of preconstruction clearance surveys for other species. The project owner shall first obtain approval from the CPM, acting in consultation with BLM, CDFG and USFWS, for the phasing of any requirements or deadlines that are not expressly phased in conditions of certification. Security for phased construction shall be in the amounts as specified in Conditions of Certification BIO-17, -18 and -20, and may be adjusted by the CPM in consultation with DFG, BLM and USFWS based upon more accurate information provided by the project owner confirming the acreages described in this table, and on updates from the REAT agencies with more current guidance than the Desert Renewable Energy REAT Biological Resource Compensation/Mitigation Cost Estimate Breakdown for use with the REAT-NFWF Mitigation Account, July 23, 2010.**	**See above sections**	Phase 1 and Phase 2 securities paid, Land Acquisition in progress	90 days after Project Completion	Rev. 2 submitted 6/28/2011			Phase 1 and Phase 2 securities paid, Land Acquisition in progress
Biological Resources	BIO-23- BLM	**The applicant shall conduct visual biweekly surveys for bird and bat mortalities throughout the project site.** **In addition to the photo documentation of bird mortalities (Item #14 in BIO-11), mortalities and injuries to bats and other wildlife shall be photo documented. Additionally, data would document the species affected and any overt signs of injury resulting in death (e.g., scorched feathers). This information would be compiled and provided to the BLM on quarterly intervals for the first three years, then annually thereafter, unless otherwise requested by the BLM. This data would add to the understanding of impacts of solar facilities on avian and bat species. BLM would maintain the authority to require additional mitigation of the applicant in the future to reduce collision or heat-related injuries.** **Effectiveness: This mitigation would be highly effective in documenting avian and bat mortalities associated with the operation of the facility. If sufficient data are gathered to support the need for additional mitigation, the mitigation may ultimately be effective in reducing avian and bat injuries and mortalities if an effective mitigation measure can be identified in the future.**	**No Verification: see Effectiveness**	Ongoing	Quarterly	Revised Spring & Summer 2014 Reports submitted on 12/16/2014; 1/30/2015; 4/20/2015; 8/14/2015; 12/23/2015; 3/16/2016; 6/30/2016; 9/30/2016; 10/4/2016; 6/16/2017; 6/16/2017; 1/25/2018 (2017 Summer & Spring Reports); 12/17/2018 (2017 Fall Report)			Revised Spring & Summer 2014 Reports submitted on 12/16/2014; 2013-2014 Annual Report and 2014 Fall Report submitted on 4/20/2015; 2013-2014 Winter Report submitted on 8/14/2015; 2015 Spring Report submitted on 12/23/2015; ABMP Rev. 13 submitted on 12/23/2015; 2015 Summer Report submitted on 3/16/2016; 2015 Annual Report submitted on 6/30/2016; 2016 Avian Report submitted on 9/30/2016 2015 Winter Report submitted on 10/4/2016; 2016 Summer and Fall Avian Reports submitted on 6/16/2017; 2017 Summer and Spring Reports submitted on 1/25/2018; 2017 Fall eport submitted on 12/17/2018
Biological Resources	BIO-25-BLM	**The applicant shall monitor and control noxious and invasive weeds within 100 feet of the artificial water source. Control of weeds shall be coordinated with the BLM staff and shall consist of removal by mechanical methods, rather than herbicides.** **Effectiveness: This mitigation measure would be moderately effective in controlling noxious and invasive weeds near the artificial water source, providing better access to the site by big game.**	**No Verification: see Effectiveness**	Ongoing	N/A				
Biological Resources	BIO-26-BLM	**The applicant shall implement all mitigation identified by the USFWS in the Biological Opinion.** **Effectiveness: This measure would be highly effective in ensuring mitigation within the USFWS' Biological Opinion was implemented.**	**No Verification: see Effectiveness**	Ongoing	N/A				

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Biological Resources	BIO-27-BLM	**The project owner shall implement the Closure, Revegetation, and Rehabilitation Plan, Revision 3, dated July 6, 2010, with the following modifications.** **1. The long-term soil stockpiles, as discussed in Table 5-2 of the plan, will be no higher than 6 feet high.** **2. The Preliminary Seeding Plan for Short-Term Disturbed Areas, and to be used as the basis for the seeding during final project decommissioning, will be based upon the species list provided in Table 7-1 of the plan, rather than the species list in Table 7-2. The list may be modified at the time of decommissioning based on seed availability.** **3. Concrete will be removed to a minimum depth of 6 feet unless it is shown that a particular area is prone to flood hazards and a greater depth for concrete removal should be required. All concrete removed shall be hauled off the project site and disposed of in an approved facility. Crushed concrete will not be used as backfill on the site during decommissioning.** **4. Succulents salvaged during project construction will not be sold by the applicant. Should excess succulents be removed that cannot be transplanted in the Succulent Nursery Area, their disposition will be managed by BLM.** **Effectiveness: This measure modifies Revision 3 of the Closure, Revegetation, and Rehabilitation Plan to incorporate procedures which will increase the probability of successful site rehabilitation.**	**No Verification: see Effectiveness**	In Progress	N/A				
Biological Resources	BIO-28-BLM	**Compliance with Eagle Act. USFWS has notified BLM that due to the proximity of known occupied golden eagle territories, and that the effects of power towers on bald and golden eagles is unknown, this project has the potential to take an eagle. Due to the distance of the project site to known eagle territories, available mitigation measures (some of which are already described in other measures identified in this section), and habitat compensation associated with other species (i.e. desert tortoise), USFWS believes that this project can reach the "no net loss" standard for golden eagles identified in the Eagle Act Rule if the applicant submits and implements an Avian Protection Plan. The holder shall submit an Avian Protection Plan for approval of the Authorized Officer within 6 months of the issuance of any ROW grant for the project. The Avian Protection Plan must be implemented within one year from the date of any ROW grant Notice to Proceed.**	**No Verification: see Avian Protection Plan submittal**	Submitted	N/A	Draft Submitted Sept 2010; Revision 1 Submitted October 2010; Revision 2 Submitted May 2011			
Compliance Conditions	COMP-01	**Unrestricted Access: BLM's Authorized Officer, responsible BLM staff, the CPM, responsible Energy Commission staff, and delegated agencies or consultants shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site, for the purpose of conducting audits, surveys, inspections, or general site visits. Although BLM's Authorized Officer and the CPM will normally schedule site visits on dates and times agreeable to the project owner, BLM's Authorized Officer and the CPM reserve the right to make unannounced visits at anytime.**		ONGOING	N/A				
Compliance Conditions	COMP-02	**<u>Compliance Record:</u> The project owner shall maintain project files on-site or at an alternative site approved by BLM's Authorized Officer and the CPM for the life of the project, unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all "as-built" drawings, documents submitted as verification for conditions, and other project-related documents. As-built drawings of all facilities including linear facilities shall be provided to the BLM Authorized Officer for inclusion in the BLM administrative record within 90-days of completion of that portion of the facility or project. BLM and Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.**		SUBMITTED	90 days of completion of that portion of the facility or project	8-Dec-2014			Electronic copies of the final approved engineering plans were hand-delivered by Doug Davis to CEC on 12/8/2014.

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Compliance Conditions	COMP-03	**Compliance Verification Submittals: Each condition of certification is followed by a means of verification. The verification describes the Energy Commission's procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified as necessary by BLM's Authorized Officer and the CPM. Verification of compliance with the conditions of certification can be accomplished by the following:** **1. Monthly and/or annual compliance reports, timely filed by the project owner or authorized agent, reporting on work done and providing pertinent documentation, as required by the specific conditions of certification;** **2. Appropriate letters from delegate agencies verifying compliance;** **3. BLM and Energy Commission staff audits of project records; and/or** **4. BLM and Energy Commission staff inspections of work, or other evidence that the requirements are satisfied.** **Verification lead times associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.** **A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. The cover letter subject line shall identify the project by AFC number, the appropriate condition(s) of certification by condition number(s), and a brief description of the subject of the submittal. The project owner shall also identify those submittals not required by a condition of certification with a statement such as: "This submittal is for information only and is not required by a specific condition of certification." When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and BLM/CEC submittal number.**		ONGOING	N/A	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Verification of compliance with the conditions of certification are submitted with the Annual Compliance Report.
Compliance Conditions	COMP-03 (Continued)	**The project owner is responsible for the delivery and content of all verification submittals to the BLM's Authorized Officer and CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.** **All hardcopy submittals shall be addressed to each of the following:** **BLM's Authorized Officer** **(CACA-48668, 49502, 49503, and 49504)** **U.S. Bureau of Land Management** **1303 South Highway 95** **Needles, CA 92363** **Compliance Project Manager** **(07-AFC-5C)** **California Energy Commission** **1516 Ninth Street (MS-2000)** **Sacramento, CA 95814** **Those submittals shall be accompanied by a searchable electronic copy, on a CD or by e-mail, as agreed upon by BLM's Authorized Officer and the CPM.** **If the project owner desires BLM and/or Energy Commission staff action by a specific date, that request shall be made in the submittal cover letter and shall include a detailed explanation of the effects on the project if that date is not met.**		ONGOING	N/A	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Verification of compliance with the conditions of certification are submitted with the Annual Compliance Report.
Compliance Conditions	COMP-04 (Continued)	**If the project owner anticipates commencing project construction as soon as the project is certified, it may be necessary for the project owner to file compliance submittals prior to project certification.** **Compliance submittals should be completed in advance where the necessary lead time for a required compliance event extends beyond the date anticipated for start of construction. The project owner must understand that the submittal of compliance documents prior to project certification is at the owner's own risk. Any approval by Energy Commission staff is subject to change, based upon BLM's ROW Grant and the Energy Commission Decision.** **Compliance Reporting** **There are two different compliance reports that the project owner must submit to assist BLM's Authorized Officer and the CPM in tracking activities and monitoring compliance with the terms and conditions of BLM's ROW Grant and the Energy Commission Decision.** **During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to BLM's Authorized Officer and the CPM in the monthly or annual compliance reports.**		Approved - COMPLETED (CONSTRUCTION) **ONGOING DURING OPERATIONS**	**Annually beginning Jan. 2015**	5/14/2010 (draft) 6/4/2010 (final). Annual Compliance Report was submitted on 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	2-Sep-2010		The first Annual Compliance Report was be submitted on January 2015.

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Compliance Conditions	COMP-07	**Annual Compliance Report: After construction of each power plant is complete or when a power plant goes into commercial operation, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to BLM's Authorized Officer and the CPM each year at a date agreed to by BLM's Authorized Officer and the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by BLM's Authorized Officer and the CPM. Each Annual Compliance Report shall include the AFC number, identify the reporting period and shall contain the following:** **1. An updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);** **2. A summary of the current project operating status and an explanation of any significant changes to facility operations during the year;** **3. Documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter, with the condition it satisfies, and submitted as attachments to the Annual Compliance Report;** **4. A cumulative listing of all post-certification changes by the Energy Commission or changes to the BLM ROW grant or approved POD by BLM , or cleared by BLM's Authorized Officer and the CPM;** **5. An explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;** **6. A listing of filings submitted to, or permits issued by, other governmental agencies during the year;** **7. A projection of project compliance activities scheduled during the next year;** **8. A listing of the year's additions to the on-site compliance file;** **9. An evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date [see Compliance Conditions for Facility Closure addressed later in this section]; and** **10. A listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters**	**After construction of each power plant is complete or when a power plant goes into commercial operation, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to BLM's Authorized Officer and the CPM each year at a date agreed to by BLM's Authorized Officer and the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by BLM's Authorized Officer and the CPM.**	IN PROGRESS	Annually Report for Unit 1 System estimated due date April 2014 1 year from start-up scheduled for April 2013; **ANNUALLY BEGINNING JAN. 2015**	**Annual Compliance Report was submitted on 1/30/2015. 1/29/2016; 1/27/2017; 1/25/2018**			The first Annual Compliance Report was be submitted on January 2015.
Compliance Conditions	COMP-08	**Confidential Information: Any information that the project owner deems confidential shall be submitted to the Energy Commission's Dockets Unit with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq. Any information the ROW holder deems confidential shall be submitted to the BLM Authorized Officer with a written request for said confidentiality along with a justification for the request. All confidential submissions to BLM should be clearly stamped "proprietary information" by the holder when submitted.**		IN PROGRESS	As Needed	21-Jun-2016			Application for Confidential Designation - Root Cause Analysis for Unit 3 Fire Damage was submitted on 6/21/2016.
Compliance Conditions	COMP-09	**Annual Facility Compliance Fee: Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay the Energy Commission an annual compliance fee, which is adjusted annually. The amount of the fee for FY2009-2010 was $19,823. The initial payment is due on the date the Energy Commission adopts the final decision. You will be notified of the amount due. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.**		ONGOING	Annually - on or before July 1st	7/1/2014; 7/1/2015; 7/1/2016; 7/1/2017; 7/1/2018			**Paid annual compliance fee to CEC**
Compliance Conditions	COMP-10	**Reports of Complaints, Notices, and Citations: Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering with date and time stamp recording. All recorded complaints shall be responded to within 24 hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to BLM's Authorized Officer and the CPM who will post it on the Energy Commission's web page at:** **http://www.energy.ca.gov/sitingcases/power_plants_contacts.html** **Any changes to the telephone number shall be submitted immediately to BLM's Authorized Officer and the CPM, who will update the web page.** **In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to BLM's Authorized Officer and the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the NOISE conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).**		Approved - COMPLETED (CONSTRUCTION) **IN PROGRESS DURING OPERATIONS**	within 10 days of receipt of complaints	10/7/2010; Pilot Report ACN 1238677 was submitted to CEC/BLM on 5/5/2015; Notice of Violation (NOV) from SBC CUPA was submitted to CEC/BLM on 8/4/2016; Response to Glare complaint Pilot Report ACN 1390751 was submitted to CEC/BLM/FAA on 11/10/2016.	10/7/2010; 5/5/2015;		ISEGS did not receive pilot glare complaints in 2017. ISEGS did not receive any complaints, notices and citations including glare compaints in 2018.

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Compliance Conditions	COMP-10 (Continued)	**FACILITY CLOSURE** **At some point in the future, the project will cease operation and close down. At that time, it will be necessary to implement the Closure, Revegetation and Restoration Plan to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made that provide the flexibility to deal with the specific situation and project setting that exist at the time of closure. Laws, Ordinances, Regulations and Standards (LORS) pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure. Closure would be conducted in accordance with Condition of Certification BIO-14 that requires the project owner to develop and implement a Closure, Revegetation and Rehabilitation Plan. There are at least three circumstances in which a facility closure can take place: planned closure, unplanned temporary closure and unplanned permanent closure.**		Approved - COMPLETED (CONSTRUCTION) **IN PROGRESS DURING OPERATIONS**	within 10 days of receipt of complaints	7-Oct-2010	7-Oct-2010		
Compliance Conditions	COMP-10 (Continued-1)	**CLOSURE DEFINITIONS** **Planned Closure** **A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.** **Unplanned Temporary Closure** **An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency.** **Short-term is defined as cessation of construction activities or operations of a power plant for a period less than 6 months long. Cessation of construction of operations for a period longer than 6 months in considered a permanent closure.** **Unplanned Permanent Closure** **An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.**		Approved - COMPLETED (CONSTRUCTION) **IN PROGRESS DURING OPERATIONS**	within 10 days of receipt of complaints	7-Oct-2010	7-Oct-2010		
Compliance Conditions	COMP-11	**Planned Closure: In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a revision or update to the approved Closure, Revegetation and Rehabilitation Plan to BLM and the Energy Commission for review and approval at least 12 months (or other period of time agreed to by BLM's Authorized Officer and the CPM) prior to commencement of closure activities. The project owner shall file 50 copies and 50 CDs with the Energy Commission and 10 copies and 10 CDs with BLM (or other number of copies agreed upon by BLM's Authorized Officer and the CPM) of a proposed facility closure plan/Closure, Revegetation and Rehabilitation Plan. The plan shall:** **1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related materials that must be removed from the site;** **2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;**		Not Yet Started	12 months prior to commencement of closure activities				Submission not required at this time
Compliance Conditions	COMP-11 (Continued-1)	**3. address conformance of the plan with all applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of facility closure, and applicable conditions of certification; and.** **4. Address any changes to the site revegetation, rehabilitation, monitoring and long-term maintenance specified in the existing plan that are needed for site revegetation and rehabilitation to be successful.** **Prior to submittal of an amended or revised Closure, Revegetation and Restoration Plan, a meeting shall be held between the project owner, BLM's Authorized Officer and the Energy Commission CPM for the purpose of discussing the specific contents of the plan. In the event that there are significant issues associated with the proposed facility Closure, Revegetation and Restoration plan's approval, or the desires of local officials or interested parties are inconsistent with the plan, BLM's Authorized Officer the CPM shall hold one or more workshops and/or BLM and the Energy Commission may hold public hearings as part of its approval procedure.** **As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until BLM and the Energy Commission approves the facility Closure, Revegetation and Restoration plan.**		Not Yet Started	12 months prior to commencement of closure activities				Submission not required at this time

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Compliance Conditions	COMP-12	**Unplanned Temporary Closure/On-Site Contingency Plan: In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an On-Site Contingency Plan in place. The On-Site Contingency Plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.** **The project owner shall submit an On-Site Contingency Plan for BLM's Authorized Officer and CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by BLM's Authorized Officer and the CPM) after approval of any NTP or letter granting approval to commence construction for each phase of construction. A copy of the approved plan must be in place during commercial operation of the facility and shall be kept at the site at all times.** **The project owner, in consultation with BLM's Authorized Officer and the CPM, will update the On-Site Contingency Plan as necessary. BLM's Authorized Officer and the CPM may require revisions to the On-Site Contingency Plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the On-Site Contingency Plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by BLM's Authorized Officer and the CPM.**		Submitted - COMPLETED (CONSTRUCTION)	60 days after approval of any NTP or letter granting approval to commence work.	31-Jan-2011			
Compliance Conditions	COMP-12 (Continued)	**The On-Site Contingency Plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by BLM's Authorized Officer and the CPM, the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management.)** **In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the On-Site Contingency Plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.** **In the event of an unplanned temporary closure, the project owner shall notify BLM's Authorized Officer and the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the On- Site Contingency Plan. The project owner shall keep BLM's Authorized Officer and the CPM informed of the circumstances and expected duration of the closure.** **If BLM's Authorized Officer and the CPM determine that an unplanned temporary closure is likely to be permanent, or for a duration of more than 6 months, a Closure Plan consistent with the requirements for a planned closure shall be developed and submitted to BLM's Authorized Officer and the CPM within 90 days of BLM's Authorized Officer and the CPM's determination (or other period of time agreed to by BLM's Authorized Officer and the CPM).**		Submitted - COMPLETED (CONSTRUCTION)	60 days after approval of any NTP or letter granting approval to commence work.	31-Jan-2011			
Compliance Conditions	COMP-14	**Post Certification Changes to BLM's ROW Grant and/or the Energy Commission Decision: Amendments, Ownership Changes, Insignificant Project Changes and Verification Changes:** **The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and to transfer ownership or operational control of the facility. The BLM ROW holder must file a written requests in the form an an application to the BLM Authorized Officer in order to change the terms and conditions of their ROW grant or POD. Written requests will be in a manner prescribed by the BLM Authorized Officer.** **It is the responsibility of the project owner to contact BLM's Authorized Officer and the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769. Implementation of a project modification without first securing BLM and either Energy Commission or Energy Commission staff approval, may result in enforcement action in accordance with section 25534 of the Public Resources Code.** **A Petition to Amend is required for changes to the project as specified below. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to BLM's Authorized Officer and the CPM, who will file it with the Energy Commission's Dockets Unit in accordance with Title 20, California Code of Regulations, section 1209.** **The criteria that determine which type of approval and the process that applies are explained below. They reflect the provisions of Section 1769 at the time this condition was drafted. If the Commission's rules regarding amendments are amended, the rules in effect at the time an amendment is requested shall apply.**		As needed	As needed				There is no petition to amend filed in 2018

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Compliance Conditions	COMP-14 (Continued)	**Amendment - The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, Section 1769(a), when proposing modifications to the project (including linear facilities) design, operation, or performance requirements. If a proposed modification results in deletion or change of a condition of certification, or makes changes that would cause the project not to comply with any applicable laws, ordinances, regulations or standards, the petition will be processed as a formal amendment to the Energy Commission's final decision, which requires public notice and review of the BLM-Energy Commission staff analysis, and approval by the full Energy Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(a). Upon request, the CPM will provide you with a sample petition to use as a template. The ROW holder shall file an application to amend the BLM ROW grant for any substantial deviation or change in use. The requirements to amend a ROW grant are the same as when filing a new application including paying processing and monitoring fees and rent.**		As needed	As needed	See amendments under specific condition			There is no petition to amend filed in 2018
Compliance Conditions	COMP-14 (Continued-1)	**Change of Ownership** **Change of Ownership - Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769(b). This process requires public notice and approval by the full Commission and BLM. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(b). Upon request, the CPM will provide you with a sample petition to use as a template. The transfer of ownership of a BLM ROW grant must be through the filing of an application for assignment of the grant.** **Insignificant Project Change - Insignificant Project Change Modifications that do not result in deletions or changes to conditions of certification, and that are compliant with laws, ordinances, regulations and standards may be authorized by BLM's Authorized Officer and the CPM as an insignificant project change pursuant to section 1769(a) (2). This process usually requires minimal time to complete, and it requires a Energy Commission 14-day public review of the Notice of Insignificant Project Change that includes the BLM and Energy Commission staff's intention to approve the modification unless substantive objections are filed. These requests must also be submitted in the form of a "Petition to Amend" as described above. BLM and the Energy Commission intend to integrate a process to jointly approve insignificant project changes to avoid duplication of approval processes and ensure appropriate documentation for the public record.** **Verification Change - A verification change may be modified by the BLM's Authorized Officer and the without requesting an amendment to the ROW Grant or Energy Commission decision if the change does not conflict with the conditions of certification and provides an effective alternate means of verification.**		As needed	As needed	See amendments under specific condition			
Cultural Resources	CUL-10	**If fill soils must be acquired from a non-commercial borrow site or disposed of to a non-commercial disposal site, unless less-than-five-year-old surveys of these sites for archaeological resources are documented to and approved by the BLM's Authorized Officer and the CPM, the CRS shall survey the borrow and/or disposal site(s) for cultural resources and record on DPR 523 forms any that are identified. When the survey is completed, the CRS shall convey the results and recommendations for further action to the project owner, the BLM's Authorized Officer, and the CPM, who will determine what, if any, further action is required. If the BLM's Authorized Officer and the CPM determine that significant archaeological resources that cannot be avoided are present at the borrow site, all these conditions of certification shall apply. The CRS shall report on the methods and results of these surveys in the CRR.**	**1. As soon as the project owner knows that a non-commercial borrow site and/or disposal site will be used, he/she shall notify the CRS and CPM and provide documentation of previous archaeological survey, if any, dating within the past five years, for CPM approval.** **2. In the absence of documentation of recent archaeological survey, at least 30 days prior to any soil borrow or disposal activities on the noncommercial borrow and/or disposal sites, the CRS shall survey the site/s for archaeological resources. The CRS shall notify the project owner, the BLM's Authorized Officer, and the CPM of the results of the cultural resources survey, with recommendations, if any, for further action.**	Ongoing	As needed				
Facility Design	GEN-1	**The project owner shall design, construct, and inspect the project in accordance with the 2007 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the chief building official (CBO) for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility (2007 CBC, Appendix Chapter 1, section 101.2, Scope). All transmission facilities (lines, switchyards, switching stations, and substations) are covered in the Conditions of Certification in the Transmission System Engineering section of this document.** **In the event that the initial engineering designs are submitted to the CBO when the successor to the 2007 CBSC is in effect, the 2007 CBSC provisions shall be replaced with the applicable successor provisions.** **Where, in any specific case, different sections of the code specify different materials, methods of construction, or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.** **The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.**	**Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to BLM's Authorized Officer and the Compliance Project Manager (CPM) a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide BLM's Authorized Officer and the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO (2007 CBC, Appendix Chapter 1, section 110, Certificate of Occupancy). Once the certificate of occupancy has been issued, the project owner shall inform BLM's Authorized Officer and the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. BLM's Authorized Officer and the CPM will then determine if the CBO needs to approve the work.**	Completed	30 days following receipt of the certificate of occupancy	1/22/2015; Notified CEC/BLM on 4/27/2016 for repair/replacement of Unit 2 STG Stator Active Parts.			**The Certificate of Occupancy was issued by CEC/CBO on January 21, 2015.** **The Certificate of Occupancy was submitted to BLM on 1/22/2015.** **A CBO inspection for the new ammonia tank system was performed on 3/16/2018.**

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Facility Design	GEN-8	**The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify BLM's Authorized Officer and the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at an alternative site approved by BLM's Authorized Officer and the CPM during the operating life of the project (2007 CBC, Appendix Chapter 1, section 106.3.1, Approval of Construction Documents). Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by BLM's Authorized Officer and the CPM.**	**Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to BLM's Authorized Officer and the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans.** After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to BLM's Authorized Officer and the CPM a letter stating both that the above documents have been stored and the storage location of those documents. **Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0) files, with restricted (password-protected) printing privileges, on archive quality compact discs.**	COMPLETED (CONSTRUCTION) **SUBMITTED**	within 15 days of completion of any work; **within 90 days of completion of construction**	**8-Dec-2014**			**Electronic copies of the final approved engineering plans were hand-delivered by Doug Davis to CEC on 12/8/2014.**
Hazardous Materials	HAZ-1	**The project owner shall not use any hazardous materials not listed in Hazardous Materials Appendix A, below, or in greater quantities than those identified by chemical name in Hazardous Materials Appendix A, unless approved in advance by the BLM's Authorized Officer and Compliance Project Manager (CPM).**	**The project owner shall provide to BLM's Authorized Officer and the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.**	ONGOING - ANNUALLY	ANNUALLY - To be submitted with the ACR	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted with the Annual Compliance Report
Hazardous Materials	HAZ-2	**The project owner shall concurrently provide a Hazardous Materials Business Plan to the Hazardous Materials Division of the County of San Bernardino Fire Department, BLM's Authorized Officer and the CPM for review. After receiving comments from the Hazardous Materials Division of the County of San Bernardino Fire Department, BLM's Authorized Officer and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from BLM's Authorized Officer and the CPM. . Copies of the final Hazardous Materials Business Plan shall then be provided to the Hazardous Materials Division of the County of San Bernardino Fire Department for information and to the BLM's Authorized Officer and CPM for approval.**	**At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to BLM's Authorized Officer and the CPM for approval.**	COMPLETED (CONSTRUCTION) **ONGOING COMPLIANCE DURING OPERATIONS**	60 days prior receiving any hazardous material on the site	9/26/2012, 11/01/12 & 12/14/12; **2/13/2013**			Chem Clean procedures submitted 9/26/12, 11/01/12 and 12/14/12. **Submitted Hazardous Materials Business Plan on 2/13/2013.** **Updated HMBP in CERS on 1/31/2017, 6/5/2017, 8/23/2017, & 1/29/2018**
Hazardous Materials	HAZ-3	**The project owner shall develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.**	**At least sixty (60) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to BLM's Authorized Officer and the CPM for review and approval**	Approved - COMPLETED (CONSTRUCTION) **ONGOING COMPLIANCE DURING OPERATIONS**	60 days prior to the delivery of any liquid hazardous material to the facility	29-Apr-2013	13-Jun-2013		**Safety Management Plan submitted on 4/29/13**
Hazardous Materials	HAZ-5	**The project owner shall prepare a site-specific Operation Security Plan for the operational phase, which shall be made available to BLM's Authorized Officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage.**	**At least 30 days prior to the initial receipt of hazardous materials onsite, the project owner shall notify BLM's Authorized Officer and the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.** **The level of security to be implemented shall not be less than that described below (as per NERC 2002). The Operations Security Plan shall include the following:** **1. Permanent full perimeter fence or wall, at least eight feet high around the Solar Field; Ivanpah Solar Electric Generating System Page 15 07-AFC-5** **2. Main entrance security gate, either hand operable or motorized;** **3. Evacuation procedures;** **4. Protocol for contacting law enforcement, BLM's Authorized Officer and the CPM in the event of suspicious activity or emergency or conduct endangering the facility, its employees, or contractors; and** **5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;** **a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;**	**ONGOING**	30 days prior to the initial receipt of hazardous materials **ANNUALLY beginning 2015**	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted with the Annual Compliance Report

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Hazardous Materials	HAZ-5 (continued-1)	**The project owner shall prepare a site-specific Operation Security Plan for the operational phase, which shall be made available to BLM's Authorized Officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage.**	**b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by BLM's Authorized Officer and the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by BLM's Authorized Officer and the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy; 6. a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy; b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by BLM's Authorized Officer and the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by BLM's Authorized Officer and the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy; 7. Site access controls for employees, contractors, vendors, and visitors;**	**ONGOING**	30 days prior to the initial receipt of hazardous materials **ANNUALLY beginning 2015**	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted with the Annual Compliance Report
Hazardous Materials	HAZ-5 (continued-2)	**The project owner shall prepare a site-specific Operation Security Plan for the operational phase, which shall be made available to BLM's Authorized Officer and the CPM for review and approval. The project owner shall implement site security measures addressing physical site security and hazardous materials storage.**	**8. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and 9. Additional measures to ensure adequate perimeter security consisting of either: a. Security guard present 24 hours per day, seven days per week, OR b. Power plant personnel on-site 24 hours per day, seven days per week and all of the following: 1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have Ivanpah Solar Electric Generating System Page 16 07-AFC-5 low-light capability, are recordable, and are able to view 100% of the perimeter fence, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; AND 2) Perimeter breach detectors or on-site motion detectors. The project owner shall fully implement the security plans and obtain BLM's Authorized Officer and CPM approval of any substantive modifications to the security plans. BLM's Authorized Officer and the CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power plant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the project owner.**	**ONGOING**	30 days prior to the initial receipt of hazardous materials **ANNUALLY**	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted with the Annual Compliance Report

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Hazardous Materials	HAZ-6	**The holder (project owner) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b**	**A copy of any report required or requested by any Federal agency or State government entity as a result of a reportable release or spill of any toxic substances shall be furnished to BLM's Authorized Officer and the CPM concurrent with the filing of the reports with the Federal or State governmental entity.**	ONGOING	As Needed	8/15/2016; 10/13/2016; 8/21/2017; 9/11/2017, 11/3/2017;			Notified CEC/BLM on 7/29/2016 on the lube oil release on 7/29/2016 at Unit 1. The Spill Report was submitted on 8/15/2016. Notified CEC/BLM on 10/2/2016 on the lube oil release at Unit 3. The Spill Report was submitted on 10/13/2016. Submitted Spill Reports at Unit 3 on 8/21/2017, 9/11/2017, & 11/3/2017.
Land Use	LAND-1	**The project owner shall obtain a Right-of-Way Grant (ROW Grant) from the Bureau of Land Management (BLM). Among the conditions for obtaining the ROW grant, the applicant shall provide the following:** **A. Prior to issuance of any right of way grant, the project owner shall submit a final Plan(s) of Development that describes in detail the construction, operation, maintenance, and termination of the right-of-way and its associated improvements and/or facilities. The project owner shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the final approved Plan of Development. The degree and scope of these plans will vary depending upon (1) the complexity of the right-of-way or its associated improvements and/or facilities, (2) the anticipated conflicts that require mitigation, and (3) additional technical information required by BLM's Authorized Officer and the CPM. The plans will be reviewed, and if appropriate, modified by the project owner until acceptable, and approved by BLM's Authorized Officer and the CPM.** **B. A bond, acceptable to BLM's Authorized Officer, shall be furnished by the owner prior to the issuance of a Notice to Proceed with construction or at such earlier date as may be specified by BLM's Authorized Officer. The amount of this bond shall be determined by BLM's Authorized Officer. This bond must be maintained in effect until removal of improvements and restoration of the right-of-way have been accepted by BLM's Authorized Officer and the CPM.**	**At least 30 days prior to the start of construction and prior to any Notice to Proceed with construction issued by BLM's Authorized Officer and the CPM, the project owner shall provide BLM's Authorized Officer and the CPM with documentation of the following:** **A. BLM's ROW Grant and final approved Plan of Development;** **B. The bond satisfactory to BLM's Authorized Officer;** **C. Certification that the project owner acknowledges that the ISEGS development and all related construction, operation, maintenance and closure activities are to be conducted in conformance with the approved Plan of Development and within the approved ROW boundaries for the life of the project.**	COMPLETED (CONSTRUCTION) **ONGOING COMPLIANCE DURING OPERATIONS**	30 days prior to start of construction	4-Oct-2010	3/14/2012 CLA and Tortoise Pen along I-15; 5/07/12 Yates Well rd;		BLM issued ROW grants: CACA 049502 (CLA) - 10/7/10; CACA 049504 (Unit 1) - 10/7/10; CACA 048668 (Unit 2) - 10/7/10; CACA 049503 (Unit 3) - 10/7/13; CACA 049502 Amend. #1 - 3/14/11; Amend. #2 - 3/9/12; Amend. #3 - 5/2/12; Amend. #4 - 3/26/13 and Amend. #5 - 4/16/13
Land Use	LAND-3	**Prior to the start of commercial operations of the first ISEGS power plant to be constructed, the project owner shall prepare plans for a Solar / Ecological Interpretive Center to be developed to in the vicinity of the ISEGS project. The project owner in consultation with the County shall propose a location on-site or off-site that provides a vantage point to observe as many features as is possible of the ISEGS project without compromising safety or security. The project owner's plans for the Solar / Ecological Interpretive Center may be coordinated with San Bernardino County.** **The Solar / Ecological Interpretive Center shall include or make accessible to the public the following features:** **1. surfaced public parking** **2. information kiosks describing ISEGS solar energy technology;** **3. picnic area with tables,** **4. garbage cans; 5. interpretive signs identifying local landmarks and ecological features;** **6. a contained restroom facility (or reasonable access to a facility with flush toilets and sinks should the Solar / Ecological Interpretive Center be constructed adjacent to another facility having a restroom).**	**At least 30 days prior to commercial operation of the first power plant of the ISEGS development, the project owner shall submit plans to BLM's Authorized Officer and the CPM for review and approval for a Solar / Ecological Interpretive Center to be developed in the ISEGS vicinity in coordination with San Bernardino County. Within 6 months of approval of the proposed Solar /Ecological Interpretive Center plans (1) by the Commission and the BLM, for an on-site Center, or (2) by the County of San Bernardino, for an off-site Center, being final and no longer subject to administrative or judicial review, the project owner shall commence construction of the Center and shall to the extent feasible complete construction within one year following the start of construction if the Center is located off of the ISEGS site. If located onsite, then construction of the Center shall follow the completion of all ISEGS construction. Upon completion the project owner shall submit notice to BLM and the Energy Commission that it has completed construction of the Solar / Ecological Interpretive Center.** **In each Annual Compliance Report, the project owner shall provide a summary of estimated public use of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.**	Submitted and Approved - **ONGOING DURING PROJECT OPERATIONS**	30 days prior to commercial operations. 60 days after completion of construction **Annually beginning 2016**	9/23/2013; BLM was notified of SEIC completion and accepted on 5/13/2015; CEC was notified of SEIC completion and accepted on 5/19/2015; SEIC Post Construction report was submitted on 7/16/2015; 1/29/2016; Submitted information kiosk panel design to BLM on 12/19/2016. 1/27/2017; 1/25/2018	BLM Approved on 9/23/13; BLM accepted on 5/13/2015; CEC accepted on 5/19/2015		**9/25/13:** Solar/Ecological Interpretive Center Plan was submitted to BLM on 9/23/2013; BLM approved on 9/25/13. The Plan was submitted to CEC on 9/25/13. **1/20/2015 to 4/17/2015:** Construction period. **5/13/2015:** BLM inspected and accepted the Solar Ecological Interpretive Center. **7/16/2015:** Submitted post-construction report for the Solar Ecological Interpretive Center. Kiosk panel design approval still pending from BLM in 2017. Payment for production of Kiosk panels was sent to BLM on 3/23/2018.
Noise & Vibration	NOISE-3	**The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval a *noise control program* and a statement, signed by the project owner's project manager, verifying that the noise control program will be implemented throughout construction of the project. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA and Cal/OSHA standards.**	**At least 30 days prior to the start of ground disturbance, the project owner shall submit to BLM's Authorized Officer and the CPM the *noise control program* and the project owner's project manager's signed statement. The project owner shall make the program available to Cal/OSHA upon request.**	Approved - COMPLETED **ONGOING COMPLIANCE DURING OPERATIONS**	30 days prior to the start of ground disturbance	11-Aug-2010	7-Oct-2010		

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Noise & Vibration	NOISE-4	The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that operation of the project will not cause noise complaints from residents of Primm, Nevada, or from the operator of the Primm Valley Golf Course or from visitors from the Mojave National Preserve. If legitimate project-related noise complaints are received from residents of Primm, the project owner shall perform a noise survey to demonstrate that noise levels due to plant operation do not exceed an average of 45 dBA Leq measured at the nearest residence of the community of Primm, Nevada. If legitimate project-related noise complaints are received from the operator of the Primm Valley Golf Course, or the visitors from the Mojave National Preserve, the project owner shall perform a noise survey to demonstrate that noise levels due to plant operation do not exceed an average of 55 dBA Leq measured at the nearest boundary of the golf course, or the nearest boundary of the Mojave National Preserve, respectively. No new project components creating pure-tone noises will be added to the project unless they are balanced by other plant features. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints. A. The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to BLM's Authorized Officer and the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected location. The character of the plant noise shall be evaluated at the affected residential locations to determine the presence of pure tones or other dominant sources of plant noise.	The survey shall take place within 30 days of the receipt of the noise complaint, unless the complaint has been resolved to the complaining party's satisfaction. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to BLM's Authorized Officer and the CPM. Included in the survey report will be a description of additional mitigation measures (if any) necessary to achieve compliance with the above-listed noise limit and a schedule, subject to BLM's Authorized Officer and CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey. Within 15 days of completion of the new survey, the project owner shall submit to BLM's Authorized Officer and the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.	ONGOING DURING OPERATIONS	Within 30 days of the Receipt of noise Complaint				ISEGS dod not received noise complaint in 2018
Noise & Vibration	NOISE-5	Following each phase (Ivanpah 1, Ivanpah 2, and Ivanpah 3) of the project's first achieving a sustained output of 80 percent or greater of rated capacity, the project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility. The surveys shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095–5099 and Title 29, Code of Federal Regulations section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure. The project owner shall prepare reports of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable California and federal regulations.	Within 30 days after completing each survey, the project owner shall submit the noise survey report to BLM's Authorized Officer and the CPM. The project owner shall make the reports available to OSHA and Cal/OSHA upon request.	ONGOING DURING OPERATIONS	Within 30 days after completing each survey	28-Oct-2014			Noise survey was conducted on 10/3/2014. The report was submitted to CEC and BLM on 10/28/2014.
Noise & Vibration	NOISE-6	Noisy construction work or heavy equipment operation that causes offsite annoyance as evidenced by the filing of a legitimate noise complaint shall be restricted to 7:00 am to 7:00 pm time period. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.	Prior to ground disturbance, the project owner shall transmit to BLM's Authorized Officer and the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.	Approved - COMPLETED (CONSTRUCTION)	prior to ground disturbance	28-Jul-2010	2-Sep-2010		
Geology & Paleontology	PAL-6	The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils, identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all paleontological resource materials encountered and collected during project construction.	The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of BLM Authorized Officer- and CPM-approved paleontological resource report (see PAL-7). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to BLM's Authorized Officer and the CPM.	ONGOING	Files are needed to be maintained for 3 years after project completion.				
Geology & Paleontology	PAL-7	The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval. The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.	Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to BLM's Authorized Officer and the CPM.	SUBMITTED	90 days after completion of ground disturbing activities	9-Jan-2014			**1/9/14:** Paleontological Resources Report was submitted by CH2M Hill to CEC and BLM on 1/9/2014.

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Recreation	REC-1	**Prior to the start of construction and in conformance with § 25529 of the Warren-Alquist Act, the project owner shall prepare plans for a Solar / Ecological Interpretive Center to be developed in the ISEGS Construction Logistics Area and submit them to BLM's Authorized Officer and the CPM for review and approval. The plans shall propose a location that if possible provides a vantage point to observe as many features as is possible of the ISEGS project without compromising ISEGS security requirements. The Solar / Ecological Interpretive Center shall include the following features:** **1. surfaced public parking for 12 vehicles (4 of which would allow vehicles with trailers);** **2. information kiosks describing ISEGS solar energy technology;** **3. picnic area with 8 shaded tables;** **4. garbage cans;** **5. interpretive signs identifying local landmarks and ecological features;** **6. a two stall contained restroom facility (or a facility with flush toilets and sinks);** **7. a drinking fountain; and** **8. native plant landscaping with plant identification labels.** **Prior to commercial operation of the first constructed power plant of the ISEGS development, the project owner shall complete construction of the Solar / Ecological Interpretive Center and request final approval by both BLM's Authorized Officer and the CPM. The project owner shall operate and maintain the Solar / Ecological Interpretive Center for the life of the ISEGS project.**	**Verification: At least 30 days prior to completion of construction of the first power plant of the ISEGS development, the project owner shall submit plans for a Solar / Ecological Interpretive Center to be developed in the ISEGS Construction Logistics Area and submit them to BLM's Authorized Officer and the CPM for review and approval.** **Prior to commercial operation, the project owner shall submit notice to BLM and the Energy Commission that it has completed construction of the Solar / Ecological Interpretive Center and shall request final approval by both BLM's Authorized Officer and the CPM.** **After commercial operation and in each Annual Compliance Report for the life of the ISEGS project, the project owner shall provide a summary of estimated public utilization of the Solar / Ecological Interpretive Center and summarize any issues associated with operating and maintenance activities.**	Submitted and Approved - ONGOING DURING PROJECT OPERATIONS	30 days prior to commercial operations. 60 days after completion of construction **Annually beginning 2016**	9/23/2013; BLM was notified of SEIC completion and accepted on 5/13/2015; CEC was notified of SEIC completion and accepted on 5/19/2015; SEIC Post Construction report was submitted on 7/16/2015; 1/29/2016; 1/27/2017; 1/25/2018	BLM Approved on 9/23/13; BLM accepted on 5/13/2015; CEC accepted on 5/19/2015		**9/25/13:** Solar/Ecological Interpretive Center Plan was submitted to BLM on 9/23/2013; BLM approved on 9/25/13. The Plan was submitted to CEC on 9/25/13. SEIC has been bid out and construction will start in early 2015. **5/13/2015:** BLM inspected and accepted the Solar Ecological Interpretive Center. **7/16/2015:** Submitted post-construction report for the Solar Ecological Interpretive Center Submitted with the Annual Compliance Report
Recreation	REC-2	**The applicant shall allow and be required to afford public access to the routes for which BLM grants a right of way, as noted above.** **Effectiveness: By allowing public access to the routes that are redirected around the project perimeter, the current level of public access to recreational areas would be maintained.**	**No Verification: see Effectiveness**	ONGOING	N/A				
Soil & Water	S&W-1	**Prior to site mobilization, the project owner shall obtain both BLM's Authorized Officer and the CPM's approval for a site specific DRAINAGE EROSION AND SEDIMENT CONTROL PLAN (DESCP) that ensures protection of water quality and soil resources of the project site and all linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, and identify all monitoring and maintenance activities. The project owner shall complete all engineering plans, reports, and documents necessary for both LM's Authorized Officer and the CPM to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements presented herein. The plan shall be consistent with the grading and drainage plan as required by Condition of Certification CIVIL-1 and shall contain the following elements:** **Vicinity Map: A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and canals, major utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale.** **Site Delineation: The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale** **Drainage: The DESCP shall include the following elements:** **a. Topography. Topography for offsite areas are required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.** **b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.** **c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.** **d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.** **Watercourses and Critical Areas: The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.**	**The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification CIVIL-1, and relevant portions of the DESCP shall be submitted to the chief building official (CBO) for review and approval. In addition, the project owner shall do all of the following:** **a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino and the RWQCB for review and comment. Both BLM's Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB and approve the DESCP.** **b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment control measures and the results of monitoring and maintenance activities.** **c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.** **d. Provide BLM's Authorized Officer and the CPM with two (2) copies each of all monitoring or compliance reports.**	DESCP was submitted and approved **IN PROGRESS / ONGOING DURING OPERATIONS**	90 days prior to the start of site mobilization, **Annually Beginning 2015**	DESCP (Phase 1) 6/15/2010; (Phase 2) 1/28/2011; (Phase 3) 4/8/2011. Submitted with the Annual Compliance Report on 1/30/2015.; 1/29/2016; 1/27/2017; 1/25/2018	DESCP (Phase 1) 10/4/2010		Ongoing reporting in the monthly compliance report, Annual SWPP submitted 8/31/12 DESCP (Phase 1) - Approved; (Phase 2) - Submitted; (Phase 3) - Submitted; Submitted in the Annual Compliance Report

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Soil & Water	S&W-1 (continued-1)	**Site Delineation: The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale** **Drainage: The DESCP shall include the following elements:** **a. Topography. Topography for offsite areas are required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.** **b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.** **c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow.** **d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.** **Watercourses and Critical Areas: The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas.**	**The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification CIVIL-1, and relevant portions of the DESCP shall be submitted to the chief building official (CBO) for review and approval. In addition, the project owner shall do all of the following:** **a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino and the RWQCB for review and comment. Both BLM's Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB and approve the DESCP.** **b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment control measures and the results of monitoring and maintenance activities.** **c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.** **d. Provide BLM's Authorized Officer and the CPM with two (2) copies each of all monitoring or compliance reports.**	DESCP was submitted and approved **IN PROGRESS / ONGOING DURING OPERATIONS**	90 days prior to the start of site mobilization, **Annually Beginning 2015**	DESCP (Phase 1) 6/15/2010; (Phase 2) 1/28/2011; (Phase 3) 4/8/2011. Submitted with the Annual Compliance Report on 1/30/2015.; 1/29/2016; 1/27/2017; 1/25/2018	DESCP (Phase 1) 10/4/2010		Ongoing reporting in the monthly compliance report, Annual SWPP submitted 8/31/12 DESCP (Phase 1) - Approved; (Phase 2) - Submitted; (Phase 3) - Submitted; Submitted in the Annual Compliance Report
Soil & Water (Continued)	S&W-1 (continued-2)	**Clearing and Grading: The plan shall provide a delineation of all areas to be cleared of vegetation, areas to be preserved, and areas where vegetation would be cut to allow clear movement of the heliostats. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.** **Soil Wind and Water Erosion Control: The plan shall address exposed soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation; BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by both BLM's Authorized Officer and the CPM prior to use.** **Project Schedule: The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final grading/stabilization). BMP implementation schedules shall be provided for each project element for each phase of construction.**	**The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification CIVIL-1, and relevant portions of the DESCP shall be submitted to the chief building official (CBO) for review and approval. In addition, the project owner shall do all of the following:** **a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino and the RWQCB for review and comment. Both BLM's Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB and approve the DESCP.** **b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment control measures and the results of monitoring and maintenance activities.** **c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.** **d. Provide BLM's Authorized Officer and the CPM with two (2) copies each of all monitoring or compliance reports.**	DESCP was submitted and approved **IN PROGRESS / ONGOING DURING OPERATIONS**	90 days prior to the start of site mobilization, **Annually Beginning 2015**	DESCP (Phase 1) 6/15/2010; (Phase 2) 1/28/2011; (Phase 3) 4/8/2011. Submitted with the Annual Compliance Report on 1/30/2015.; 1/29/2016; 1/27/2017; 1/25/2018	DESCP (Phase 1) 10/4/2010		Ongoing reporting in the monthly compliance report, Annual SWPP submitted 8/31/12 DESCP (Phase 1) - Approved; (Phase 2) - Submitted; (Phase 3) - Submitted; Submitted in the Annual Compliance Report
Soil & Water	S&W-1 (continued-3)	**Best Management Practices: The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.** **Erosion Control Drawings: The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion control specialist.** **Agency Comments: The DESCP shall include copies of recommendations from the County of San Bernardino, California Department of Fish and Game (CDFG), and Lahontan Regional Water Quality Control Board (RWQCB).** **Monitoring Plan: Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions and the requirements specified in Appendix B, C, and D.**	**The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification CIVIL-1, and relevant portions of the DESCP shall be submitted to the chief building official (CBO) for review and approval. In addition, the project owner shall do all of the following:** **a. No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino and the RWQCB for review and comment. Both BLM's Authorized Officer and the CPM shall consider comments received from San Bernardino County and RWQCB and approve the DESCP.** **b. During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment control measures and the results of monitoring and maintenance activities.** **c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.** **d. Provide BLM's Authorized Officer and the CPM with two (2) copies each of all monitoring or compliance reports.**	DESCP was submitted and approved **IN PROGRESS / ONGOING DURING OPERATIONS**	90 days prior to the start of site mobilization, **Annually Beginning 2015**	DESCP (Phase 1) 6/15/2010; (Phase 2) 1/28/2011; (Phase 3) 4/8/2011. Submitted with the Annual Compliance Report on 1/30/2015.; 1/29/2016; 1/27/2017; 1/25/2018	DESCP (Phase 1) 10/4/2010		Ongoing reporting in the monthly compliance report, Annual SWPP submitted 8/31/12 DESCP (Phase 1) - Approved; (Phase 2) - Submitted; (Phase 3) - Submitted; Submitted in the Annual Compliance Report

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Soil & Water	S&W-2	**The project owner shall comply with the requirements specified in Appendix B, C, and D for dredge and fill, wastewater, and storm water discharges associated with construction and industrial activity. These requirements relate to discharges, or potential discharges, of waste that could affect the quality of waters of the state, and were developed in consultation with staff of the State Water Resources Control Board and/or the applicable California Regional Water Quality Control Board (hereafter "Water Boards"). It is the Commission's intent that these requirements be enforceable by both the Commission and the Water Boards. In furtherance of that objective, the Commission hereby delegates the enforcement of these requirements, and associated monitoring, inspection and annual fee collection authority, to the Water Boards. Accordingly, the Commission and the Water Board shall confer with each other and coordinate, as needed, in the enforcement of the requirements. The project owner shall pay the annual waste discharge permit fee associated with this facility to the Water Boards. In addition, the Water Boards may "prescribe" these requirements as waste discharge requirements pursuant to Water Code Section 13263 solely for the purposes of enforcement, monitoring, inspection, and the assessment of annual fees, consistent with Public Resources Code Section 25531, subdivision (c). The project owner shall develop, obtain both BLM's Authorized Officer and CPM approval of, and implement a construction Storm Water Pollution Prevention Plan (SWPPP) for the construction of the project and an Industrial SWPPP for operation of the project.**	**At least sixty (60) days prior to commercial operation, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the Industrial SWPPP for operation of the project for review and approval prior to commercial operation. The project owner shall retain a copy on site. *The project owner shall submit copies to both BLM's Authorized Officer and the CPM of all correspondence between the project owner and the Lahontan RWQCB regarding the WDRs for discharge of storm water associated with construction and industrial activity within ten (10) days of its receipt or submittal. .***	**ONGOING DURING OPERATIONS**	**60 days Prior to Commercial Operations**	8/27/2013; 6/30/2014; 6/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			**Industrial SWPPP for Operations submitted to CEC/BLM on 8/27/13** **SWPPP Annual Reports submitted to SWRCB - 6/30/2014; 6/30/2015;** **Submitted with the Annual Compliance Report**
Soil & Water	S&W-3	**Pre-Well Installation. The project owner shall construct and operate up to two onsite groundwater wells that produce water from the IVGB. The project owner shall ensure that the wells are completed in accordance with all applicable state and local water well construction permits and requirements, including the San Bernardino County's Desert Groundwater Management Ordinance. Prior to initiation of well construction activities, the project owner shall submit for review and comment a well construction packet to the County of San Bernardino, in accordance with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5, containing the documentation, plans, and fees normally required for the county's well permit, with copies to both BLM's Authorized Officer and the CPM. The project shall not construct a well or extract and use groundwater until both BLM's Authorized Officer and the CPM provides approval to construct and operate the well.** **Post-Well Installation. The project owner shall provide documentation to both BLM's Authorized Officer and the CPM that the well has been properly completed. In accordance with California's Water Code section 13754,** **the driller of the well shall submit to the DWR a Well Completion Report for each well installed.** **No later than 180 days prior to the construction of the onsite groundwater wells, the project owner shall submit a Groundwater Monitoring and Management Plan to the County of San Bernardino for review and comment (see Condition of Certification Soil & Water - 6)**	**The project owner shall ensure the Well Completion Reports are submitted and shall ensure compliance with all county water well standards and requirements for the life of the wells. The project owner shall do all of the following:** **1. No later than 180 days prior to the construction of the onsite groundwater wells, the project owner shall submit a Groundwater Monitoring and Management Plan to the County of San Bernardino for review and comment (see Condition of Certification Soil & Water - 6)** **2. No later than sixty (60) days prior to the construction of the onsite groundwater wells, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the water well construction packet submitted to the County of San Bernardino for review and comment.** **3. No later than thirty (30) days prior to the construction of the onsite water supply wells, the project owner shall submit a copy of any written comments received from the County of San Bernardino indicating whether the proposed well construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program.** **4. No later than sixty (60) days after installation of each well at the project site, the project owner shall provide to both BLM's Authorized Officer and the CPM copies of the Well Completion Reports submitted to the DWR by the** **well driller. The project owner shall submit to the CPM with the Well Completion Report a copy of well drilling logs, water quality analyses, and any inspection reports.** **5. During well construction and for the operational life of the well, the project owner shall submit two (2) copies each to BLM's Authorized Officer and the CPM for review and approval any proposed well construction or operation** **changes.** **6. The project owner shall provide BLM's authorized officer and the CPM with (2) two copies each of all monitoring and other reports required for compliance with the County of San Bernardino water well standards and operation requirements.** **7. No later than fifteen (15) days after completion of the onsite water supply wells, the project owner shall submit documentation to BLM's Authorized Officer and the CPM, confirming that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).** **8. Annual Monitoring Reports will be submitted which include Quarterly monitoring data as described in the Approved Groundwater Monitoring and Management Plan. The First Annual Report will be a Baseline Report which includes the Well Network and level monitoring report and plan**	GWMMP Approved 11/03/10; Well Completion Reports Filed for PW-1 PW-2 MW-1(3/03/11) , Baseline First Annual Monitoring Report submitted on August 10, 2012 **ANNUAL MONITORING REPORT ONGOING**	9/23/2010(GWMMP); Baseline Report 8/1/12, 2nd Annual report 1/31/13 **ANNUALLY**	11/2/2010 Addendum to GWMMP submitted to San Bernardino Co and CEC; First Annual Report(Baseline) submitted on 8/10/12, 2nd annual Report to be submitted January 31, 2013 for 2012 data	GWMMP 11/3/2010		GWMMP Approved 11/03/10; Well Completion Reports Filed for PW-1 PW-2 MW-1(3/03/11) , Baseline First Annual Monitoring Report submitted on August 10, 2012. 9/23/2010(GWMMP); Baseline Report 8/1/12, 2nd Annual report 1/31/13

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Soil & Water	S&W-4	**The proposed project's use of groundwater during each year of construction shall not exceed an average of 200 acre-feet per year over the forty-three (43) month construction period. Groundwater use for operations activities shall not exceed 100 acre-feet per year. Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per day the total volume(s) of water supplied to the project from this water source. The metering devices shall be operational for the life of the project.**	**Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary of amount of water used for construction purposes. The summary shall include the monthly range and monthly average of daily water usage in gallons per day.** **At least sixty (60) days prior to the start of construction of the proposed project, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of evidence that metering devices have been installed and are operational. The project owner shall prepare an annual summary, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal.**	Semi-annual reporting in MCR Completed. **ONGOING ANNUAL REPORTING**	2011, 2012, 2013.. **Operations annual report due on January 31st ANNUALLY**	Semi Annual Water Usage Calcs filed on 5/9/2011; 10/7/2011; 4/20/2012, 10/20/12 **1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018**			Submitted with the Annual Compliance Report
Soil & Water	S&W-5 (Continued-1b)	**The project owner shall ensure that the heliostats are designed and installed to withstand storm water scour as a result of a 100-year storm event. The analysis of the storm event and resulting heliostat stability will be provided within a Pylon Insertion Depth and Heliostat Stability Report to be completed by the applicant. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic stormwater modeling performed by the applicant. The modeling will be completed using methodology and assumptions approved by the CPM and BLM's Authorized Officer.**	**The <u>Storm Water Damage Monitoring and Response Plan</u> shall be submitted to both the BLM's authorized office and CPM for review and approval and shall include the following:** **• Detailed maps showing the installed location of all heliostats within each project phase;** **• Description of the method of removing all soil spoils should any be generated;** **• Each heliostat should be identified by a unique ID number marked to show initial ground surface at its base, and the depth of the pylon below ground;** **• Minimum Depth Stability Threshold to be maintained of pylons to meet long-term stability for applicable wind, water and debris loading effects;** **• Above and below ground construction details of a typical installed heliostat;** **• BMPs to be employed to minimize the potential impact of broken mirrors to soil resources;** **• Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments; and** **• Monitoring, documenting, and restoring the Ivanpah playa surface when impacted by sedimentation or broken mirror shards.** **A plan to monitor and inspect periodically, before first seasonal and after every storm event:** **• Security and Tortoise Exclusion Fence: Inspect for damage and buildup of sediment or debris** **• Heliostats within Drainages or subject to drainage overflow: Inspect for tilting, mirror damage, depth of scour compared to pylon depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport.** **• Drainage Channels: Inspect for substantial migration or changes in depth, and transport of broken glass.** **• Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.** **• Ivanpah Playa Surface: Inspect for changes in the surface texture and quality from sediment buildup, erosion, or broken glass.** **Short-Term Incident-Based Response:** **• Security and Tortoise Exclusion Fence: repair damage, and remove built-up of sediment and debris.** **• Heliostats: Remove broken glass, damaged structure, and wiring from the ground, and for pylons no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the mirrors to avoid exposure for broken glass.**	Submitted **ONGOING REPORTING DURING OPERATIONS**	60 days Prior to Commercial Operations **ANNUALLY**	8/27/2013; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Storm Water Damage Monitoring & Response Plan for Operations submitted to CEC/BLM on 8/27/13" Submitted with the Annual Compliance Report
Soil & Water	S&W-5 (Continued-1c)	**The project owner shall ensure that the heliostats are designed and installed to withstand storm water scour as a result of a 100-year storm event. The analysis of the storm event and resulting heliostat stability will be provided within a Pylon Insertion Depth and Heliostat Stability Report to be completed by the applicant. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic stormwater modeling performed by the applicant. The modeling will be completed using methodology and assumptions approved by the CPM and BLM's Authorized Officer.**	**The <u>Storm Water Damage Monitoring and Response Plan</u> shall be submitted to both the BLM's authorized office and CPM for review and approval and shall include the following:** **• Detailed maps showing the installed location of all heliostats within each project phase;** **• Description of the method of removing all soil spoils should any be generated;** **• Each heliostat should be identified by a unique ID number marked to show initial ground surface at its base, and the depth of the pylon below ground;** **• Minimum Depth Stability Threshold to be maintained of pylons to meet long-term stability for applicable wind, water and debris loading effects;** **• Above and below ground construction details of a typical installed heliostat;** **• BMPs to be employed to minimize the potential impact of broken mirrors to soil resources;** **• Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments; and**	Submitted **ONGOING REPORTING DURING OPERATIONS**	60 days Prior to Commercial Operations **ANNUALLY**	8/27/2013; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Storm Water Damage Monitoring & Response Plan for Operations submitted to CEC/BLM on 8/27/13" Submitted with the Annual Compliance Report

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Soil & Water	S&W-5 (Continued-1d)	The project owner shall ensure that the heliostats are designed and installed to withstand storm water scour as a result of a 100-year storm event. The analysis of the storm event and resulting heliostat stability will be provided within a Pylon Insertion Depth and Heliostat Stability Report to be completed by the applicant. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic stormwater modeling performed by the applicant. The modeling will be completed using methodology and assumptions approved by the CPM and BLM's Authorized Officer.	• Monitoring, documenting, and restoring the Ivanpah playa surface when impacted by sedimentation or broken mirror shards. A plan to monitor and inspect periodically, before first seasonal and after every storm event: • Security and Tortoise Exclusion Fence: Inspect for damage and buildup of sediment or debris • Heliostats within Drainages or subject to drainage overflow: Inspect for tilting, mirror damage, depth of scour compared to pylon depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport. • Drainage Channels: Inspect for substantial migration or changes in depth, and transport of broken glass. • Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup. • Ivanpah Playa Surface: Inspect for changes in the surface texture and quality from sediment buildup, erosion, or broken glass. Short-Term Incident-Based Response: • Security and Tortoise Exclusion Fence: repair damage, and remove built-up of sediment and debris. • Heliostats: Remove broken glass, damaged structure, and wiring from the ground, and for pylons no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the mirrors to avoid exposure for broken glass.	Submitted **ONGOING REPORTING DURING OPERATIONS**	60 days Prior to Commercial Operations **ANNUALLY**	8/27/2013; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Storm Water Damage Monitoring & Response Plan for Operations submitted to CEC/BLM on 8/27/13" Submitted with the Annual Compliance Report
Soil & Water	S&W-5 (Continued-2)	The project owner shall ensure that the heliostats are designed and installed to withstand storm water scour as a result of a 100-year storm event. The analysis of the storm event and resulting heliostat stability will be provided within a Pylon Insertion Depth and Heliostat Stability Report to be completed by the applicant. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic stormwater modeling performed by the applicant. The modeling will be completed using methodology and assumptions approved by the CPM and BLM's Authorized Officer.	At least sixty (60) days prior to construction, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the Pylon Insertion Depth and Heliostat Stability Report for review and approval prior to construction. At least sixty (60) days prior to commercial operation, the project owner shall submit to both BLM's Authorized Officer and the CPM a copy of the Storm Water Damage Monitoring and Response Plan for review and approval prior to commercial operation. The project owner shall retain a copy of this plan onsite at the power plant at all times. *The project owner shall prepare an annual summary of the number of heliostats failed, cause of the failure, and cleanup and mitigation performed for each failed heliostat.*	Submitted **ONGOING REPORTING DURING OPERATIONS**	60 days Prior to Commercial Operations **ANNUALLY**	8/27/2013; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Storm Water Damage Monitoring & Response Plan for Operations submitted to CEC/BLM on 8/27/13" Submitted with the Annual Compliance Report
Soil & Water	S&W-6 (continued-2)	The project owner shall submit a **Groundwater Monitoring and Reporting Plan** to both BLM's Authorized Officer and the CPM for review and approval and to San Bernardino County for review and comment regarding consistency with the County of San Bernardino Code Title 2, Division 3, Chapter 6, Article 5 (Desert Groundwater Management Ordinance). The Groundwater Level Monitoring and Reporting Plan shall provide a description of the methodology for monitoring background and site groundwater levels. Monitoring shall include pre-construction, construction, and project operation water use. The primary objective for the monitoring is to establish pre-construction and project related groundwater level-that can be quantitatively compared against observed and simulated levels near the project pumping well and near potentially impacted existing wells. Prior to project construction, monitoring shall commence to establish preconstruction base-line conditions and shall incorporate the existing monitoring and reporting data collected for the Primm Valley Golf Club. The monitoring network shall be designed to incorporate the ongoing monitoring and reporting program established for the Primm Valley Golf Course. The monitoring plan and network may make use of existing wells in the basin that would satisfy the requirements for the monitoring program.	4. At least two (2) months prior to project construction, all water level monitoring data shall be provided to both BLM's Authorized Officer and the CPM. The data transmittal shall include an assessment of pre-project water level trends, a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and a comparison and assessment of water level data relative to the assumptions and spatial levels simulated by the applicant's groundwater model. 5. **After project construction and during project operations, the project owner shall submit the monitoring data annually to both BLM's Authorized Office and the CPM.The summary shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall), and a comparison and assessment of water level data relative to the assumptions and spatial levels simulated by the applicant's groundwater model.**	ONGOING	ANNUALLY DURING PROJECT OPERATIONS	11/17/2014; 2014 GWMR was submitted on 8/13/2015; 2015 Five-Year GWMR submitted on 12/19/2016; 2016 GWMR submitted on 7/6/2017. 2017 GWMR was submitted on 9/26/2018.			8/18/2010(GWMMP); First Annual Baseline Report inch Well Monitoring, Installation & GW Level Network Report Submitted 8/10/12 ANNUAL REPORT FOR 2012 was submitted on 5/1/2013; ANNUAL REPORT FOR 2013 was submitted on 11/17/2014; An updated 2015 & 2016 GWM Reports were submitted on 10/24/2017 to include PVGC data.
Soil & Water	S&W-7	The project owner shall recycle and reuse all process wastewater streams to the extent practicable. Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).	Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).	ONGOING	prior to transport and disposal of any facility operation wastewater			
Soil & Water	S&W-8	Prior to the start of construction of the sanitary waste system, the project owner shall submit to the County of San Bernardino for review and comment, and to both the BLM's authorized officer and CPM for review and approval, plans for the construction and operation of the project's proposed sanitary waste septic system and leach field. These plans shall comply with the requirements set forth in County of San Bernardino codes and Appendices B, C, and D. Project construction shall not proceed until both BLM's Authorized Officer and the CPM have approved the plans. The project owner shall remain in compliance with the San Bernardino County code requirements for the life of the project.	Sixty (60) days prior to the start of commercial operations, the project owner shall submit to the County of San Bernardino appropriate fees and plans for review and comment for the construction and operation of the project's sanitary waste septic system and leach field. A copy of these plans shall be submitted to both the BLM's authorized officer and CPM for review and approval. The plans shall demonstrate compliance with the sanitary waste disposal facility requirements of County of San Bernardino and Appendices B, C, and D.	Submitted	60 days prior to start of commercial operations	25-Mar-2013			Sanitary Waste System Plan Submitted on 3/25/13

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Traffic & Transport.	TRANS-2 (continued)	**The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities to original or near-original condition in a timely manner, as directed by the BLM's Authorized Officer and CPM. The project owner's use of Yates Well Road shall not diminish the rights or use of the road by other BLM authorized users. Repairs and restoration of access roads may be required at any time during the construction phase of the project to assure safe ingress and egress. Prior to the start of site mobilization, the project owner shall consult with the County of San Bernardino and Caltrans District 8 and notify them of the proposed schedule for project construction. The purpose of this notification is to request that the County of San Bernardino and Caltrans consider postponement of public right-of-way repair or improvement activities in areas affected by project construction until construction is completed and to coordinate with the project owner regarding any concurrent construction related activities that are planned or in progress and cannot be postponed.**	**Within 60 calendar days after completion of construction, the project owner shall meet with BLM's Authorized Officer and the CPM, the County of San Bernardino and Caltrans District 8 to identify sections of public right-of-way to be repaired. At that time, the project owner shall establish a schedule to complete the repairs and to receive approval for the action(s). Following completion of any public right-of-way repairs, the project owner shall provide a letter signed by the County of San Bernardino and Caltrans District 8 stating their satisfaction with the repairs to BLM's Authorized Officer and the CPM.**	Approved; **ONGOING**	10-Aug-2010	24-Jun-2010	2-Sep-2010		**7/31/2014:** Solar Partners/NRG is coordinating with appropriate agencies to complete the ROW inspections for repairs.
Traffic & Transport.	TRANS-3 (continued)	**The project owner shall prepare a Heliostat Positioning Plan that would avoid potential for human health and safety hazards from solar radiation exposure.**	**2. Describe within the HPP how programmed heliostat operation would avoid potential for human health and safety hazards at locations of observers as attributable to momentary solar radiation exposure greater than the Maximum Permissible Exposure of 10 kw/m^2 (for a period of 0.25 second or less).** **3. Prepare a monitoring plan that would: a) obtain field measurements in response to legitimate complaints; b) verify that the Heliostat Positioning Plan would avoid potential for human health and safety hazards including temporary and permanent blindness at locations of observers; and** **c) provide requirements and procedures to document, investigate and resolve legitimate complaints regarding glare.** **4. The monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, CHP, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.**	Approved - ONGOING	ANNUALLY FOR THE FIRST 5 YEARS; Every 2 years after the first 5 years	Heliostat Positioning Plan was submitted on 1/14/2013. Revision 1 was submitted on 4/19/2013. Approved by BLM on 6/13/13. Revision 1 was resubmitted on 9/13/13. **Approved by CEC on 12/10/13** **Submitted HPP Report 2nd Flyover on 8/29/2014** ***HPP Addendum/Update was submitted on 12/10/2014;*** ***HPP addendum/update submitted on 12/10/2015;*** ***Response to Glare complaint Pilot Report ACN 1353100 was submitted to CEC/BLM/FAA on 8/16/2016.*** ***Response to Glare complaint Pilot Report ACN 1390751 was submitted to CEC/BLM/FAA on 11/10/2016;*** ***HPP addendum/update submitted on 12/7/2016;*** ***HPP Update submitted on 12/11/2017;*** ***HPP Update submitted on 12/10/2018***	6/13/2013 **12/10/13;**		Heliostat Positioning Plan Addendum / Update was submitted to BLM and CEC on 12/10/2014; Also submitted in the Annual Compliance Reports

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Traffic & Transport.	TRANS-4	**The project owner shall prepare a Power Tower Luminance Monitoring Plan to provide procedures to conduct periodic monitoring and to document, investigate and resolve complaints regarding distraction effects to aviation, vehicular and pedestrian traffic associated with the power towers.**	**Within 60 days prior to commercial operation of the first ISEGS power plant to become operational, the project owner shall provide a Power Tower Luminance Monitoring Plan applicable for the ISEGS Project for review and approval by BLM's Authorized Officer and the CPM. The plan shall specify procedures to document, investigate and resolve complaints regarding glare, and report these to BLM's Authorized Officer and the CPM within 10 days of receiving a complaint.** **The project owner shall evaluate the effects of the intensity of the luminance of light reflected from the power tower receivers for the following scenarios:** **A. Within 90 days following commercial operation;** **B. After the initial 5 years of operation;** **C. If a major design change is implemented that results in an increase of the reflective luminance of the power towers for each of the three ISEGS power plants (Ivanpah 1, 2 and 3); and** **D. After receiving a legitimate complaint regarding a distraction associated with the power towers.**	Submitted and Approved - **ONGOING DURING PROJECT OPERATIONS**	60 days Prior Commercial Operations. 90 days Following Commercial Operations. **After the Initial 5 years of Operation**	4/18/13: Power Tower Luminance Monitoring Plan Submitted on 4/5/2013. Approved by BLM on 6/13/13. Revision 1 was resubmitted on 9/13/13. **Approved by CEC on 12/10/13;** **Response to Glare complaint Pilot Report ACN 1353100 was submitted to CEC/BLM/FAA on 8/16/2016.** **Response to Glare complaint Pilot Report ACN 1390751 was submitted to CEC/BLM/FAA on 11/10/2016.**	6/13/2013 **12/10/13**		ISEGS received Pilot Report ACN 1353100 and ACN 1390751 during the reporting period.
Traffic & Transport.	TRANS-4 (continued-1)	**The project owner shall prepare a Power Tower Luminance Monitoring Plan to provide procedures to conduct periodic monitoring and to document, investigate and resolve complaints regarding distraction effects to aviation, vehicular and pedestrian traffic associated with the power towers.**	**The Power Tower Luminance Monitoring Plan shall include provisions for the following:** **1. Coordination of luminance evaluations with the FAA, U.S. Department of the Navy, CalTrans, CHP, and with Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport;** **2. Reporting within 30 days after completing luminance measurements required under this plan; the project owner shall submit a summary report to FAA, U.S. Department of the Navy, CalTrans, San Bernardino County, SANBAG, CHP and Clark County Department of Aviation for review and comment, and to BLM's Authorized Officer and the CPM for review and approval.** **3. Measurement of luminance at the locations where any distraction effects have been reported and at the locations nearest the power towers from the four sides of the power plant boundaries, and the nearest public road, which may be substituted for one of the sides of the power tower of each of the three power plants during the time of day when values would be highest;** **4. Measurement of luminance using an illuminance meter, photometer, or similar device and reporting of data in photometric units; the measurements are intended to provide a relative and quantifiable measure of luminance that can be associated with any observed and reported distraction effect from the power tower receivers that may support anticipation and investigation of any future effects.**	Approved - COMPLETED **ONGOING DURING PROJECT OPERATIONS**	60 days Prior Commercial Operations. 90 days Following Commercial Operations. **After the Initial 5 years of Operation**	4/18/13: Power Tower Luminance Monitoring Plan Submitted on 4/5/2013. Approved by BLM on 6/13/13. Revision 1 was resubmitted on 9/13/13. **Approved by CEC on 12/10/13;** **Response to Glare complaint Pilot Report ACN 1353100 was submitted to CEC/BLM/FAA on 8/16/2016.** **Response to Glare complaint Pilot Report ACN 1390751 was submitted to CEC/BLM/FAA on 11/10/2016.**	6/13/2013 **12/10/13**		ISEGS received Pilot Report ACN 1353100 and ACN 1390751 during the reporting period.

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Traffic & Transport.	TRANS-4 (continued-2)	**The project owner shall prepare a Power Tower Luminance Monitoring Plan to provide procedures to conduct periodic monitoring and to document, investigate and resolve complaints regarding distraction effects to aviation, vehicular and pedestrian traffic associated with the power towers.**	**5. Provisions for identifying and implementing appropriate mitigation measures if reported distraction is determined to be legitimate and if power tower luminance is determined to be causing a safety concern; The project owner shall consider and propose any reasonable mitigation measures that are technically and financially feasible. The mitigation measures may include surface treatment or material changes to increase absorption and reduce reflectivity of the power tower receivers, road signage, screening or other reasonable measures.** **6. Post-mitigation verification; Within 30 days following the implementation of mitigation measures designed to reduce reflectivity of the power towers, the project owner shall repeat the luminance measurements to demonstrate the effectiveness of mitigation measures and prepare a supplemental survey report for review and comment by FAA, U.S. Department of the Navy, CalTrans, San Bernardino County, SANBAG, CHP and Clark County Department of Aviation, and for review and approval by BLM's Authorized Officer and the CPM.**	Approved - COMPLETED	Post Mitigation Verification - within 30 days following implementation of Mitigation Measures	4/18/13: Power Tower Luminance Monitoring Plan Submitted on 4/5/2013. Approved by BLM on 6/13/13. Revision 1 was resubmitted on 9/13/13. **Approved by CEC on 12/10/13;** **Response to Glare complaint Pilot Report ACN 1353100 was submitted to CEC/BLM/FAA on 8/16/2016.** **Response to Glare complaint Pilot Report ACN 1390751 was submitted to CEC/BLM/FAA on 11/10/2016.**	6/13/2013 **12/10/13**		ISEGS received Pilot Report ACN 1353100 and ACN 1390751 during the reporting period.
Transmission System Engineering	TSE-7	**The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent BLM authorized officer, CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC; Title 8, CCR, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards. In case of non-conformance, the project owner shall inform BLM's Authorized Officer, the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.**	**Within 60 days after first synchronization of the project, the project owner shall transmit to BLM's Authorized Officer, the CPM and CBO:** **1. "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders"; applicable interconnection standards; NEC; and related industry standards, and these conditions shall be provided concurrently.** **2. An "as built" engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. "As built" drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for BLM's Authorized Officer or CPM audit as set forth in the "Compliance Monitoring Plan."** **3. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge**	COMPLETED (CONSTRUCTION)	60 days After First Synchronization	19-Nov-2013			Submitted As-Built engineering description of the electrical, mechanical, structural and civil portion of the transmission facilities
Transm. Lines	TLSN-2	**The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the line at the points of maximum intensity along the route for which the applicant provided specific estimates. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than 6 months after the start of operations.**	**The project owner shall file copies of the pre-and post-energization measurements with BLM's Authorized Officer and the CPM within 60 days after completion of the measurements.**	**Submitted**	60 days after Completion of Measurements	31-Jul-2014			**Pre and Post Energization Measurement Report was submitted on 7/31/2014.**
Transm. Lines	TLSN-3	**The project owner shall ensure that the rights-of-way of the proposed generation tie lines are kept free of combustible material, as required under the provisions of section 4292 of the Public Resources Code and section 1250 of Title 14 of the California Code of Regulations.**	**During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report to be provided to BLM's Authorized Officer and the CPM.**	Ongoing - Annually	First 5 years of Plant Operation	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Submitted with the Annual Compliance Report

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Visual Resources	VIS-1	***Surface Treatment of Project Structures and Buildings:*** **The project owner shall treat the surfaces of all project structures and buildings visible to the public, other than surfaces that are included to direct or reflect sunlight, such that a) their colors minimize visual intrusion and contrast by blending with the existing tan and brown color of the surrounding landscape; and b) their colors and finishes do not create excessive glare. The transmission line conductors shall be nonspecular and non-reflective, and the insulators shall be non-reflective and non-refractive.** **The project owner shall submit for CPM review and approval, a specific Surface Treatment Plan that will satisfy these requirements.**	**At least 90 days prior to specifying to the vendor the colors and finishes for each set of structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to BLM's Authorized Officer and the CPM for review and approval and simultaneously to San Bernardino County for review and comment. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM a plan with the specified revision(s) for review and approval by BLM's Authorized Officer and the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to BLM's Authorized Officer and the CPM for review and approval. BLM's Authorized Officer and the CPM shall review and approve the Surface Treatment Plan or identify any material deficiencies within thirty (30) days of receipt.** **The treatment plan shall include:** **A. A description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes;** **B. A list of each major project structure, building, tank, pipe, and wall; the transmission line towers and/or poles; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, and number; or according to a universal designation system;** **C. One set of color brochures or color chips showing each proposed color and finish;** **D. A specific schedule for completion of the treatment; and** **E. A procedure to ensure proper treatment maintenance for the life of the project.** **The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by BLM's Authorized Officer and the CPM. Subsequent modifications to the treatment plan are prohibited without BLM's Authorized Officer and CPM approval.** **Prior to the start of commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that surface treatment of all listed structures and buildings has been completed and they are ready for inspection and shall submit to each one set of electronic color photographs from the same key observation points identified in (d) above.** **The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify: a) the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.**	Approved During Construction. **ONGOING ANNUAL REPORTING DURING OPERATIONS**	90 days Prior Specifying to the Vendor the Colors and Finishes. **ANNUAL REPORTING REQUIRED DURING PROJECT OPERATIONS**	6/30/2010; 11/4/2010 (amend. 1 & 2); 12/8/2010 (amend. 3 & 4); 4/5/2011 (amend. 5 & 6); Plan Revision 1 May 27, 2011; Revision 1.2 submitted June 27, 2011; Revision 1.3 submitted September 7, 2011; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018	10/7/2010; 11/23/2010 (amend. 1 & 2); 1/10/2011 (amend. 3 & 4); 4/15/2011 (amend. 5); 5/2/2011 (amend. 6)		Submitted in the Annual Compliance Reports

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Visual Resources	VIS-2	***Landscape Screening of Golf Course:*** **At the request of, and in consultation with BLM's Authorized Officer, the CPM and the golf course owner, the project owner shall prepare a perimeter landscape screening plan to reduce the visibility of the proposed ISEGS project as seen from the golf course. The purpose of the plan shall be to provide screening of the power project, particularly the mirror fields, while retaining as much of the scenic portion of the overall views of Ivanpah Valley and Clark Mountains as feasible. The design approach shall be developed with prior consultation with the golf course owner, and implemented only at the golf course owner's request.** **The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment a preliminary conceptual landscaping plan whose objective is to provide an attractive visual screen to views of the ISEGS project mirror fields. Upon approval by BLM's Authorized Officer and the CPM and golf course owner, the project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment a landscaping plan whose proper implementation will satisfy these requirements.** **The plan shall not be implemented until the project owner receives final approval from BLM's Authorized Officer and the CPM.**	**The landscaping plan shall be submitted to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the golf course owner for review and comment at least 90 days prior to installation of the landscaping. If BLM's Authorized Officer and the CPM determine that the plan requires revision, the project owner shall provide to BLM's Authorized Officer and the CPM and simultaneously to the golf course owner a revised plan for review and approval by BLM's Authorized Officer and the CPM.** **The plan shall include:** **A. A detailed landscape, grading, and irrigation plan, at a reasonable scale. The plan shall demonstrate how the requirements stated above shall be met. The plan shall provide a detailed installation schedule demonstrating installation of as much of the landscaping as early in the construction process as is feasible in coordination with project construction.** **B. A list (prepared by a qualified professional arborist familiar with local growing conditions) of proposed species, specifying installation sizes, growth rates, expected time to maturity, expected size at five years and at maturity, spacing, number, availability, and a discussion of the suitability of the plants for the site conditions and mitigation objectives, with the objective of providing the widest possible range of species from which to choose;** **C. Maintenance procedures, including any needed irrigation and a plan for routine annual or semi-annual debris removal for the life of the project;** **D. A procedure for monitoring for and replacement of unsuccessful plantings for the life of the project; and** **E. One set each for BLM's Authorized Officer and the CPM of 11"x17" color photo simulations of the proposed landscaping at five years and twenty years after planting, as viewed from adjoining segments of I-15 .** **The plan shall not be implemented until the project owner receives final approval from BLM's Authorized Officer and the CPM.** **The planting must occur during the first optimal planting season following site mobilization. The project owner shall simultaneously notify BLM's Authorized Officer and the CPM and the golf course owner within seven days after completing installation of the landscaping, that the landscaping is ready for inspection.** **The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.**	COMPLETED LANDSCAPING WORKS. MAINTENANCE WORKS IN PROGRESS	ANNUALLY (To be included in the Annual Compliance Report)	1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018;			Landscaping along the Golf Course was completed. Landscape maintenance monitoring in progress and shall be reported in the Annual Compliance Report. A letter from Primm Valley Golf Club dated 9/16/2015 informed Solar Partners that they will permanently take over responsibilities for the well-being of the replaced trees and relieving Solar Partners of any future financial/reporting obligation for the maintenance of the Golf Course Landscape Screening under the requirement of this Condition of Certification. A copy of the letter was submitted with the 2015 Annual Compliance Report on 1/29/2016 and on 1/27/2017.
Visual Resources	VIS-4 (Continued-1)	***Temporary and Permanent Exterior Lighting:*** **To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting and all temporary construction lighting such that a) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas; b) lighting does not cause excessive reflected glare; c) direct lighting does not illuminate the nighttime sky, except for required FAA aircraft safety lighting; d) illumination of the project and its immediate vicinity is minimized, and e) the plan complies with local policies and ordinances.** **The project owner shall submit to BLM's Authorized Officer and the CPM for review and approval and simultaneously to the County of San Bernardino for review and comment a lighting mitigation plan.**	**E. All lighting shall be of minimum necessary brightness consistent with operational safety and security; and** **F. Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.** **The project owner shall not order any exterior lighting until receiving BLM Authorized Officer and CPM approval of the lighting mitigation plan.** **Prior to commercial operation, the project owner shall notify BLM's Authorized Officer and the CPM that the lighting has been completed and is ready for inspection. *If after inspection, BLM's Authorized Officer and the CPM notify the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify BLM's Authorized Officer and the CPM that the modifications have been completed and are ready for inspection.***	Approved - COMPLETED (CONSTRUCTION) AS NEEDED DURING OPERATIONS	Within 30 days of Receiving Notification from BLM & CEC	11/1/2010; 12/14/2010 (amend. 1)	Amend 1 approved by BLM and CEC on 1/11/2012		Lighting Plan Addendum 1 submitted 11/02/12
Waste Mgmt.	WASTE-5	**Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify BLM's Authorized Officer and the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.**	**The project owner shall notify BLM's Authorized Officer and the CPM in writing within 10 days of becoming aware of an impending enforcement action. BLM's Authorized Officer and the CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.**	As needed	As needed				

Technical Area	COC No.	Description	Verification	Compliance Status	Required Submittal Date	Date Submitted	Approval Date	Date of Amendment	NOTES
Waste Mgmt.	WASTE-6	The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to BLM's Authorized Officer and the CPM for review and approval. The plan shall contain, at a minimum, the following: • a detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications; • management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans; • information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary; • a detailed description of how facility wastes will be managed and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and • a detailed description of how facility wastes will be managed and disposed upon closure of the facility.	The project owner shall submit the Operation Waste Management Plan to BLM's Authorized Officer and the CPM for approval no less than 30 days prior to the start of project operation. BLM's Authorized Officer and the CPM shall approve or identify any material deficiencies in the Operation Waste Management Plan within 30 days following receipt of the Plan. The project owner shall submit any required revisions to BLM's Authorized Officer and the CPM within 20 days of notification from BLM's Authorized Officer and the CPM that revisions are necessary. The project owner shall also document in each ***Annual Compliance Report*** the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the Operation Waste Management Plan as necessary to address current waste generation and management practices.	Operations Waste Management Plan was submitted on 9/24/2013	30 days Prior to the Start of Project Operations **Annual Reporting Required in the Annual Compliance Report**	9/24/2013; 1/30/2015; 1/29/2016; 1/27/2017; 1/25/2018			Operations Waste Management Plan was submitted on 9/24/2013; Actual volume of wastes generated submitted in the Annual Compliance Report
Waste Mgmt.	WASTE-7	The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are reported, cleaned up, and remediated as necessary, in accordance with all applicable federal, state, and local requirements.	The project owner shall document all unauthorized releases and spills of hazardous substances, materials, or wastes that occur on the project property or related pipeline and transmission corridors. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; amount of contaminated soil/material generated; how release was managed and material cleaned up; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements imposed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. Copies of the unauthorized spill documentation shall be provided to BLM's Authorized Officer and the CPM within 30 days of the date the release was discovered.	As needed/ONGOING REPORTED IN MCR	As needed	8/15/2016; 10/13/2016; 8/21/2017; 9/11/2017, 11/3/2017;			Notified CEC/BLM on 7/29/2016 on the lube oil release on 7/29/2016 at Unit 1. The Spill Report was submitted on 8/15/2016. Notified CEC/BLM on 10/2/2016 on the lube oil release at Unit 3. The Spill Report was submitted on 10/13/2016. Submitted Spill Reports at Unit 3 on 8/21/2017, 9/11/2017, & 11/3/2017.
Worker Safety & FP	WS-2	The project owner shall submit to BLM's Authorized Officer and the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following: • An Operation Injury and Illness Prevention Plan; • An Emergency Action Plan; • Hazardous Materials Management Program; • Fire Prevention Program (8 CCR § 3221); and; • Personal Protective Equipment Program (8 CCR §§ 3401-3411).	At least thirty (30) days prior to the start of first-fire or commissioning, the project owner shall submit to BLM's Authorized Officer and the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program. The project owner shall provide a copy of a letter to BLM's Authorized Officer and the CPM from the San Bernardino County Fire Department stating the Fire Department's comments on the Operations Fire Prevention Plan and Emergency Action Plan. The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to BLM's Authorized Officer and the CPM for review and approval concerning compliance of the program with all applicable Safety Orders. The Operation Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the San Bernardino County Fire Department for review and comment.	**Submitted Project Operations Safety and Health Program to BLM's Authorized Officer and the CPM and SBCFD.**	30 days Prior Start of First Fire or Commissioning	**19-Nov-2013**			
Worker Safety & FP	WS-5	The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on-site whenever the workers that they supervise are on-site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to BLM's Authorized Officer and the CPM for review and approval.	At least thirty (30) days prior to the start of site mobilization the project owner shall submit to BLM's Authorized Officer and the CPM proof that a portable AED exists on site and a copy of the training and maintenance program for review and approval.	Approved (Construction) ONGOING DURING OPERATIONS.	30 days Prior Site Mobilization	13-Aug-2010	2-Sep-2010		

Exhibit 3

Air Quality Conditions of Certification

Appendix A

Conditions of Certification AQ-1 & AQ-27

Project Owner Statement Pertaining to Equipment Non-Compliant Operations

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 4, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Project Owner Statement Pertaining to Equipment Non-compliant Operations that shall be Listed in the Annual Compliance Report (COMPLIANCE-7) to fulfill California Energy Commission Conditions of Certification, AQ-1 and AQ-27

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certifications AQ-01 and AQ-27 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

Operation of all auxiliary boilers and nighttime preservation boilers are conducted in compliance with all specifications and requirements submitted with the applications under which the permits were issued. Mojave Desert Air Quality Management District (MDAQMD) conducted an Air Quality Inspection on April 24, 2018, and reported that the facility is in full compliance with these Conditions of Certification and MDAQMD permit conditions. There are no non-compliant air quality operations to be listed in the annual compliance report.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Appendix B

Conditions of Certification
AQ-2 & AQ-28

Project Owner Statement Pertaining to Violations in Equipment Operations

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 4, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Project Owner/Operator Statement Pertaining to Violations in Equipment Operations that shall be Included in the Annual Compliance Report (COMPLIANCE-7) to fulfill California Energy Commission Conditions of Certifications, AQ-2 and AQ-28

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certifications AQ-2 and AQ-28 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

The owner's/operator's operation of all auxiliary boilers and nighttime preservation boilers are in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles, and consistent with all information submitted with the permit applications. Mojave Desert Air Quality Management District (MDAQMD) conducted an Air Quality Inspection on April 24, 2018, and reported that the facility is in full compliance with these Conditions of Certification. There are no air quality violations or operational non-compliance information to be included in the annual compliance report.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Appendix C

Conditions of Certification
AQ-3 & AQ-29

Project Owner Statement
Pertaining to Use of Natural Gas
As Fuel for the Boilers

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 4, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Project Owner/Operator Statement Pertaining to Use of Natural Gas as Fuel for the Boilers and Include Proofs in the Annual Compliance Report (COMPLIANCE-7) to fulfill California Energy Commission Conditions of Certifications, AQ-3 and AQ-29

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certifications AQ-3 and AQ-29 of the Commission's approval of the Ivanpah Solar Electric Generating System (ISEGS), we are providing the following statement as a requirement in the Annual Compliance Report:

ISEGS is using pipeline quality natural gas supplied from Kern River Gas Transmission (KRGT) Company pipeline. KRGT Company is a Public Utility Company that was previously approved for this project. Mojave Desert Air Quality Management District (MDAQMD) conducted an Air Quality Inspection on April 24, 2018, and reported that the facility is in full compliance with these Conditions of Certifications.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Appendix D

Conditions of Certification
AQ-12 & AQ-34

Auxiliary Boilers & Nighttime Preservation Boilers Gas Consumption Record

2018 - ISEGS AUXILIARY BOILERS and NIGHTTIME PRESERVATION BOILERS GAS CONSUMPTION RECORD

(Compliance with AQ-03, AQ-04, AQ-08, AQ-11, AQ-12, AQ-29, AQ-30, AQ-32 & AQ-34)

Last Reading Taken on: 31-Dec-2018

LOCATION (MDAQMD PERMIT No.)	2018 AUXILIARY BOILER GAS CONSUMPTION				2018 NIGHTTIME PRESERVATION BOILER GAS CONSUMPTION				2018 YTD GAS CONSUMPTION				ANNUAL GAS CONSUMPTION LIMIT	2018 AVAILABLE CAPACITY FOR CONSUMPTION	2018 AVERAGE DAILY AVAILABLE CAPACITY
	(lbm)	(SCF)	(MMSCF)	(MMBTU)	(lbm)	(SCF)	(MMSCF)	(MMBTU)	(lbm)	(SCF)	(MMSCF)	(MMBTU)	(MMSCF)	(MMSCF)	(MMSCF)
Unit 1 Gas Consumption by Month:															
Jan-2018	*1,564,438*	*35,051,740*	*35.05*	*36,318.10*	*96,965*	*2,170,364.57*	*2.17*	*2,250.89*	*1,661,402*	*37,222,104*	*37.22*	*38,568.99*			
Feb-2018	*680,460*	*15,266,108*	*15.27*	*15,806.12*	*35,961*	*806,981.32*	*0.81*	*835.48*	*716,422*	*16,073,089*	*16.07*	*16,641.60*			
Mar-2018	*1,522,640*	*34,295,075*	*34.30*	*35,326.05*	*100,028*	*2,253,155.33*	*2.25*	*2,320.40*	*1,622,668*	*36,548,230*	*36.55*	*37,646.45*			
Apr-2018	*1,034,355*	*23,160,746*	*23.16*	*23,987.47*	*48,544*	*1,088,258.23*	*1.09*	*1,125.95*	*1,082,899*	*24,249,004*	*24.25*	*25,113.41*			
May-2018	*1,311,474*	*29,251,378*	*29.25*	*30,416.92*	*63,592*	*1,420,524.72*	*1.42*	*1,474.99*	*1,375,067*	*30,671,902*	*30.67*	*31,891.91*			
Jun-2018	*3,024,903*	*67,461,332*	*67.46*	*70,135.04*	*57,637*	*1,286,813.67*	*1.29*	*1,336.39*	*3,082,540*	*68,748,146*	*68.75*	*71,471.43*			
Jul-2018	*2,743,993*	*61,052,388*	*61.05*	*63,612.06*	*81,068*	*1,802,106.46*	*1.80*	*1,879.47*	*2,825,061*	*62,854,495*	*62.85*	*65,491.53*			
Aug-2018	*3,059,380*	*68,381,888*	*68.38*	*70,965.76*	*14,987*	*334,045.53*	*0.33*	*347.62*	*3,074,367*	*68,715,934*	*68.72*	*71,313.38*			
Sep-2018	*1,510,873*	*33,801,853*	*33.80*	*35,086.54*	*44,687*	*999,757.91*	*1.00*	*1,037.57*	*1,555,559*	*34,801,611*	*34.80*	*36,124.11*			
Oct-2018	*1,263,192*	*28,308,425*	*28.31*	*29,335.88*	*51,411*	*1,153,491.38*	*1.15*	*1,193.63*	*1,314,603*	*29,461,916*	*29.46*	*30,529.51*			
Nov-2018	*481,693*	*10,764,672*	*10.76*	*11,160.99*	*123,567*	*2,765,927.49*	*2.77*	*2,862.78*	*605,260*	*13,530,599*	*13.53*	*14,023.78*			
Dec-2018	*1,328,838*	*29,733,841*	*29.73*	*30,816.10*	*34,700*	*775,499.32*	*0.78*	*805.32*	*1,363,538*	*30,509,341*	*30.51*	*31,621.43*			
Ivanpah 1 Aux. Boiler (B010375) & Nighttime Preservation Boiler (B011544)	**19,526,238**	**436,529,446**	**436.53**	**452,967.05**	**753,147**	**16,856,925.94**	**16.86**	**17,470.48**	**20,279,385**	**453,386,372**	**453.39**	**470,437.53**	**525.00**	**71.61**	**4.77**
Unit 2 Gas Consumption by Month:															
Jan-2018	*1,401,035*	*31,395,054*	*31.40*	*32,525.40*	*55,930*	*1,251,177.90*	*1.25*	*1,298.14*	*1,456,965*	*32,646,232*	*32.65*	*33,823.54*			
Feb-2018	*1,038,302*	*23,290,534*	*23.29*	*24,113.48*	*72,378*	*1,623,377.52*	*1.62*	*1,680.74*	*1,110,680*	*24,913,911*	*24.91*	*25,794.22*			
Mar-2018	*1,587,489*	*35,754,971*	*35.75*	*36,827.94*	*81,027*	*1,825,112.67*	*1.83*	*1,879.64*	*1,668,516*	*37,580,083*	*37.58*	*38,707.58*			
Apr-2018	*1,398,686*	*31,326,674*	*31.33*	*32,439.88*	*69,077*	*1,547,838.87*	*1.55*	*1,602.15*	*1,467,763*	*32,874,513*	*32.87*	*34,042.03*			
May-2018	*1,851,418*	*41,270,180*	*41.27*	*42,937.78*	*74,661*	*1,664,938.20*	*1.66*	*1,731.70*	*1,926,079*	*42,935,118*	*42.94*	*44,669.48*			
Jun-2018	*2,401,270*	*53,551,807*	*53.55*	*55,678.48*	*73,714*	*1,643,478.86*	*1.64*	*1,709.15*	*2,474,984*	*55,195,286*	*55.20*	*57,387.62*			
Jul-2018	*2,262,066*	*50,323,194*	*50.32*	*52,441.75*	*97,931*	*2,177,372.60*	*2.18*	*2,270.20*	*2,359,997*	*52,500,566*	*52.50*	*54,711.95*			
Aug-2018	*3,562,525*	*79,633,325*	*79.63*	*82,642.24*	*0*	*0.00*	*0.00*	*0.00*	*3,562,525*	*79,633,325*	*79.63*	*82,642.24*			
Sep-2018	*3,189,806*	*71,366,893*	*71.37*	*74,069.64*	*231*	*5,180.73*	*0.01*	*5.36*	*3,190,036*	*71,372,073*	*71.37*	*74,075.00*			
Oct-2018	*1,225,362*	*27,464,094*	*27.46*	*28,459.57*	*51,875*	*1,163,674.01*	*1.16*	*1,204.39*	*1,277,237*	*28,627,768*	*28.63*	*29,663.95*			
Nov-2018	*513,130*	*11,469,119*	*11.47*	*11,889.38*	*111,663*	*2,498,985.69*	*2.50*	*2,587.03*	*624,794*	*13,968,105*	*13.97*	*14,476.41*			
Dec-2018	*985,060*	*22,045,087*	*22.05*	*22,844.25*	*111,153*	*2,486,655.05*	*2.49*	*2,578.08*	*1,096,213*	*24,531,742*	*24.53*	*25,422.34*			
Ivanpah 2 Aux. Boiler (B010376) & Nighttime preservation Boiler (B011572)	**21,416,149**	**478,890,931**	**478.89**	**496,869.79**	**799,640**	**17,887,792.12**	**17.89**	**18,546.57**	**22,215,789**	**496,778,724**	**496.78**	**515,416.36**	**525.00**	**28.22**	**1.88**
Unit 3 Gas Consumption by Month:															
Jan-2018	*1,579,521*	*35,393,630*	*35.39*	*36,668.75*	*106,262*	*2,378,929.11*	*2.38*	*2,466.79*	*1,685,782*	*37,772,559*	*37.77*	*39,135.54*			
Feb-2018	*1,230,453*	*27,643,492*	*27.64*	*28,589.08*	*63,413*	*1,419,686.23*	*1.42*	*1,471.61*	*1,293,866*	*29,063,178*	*29.06*	*30,060.69*			
Mar-2018	*2,488,987*	*56,063,807*	*56.06*	*57,742.12*	*10*	*227.45*	*0.00*	*0.23*	*2,488,998*	*56,064,035*	*56.06*	*57,742.36*			
Apr-2018	*2,331,512*	*52,202,277*	*52.20*	*54,062.44*	*12,177*	*273,190.90*	*0.27*	*282.69*	*2,343,689*	*52,475,468*	*52.48*	*54,345.13*			
May-2018	*353,985*	*7,872,839*	*7.87*	*8,208.55*	*87,585*	*1,953,810.34*	*1.95*	*2,031.42*	*441,570*	*9,826,649*	*9.83*	*10,239.97*			
Jun-2018	*2,584,223*	*57,648,000*	*57.65*	*59,916.82*	*62,907*	*1,402,250.50*	*1.40*	*1,458.62*	*2,647,130*	*59,050,251*	*59.05*	*61,375.45*			
Jul-2018	*912,724*	*20,326,056*	*20.33*	*21,153.09*	*103,605*	*2,303,671.38*	*2.30*	*2,401.91*	*1,016,329*	*22,629,727*	*22.63*	*23,555.00*			
Aug-2018	*1,544,168*	*34,547,954*	*34.55*	*35,834.96*	*104,891*	*2,343,704.59*	*2.34*	*2,433.01*	*1,649,059*	*36,891,658*	*36.89*	*38,267.97*			
Sep-2018	*1,565,556*	*35,033,541*	*35.03*	*36,353.53*	*61,081*	*1,365,478.51*	*1.37*	*1,418.20*	*1,626,636*	*36,399,019*	*36.40*	*37,771.74*			
Oct-2018	*928,788*	*20,827,788*	*20.83*	*21,573.72*	*99,134*	*2,222,941.54*	*2.22*	*2,302.22*	*1,027,921*	*23,050,729*	*23.05*	*23,875.94*			
Nov-2018	*255,628*	*5,718,346*	*5.72*	*5,922.19*	*110,527*	*2,474,885.26*	*2.47*	*2,560.76*	*366,155*	*8,193,231*	*8.19*	*8,482.95*			
Dec-2018	*601,139*	*13,447,709*	*13.45*	*13,940.32*	*137,769*	*3,082,116.73*	*3.08*	*3,195.34*	*738,908*	*16,529,825*	*16.53*	*17,135.66*			
Ivanpah 3 Aux. Boiler (B010377) & Nighttime Preservation Boiler (B011573)	**16,376,683**	**366,725,438**	**366.73**	**379,965.58**	**949,359**	**21,220,892.53**	**21.22**	**22,022.80**	**17,326,042**	**387,946,330**	**387.95**	**401,988.38**	**525.00**	**137.05**	**9.14**
2018 YTD COMBINED GAS CONSUMPTION	**57,319,070**	**1,282,145,815**	**1,282.15**	**1,329,802.42**	**2,502,146**	**55,965,610.59**	**55.97**	**58,039.85**	**59,821,216**	**1,338,111,426**	**1,338.11**	**1,387,842.27**	**1,575.00**	**236.89**	**15.79**

Appendix E

Condition of Certification AQSC-07

Dust Control Annual Report

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 7, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Operations Dust Control Annual Report, to fulfill California Energy Commission Condition of Certification, AQSC-7

Dear Mr. Payne and Mr. Ahrens,

In accordance with Section 5.1 of the Operations Dust Control Plan submitted under the requirements of Condition of Certification AQSC-7 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following recordkeeping and reporting requirements of the Operations Dust Control Plan as a requirement in the Annual Compliance Report:

Requirement #1: For dust suppressants, the CARB equipment precertification Executive Order and Evaluation Report or EPA Environmental Technology Verification Report, as appropriate. Only dust suppressants certified through CARB's Equipment Precertification Program4 or U.S. EPA's Environmental Technology Verification Program5 will be used onsite, unless approved in advance in writing by the CEC CPM. Dust suppressants that are disallowed by California's Regional Water Quality Control Boards and/or the Mojave Desert AQMD will not be utilized.

Water is the only medium of dust suppressant used in the ISEGS facility. However, there were no site activities requiring dust abatement during the reporting period.

Requirement #2: Documentation of any fugitive dust complaints made to the Mojave Desert AQMD (where ISEGS was subsequently notified), and documentation of any fugitive dust complaints made directly with the ISEGS.

ISEGS did not receive any fugitive dust complaints during the reporting period, either from the Mojave Desert AQMD or directly.

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

Requirement #3: Copies of any fugitive dust violations received, and immediate actions taken to return to compliance.

ISEGS did not receive any fugitive dust violations during the reporting period.

Requirement #4: A record of each visible dust plume response performed under Section 4.0. The record will identify the date and time that a visible dust plume meeting the criteria of Section 4.2 was observed; the source of the dust plume; the specific mitigation measures directed under Steps 1, 2, or 3; the time that the specific mitigation measures were directed under Steps 1, 2, or 3; the effectiveness of each mitigation measure directed, and a record of any appeals/responses to/from the CEC CPM or the Bureau of BLM Authorized Officer in relation to the shutdown of dust plume generating activities.

ISEGS implemented standard control measures as listed in section 3.3 of the Operations Dust Control Plan. Per section 4.0, the Environmental Health and Safety Specialist monitored the site for dust plumes. No visible plumes were observed either 400 feet upwind from any regularly occupied structure not owned by ISEGS or 200 feet beyond the centerline of a linear feature. No additional response as outlined in section 4.0 was required.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Exhibit 4

Biological Resources
Conditions of Certification

Appendix F

Conditions of Certification BIO-2, BIO-4, BIO-10, BIO-11, BIO-18, BIO-20, & BIO-21

2018 Annual Biological Report

Ivanpah Solar Electric Generating System

California Energy Commission (07-AFC-5C)
Bureau of Land Management
(CACA-48668, 49502, 49503, and 49504)
Conditions of Certification BIO-2, BIO-4, BIO-10, BIO-11, BIO-18, BIO-20, BIO-21

Annual Biological Report

January 1, 2018 – December 31, 2018
Reporting Period

Submitted
January 31, 2019

Prepared by: Designated Biologist
(on behalf of Solar Partners I, II, VIII LLC's)

100302 Yates Well Road
Nipton, CA 92364

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Appendices

1.0 Introduction

This report is submitted in accordance with condition of certification (COC) BIO-2, BIO-4, BIO-10, BIO-11, BIO-18, BIO-20 and BIO-21 of the California Energy Commission (CEC) Ivanpah Solar Electric Generating System (ISEGS) Commission Decision (07-AFC-5C) and terms, conditions, and stipulations of the Bureau of Land Management (BLM) right of way agreement (CACA-48668, 49502, 49503, and 49504). Each of these conditions requires reporting on an annual basis for particular aspects of the project related to biological resources. The requirements of each of these conditions are outlined below and this report addresses each of these requirements.
BIO-2 and BIO-4 require:

> "During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report."

BIO-10 requires:

> The Designated Biologist will provide the Bureau of Land Management (BLM) Authorized Officer (AO) and the CEC Compliance Project Manager (CPM) with an annual Listed Species Status Report which shall include at a minimum: "1) A general description of the status of the project site and construction activities, including actual or projected completion dates, if known; 2) a copy of the table in the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) for the Ivanpah Solar Electric Generating System, San Bernardino County, California (07-AFC-5C), COC BIO-7 with notes showing the current implementation status of each mitigation measure; and 3) an assessment of the effectiveness of each completed or partially completed mitigation measure in minimizing and compensating for project impacts."

BIO-11 requires:

> "The Designated Biologist shall provide to the CPM, BLM's Authorized Officer, CDFG, and USFWS an annual report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year."

BIO-18 requires:

> "During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report for a period not less than 10 years for the Gas Pipeline Revegetation Plan, and for the life of the project for the Special-Status Plant Protection and Monitoring Plan, and the Special-Status Plant Remedial Action Plan, including funding for the seed storage."

BIO-20 requires:

> "A copy of the notify change of conditions report shall be included in the annual reports"

BIO-21 requires:

> "Following the completion of the fourth quarter of monitoring, the Designated Biologist shall prepare an Annual Report that summarizes the year's data, analyzes any Project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed."

This report provides the required information for BIO-2, BIO-4, BIO-10, BIO-20 and the data for non-avian species as required in BIO-11. Avian reporting as required by BIO-11, BIO-21, and terms, conditions, and stipulations of the BLM right of way agreement is provided under separate cover. In addition, BIO-18 requirements are provided under a separate cover. This report provides an update on the project status, the BRMIMP table, an assessment of mitigation measures, and a summary of data for non-avian species.

2.0 Project Status

On December 30, 2013, Ivanpah 1 commenced commercial operations. On December 31, 2013, Ivanpah 2 and 3 commenced commercial operations. As a result of the commencement of commercial operations, the management of the environmental compliance at the facility was transferred to NRG Energy Services (NRG), the operator of the facility.

NRG operated the ISEGS facility from January 1, 2018 through December 31, 2018. The Designated Biologist and/or Biological Monitors are still present at the facility three to four days a week. In addition the designated biologist is on call twenty-four hours a day working with NRG to implement the CEC's conditions of certifications, terms, conditions, and stipulations of the BLM right of way agreement, and the USFWS biological opinion mitigation measures.

2.1 Operations Monitoring Summary

Monitoring of environmental conditions within the project fence line boundaries included but were not limited to kit fox activity, weed presence and management, nesting birds, and fence line integrity. In addition, biological staff responded to reports of wildlife presence or incidents involving wildlife throughout the facility.

On a typical weekday:

- The designated biologist or biological monitor inspected the three units and the construction logistic areas (CLA), for fence integrity and fence repairs, weed presence, nesting birds, kit fox activity, presence of avian and bat mortalities and injuries, and compliance with raven mitigation measures.

- The designated biologist or biological monitor performed maintenance on avian deterrent systems at Ivanpah Units 1, 2, and 3.

- The designated biologist monitored the installed Roadrunner best management practice measures within the fence line of Unit 1, 2, and 3.

2.1.1 Ivanpah 1, 2, and 3, Construction Logistics Areas, and Colosseum Road

The designated biologist or biological monitor performed the following activities:

- Monitored fences for breaches

- Surveyed for weeds
- Monitored tortoise activity
- Performed maintenance on Bird Buffer and Bird Gard
- Responded to the presence of or incidences involving wildlife
- Collected raven and nesting bird data
- Collected incidental bird and bat carcasses

2.1.2 Construction in 2018

In 2018, no construction activities were undertaken at the facility within the project fence line.

2.1.3 Interstate 15 Pen

A biological monitor periodically surveyed fences for breaches and weeds. A biological monitor escorted all fence line repair workers when repairs were necessary.

3.0 Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP)

BIO-10 requires a copy of the table in the BRMIMP with notes showing the current implementation status of each mitigation measure. See **Appendix A** for a copy of the BRMIMP table.

4.0 Assessment of Mitigation Measures

Mitigation measures discussed in this section are limited to those measures included as BIO-6 Worker Environmental Awareness Program, BIO-8 Desert Tortoise Clearance Surveys and Fencing, BIO-9 Desert Tortoise Translocation Plan, BIO-10 Desert Tortoise Compliance Verification, BIO-11 Impact Avoidance and Minimization Measures, BIO-12 Raven Management, BIO-13 Weed Management Measures, BIO-15 Nest Surveys, BIO-16 Burrowing Owl Impact Avoidance and Minimization Measures, BIO-17 Desert Tortoise Compensatory Mitigation, BIO-19 Special-status Plant Impact Avoidance and Minimization, and BIO-20 Streambed Impact Avoidance and Minimization .

The measures described below represent best management practices that were either specified in the CEC License, BLM ROW or developed independently at the site. For each of these broad categories of measures a succinct summary and an evaluation of the effectiveness is provided as required under BIO-10

4.1 Worker Environmental Awareness Program BIO-6

The approved Worker Environmental Awareness Program (WEAP) was implemented throughout 2018. Prior to commencing work all workers are trained upon arrival at the site or provided an annual WEAP training refresher. Training records are maintained on-site and available by request.

4.2 Impact Avoidance and Minimization Measures BIO-11

BIO-11 requires impact avoidance and minimization measures to protect biological resources during construction. BIO-11 contains seventeen specific measures and each of these measures is evaluated below.

4.2.1 Limit Disturbance Areas

In 2018, no construction activities took place within the project fence line that required delineation with stakes, and there was no additional storage of soils. All project vehicles were parked within the project fence line. No measures were undertaken for this measure and therefore, no evaluation is presented.

4.2.2 Minimize Road Impacts

Established roads exist at the site and site fencing constrains vehicles to these areas. No new roads were constructed within the ISEGS fence line in 2018. Monitors supervised any activities that occurred outside of the fence line, and ensured workers stayed on existing roads. Having a monitor present to supervise work occurring outside the fence line has been an effective measure to ensure no off road travel or travel in undisturbed areas.

4.2.3 Minimize Traffic Impacts

Vehicular traffic during project operations was confined to existing routes of travel to and from the project site. Cross-country vehicle and equipment use outside designated work areas is prohibited. The speed limit is 20 miles per hour within the project area or on maintenance roads for linear facilities. All workers go through a site orientation. The orientation discusses the site egress route, prohibition of cross-country travel, the requirement of a biological monitor outside of the project fence line, and the speed limit on access routes. There have been no recorded instances of workers traveling cross-country, using equipment outside the project fence line, or using alternative routes of travel to and from the site. Orientation of all workers has been an effective means ensuring workers are aware of the mitigation measure.

4.2.4 Monitoring During Construction occurring as part of Maintenance Activities

This mitigation measure was successful as at least one biological monitor was at the site when there was potential to disturb soil, vegetation, and wildlife during 2018. The Designated Biologist was available by cell phone when offsite to respond as needed. See Section 2.1 Operations Monitoring Summary for more details.

4.2.5 Minimize Impacts of Transmission/Pipeline Alignments, Roads, Staging Areas

Staging areas for operations on the plant site are within the areas that had been fenced with desert tortoise exclusion fencing and cleared. These areas were concentrated rather than dispersed, with the primary staging areas located in the eastern portion of the CLA, which is adjacent to the Heliostat Assembly Building (HAB), and within the paved parking lot of the power blocks. This mitigation measure was effective during 2018.

4.2.6 Avoid Use of Toxic Substances

Separate cover in this annual report discusses hazardous materials used on-site. See reporting for HAZ-01 and HAZ-06, provided under separate cover.

4.2.7 Minimize Lighting Impacts

The installation of downcast lighting on-site has been effective, and prevents casting light into adjacent wildlife habitat. Nighttime lighting was discontinued on all Unit towers in July 2014, with the exception of the required FAA lighting. Illumination in the towers will only be used when required for maintenance. The results of these mitigation measures continue to be monitored and evaluated.

4.2.8 Badger Surveys

Per the requirements of COC BIO-11, no badger surveys were conducted, and no natal badger dens were located onsite in 2018. There were several badger observations by workers in the solar field and power block during 2018. If a badger is observed going into or around a burrow a motion camera is placed on the burrow.

On May 21, 2018 a camera was placed on den 121 after a worker observed a badger exit the burrow look around and re-enter the burrow during day light hours. Den 121 is located within the solar field of Unit 2. Camera monitoring of den 121 captured a badger using the burrow for one night. Den 121 was camera monitored for 29 days without any activity before the camera was removed.

On May 22, 2018 a camera was placed on den 123 after workers observed a badger enter the burrow during the early morning hours. Den 123 is located within the solar field of Unit 2. Camera monitoring of den 123 captured a badger sniffing around the den on June 6 and entering the burrow on June 8. Den 123 was camera monitored for 6 weeks without any activity before the camera was removed.

Several observations were made of a badger walking around the power block area of Unit 1 during the last week in June. Four cameras were placed within the Unit 1 power block for 4 weeks but nothing was captured on the motion cameras.

Per COC BIO-2, the American Badger observations were submitted to the California Natural Diversity Data Base. Camera monitoring of the dens was an effective measure taken to determine if a den was active or inactive and to determine if a natal den existed. There were no natal dens discovered on the ISEGS site during 2018. Camera monitoring was an effective measure taken to determine if a natal den existed.

4.2.9 Gila Monster Surveys

Per the requirements of COC BIO-11, no Gila monster surveys were conducted, and no Gila monsters were observed onsite in 2018. No measures were undertaken for these species, and therefore no evaluation is presented.

4.2.10 Avoid Vehicle Impacts to Desert Tortoise

Except for work on the gas line, the Interstate 15 Pen (“I-15 Pen”), and offsite mitigation fences, all vehicles were confined to the area enclosed by desert tortoise exclusion fencing. WEAP training emphasized that workers should routinely inspect the ground beneath vehicles for the presence of wildlife

prior to moving the vehicle. Biological monitors reminded workers of the requirement to inspect under vehicles. Outside of fenced areas, biological monitors were responsible to search under all vehicles they escorted. Monitors were required to escort all vehicles traveling on offsite roads. Adult and juvenile tortoises, snakes, lizards, and small mammals have been found under vehicles, and allowed to move or, if necessary, are manually moved out of harm's way per applicable protocols**.** These protective measures were effective at avoiding vehicle impacts to desert tortoise.

4.2.11 Avoid Wildlife Pitfalls

During 2018 there were no open trenches or pipes stored outside areas fenced with desert tortoise exclusion fences. During the course of operations, work is completed on heliostats in the solar field. When mirrors are removed from a pylon it provides a possible trap for wildlife. Operation staff in conjunction with bological monitors covered uncapped pylons with temporary caps that are weighted to maintain position. These temporary caps are preventing entrapment until mirrors are installed in the future. Capping pylons is an effective mitigation measure to prevent wildlife from becoming trapped.

4.2.12 Minimize Standing Water

No activities on-site required dust abatement during 2018. Therefore, no wildlife was attracted to standing water resulting from dust abatement activities.

4.2.13 Dispose of Road-killed Animals

Carcasses of small mammals (rabbits and rodents) and reptiles found in the project area and along access roads were removed by biological monitors as soon as they were detected. Per the Raven Management Plan, carcasses are disposed of in covered containers to prevent scavenging by ravens or other scavengers. See Section 5.2 for a list of onsite wildlife fatalities disposed of in 2018.

4.2.14 Bird Carcasses

Bird carcasses found onsite were photographed, and the location was recorded. A database is maintained of the date, bird species, location data, and suspected cause of death. NRG Operators and WEST Inc. performed the avian and bat injury and fatality surveys during 2018, and this data is presented under separate cover.

4.2.15 Minimize Spills of Hazardous Materials

All vehicles were routinely inspected and maintained in accordance with servicing specifications. A Construction Waste Management Plan was prepared in accordance with WASTE-3, and an Operations

Waste Management Plan prepared in accordance with WASTE-6. The annual report for WASTE-6 is provided separately. All spills were reported according to applicable county, state and federal requirements.

4.2.16 Worker Guidelines

All workers and visitors to the site were provided a basic orientation that included specific instruction on biological resources, safety, placement of trash, etc. in accordance with CEC COCs. In addition, workers were provided additional instruction in the worker orientations. All workers were informed as part of the worker training of the requirement that pets were not allowed onsite nor were wildlife to be fed. All site visitors and workers were made aware of the firearms restrictions through worker and visitor orientations. Providing an orientation to all worker and site visitors has been an effective measure to ensure the aforementioned guidelines are followed on site.

4.2.17 Monitor Ground Disturbing Activities Prior to Site Mobilization

No site mobilization requiring monitoring of ground disturbing activities occurred in 2018.

4.3 Raven Management, BIO-12

During 2018, the Raven Management Plan objectives were implemented per COC BIO-12 and the 2011 Biological Opinion. The goal of the Raven Management Plan is to deter raven depredation of hatchling and juvenile desert tortoises in Ivanpah Valley. The Raven Management Plan was designed to implement mitigation measures, which would discourage the presences of ravens on-site. The Raven Management Plan specifies measures to prevent raven access to anthropogenic food and water resources (i.e. lids on dumpster, remove and dispose of all road-killed animals on the project site, and use of water in a manner that does not result in puddling), employee education, and reporting of raven nests observed on-site.

Biologists continue to work with NRG and contractors to ensure Raven Management Plan mitigation measures are implemented on-site. All dumpsters on-site have lids with a metal bar to secure the lids. Any observations of an open garbage dumpster or trashcan containing food was immediately closed and secured.

If an observation was made of water runoff or minor water accumulation created by leaking fixtures in the power blocks, a raven proof spill containment pan was placed under the leak until a more permanent fix was possible by the maintenance department. In addition, when anthropogenic water sources for ravens are identified, these features are addressed directly if possible with repairs, barriers, or engineering

alterations, and workers, technicians, or supervisors are informed how to prevent ravens from accessing water.

All road-killed wildlife observed on-site is reported immediately to the designated biologist. A biologist removes the road-killed wildlife and disposes of it in an appropriate manner. All birds and bats are transferred to WEST for processing and storage within the on-site freezer.

Employee education is provided as part of the on-site orientation program and Worker Environmental Awareness Program. The education program covers disposing of food in proper receptacles, not leaving water bottles or food in areas accessible to ravens, speed limits on-site, and reporting road-killed animals to the designated biologist. Where ravens are observed procuring human food or anthropogenic sources of water, the work crews and supervisors in the area are informed and raven protocols are reviewed directly with the field personnel involved.

A raven pair attempted to build a nest on the ISEGS site, in the Unit 2 tower. The partially built nest was removed after authorized by BLM. The raven pair did not attempt to rebuild the nest once it was removed.

4.4 Weed Management Activities, BIO-13

A report summarizing weed management activities on-site is provided under a separate cover.

4.5 Closure, Revegetation and Rehabilitation Plan, BIO-14

A report summarizing the assessments of the Closure, Revegetation and Rehabilitation Plan is provided under a separate cover.

4.6 Nesting Birds, BIO-15

Per the requirements of COC BIO-15, no pre-construction surveys for nesting birds were required for the ISEGS site in 2018. One partially built nest was reported previously in Section 4.3. No other nests were found incidentally on the site during 2018.

4.7 Burrowing Owls, BIO-16

Per the stipulations of COC BIO-16, no pre-construction surveys for burrowing owls were required or warranted on the ISEGS site in 2018. No visual or auditory detections were made of burrowing owls on

the ISEGS site during 2018, and no photos of owls on motion sensor cameras placed at mammal burrows and shelter sites were collected. No indication of the presence of burrowing owl was observed in 2018 by biological monitors on the site.

No measures were undertaken for these species, and therefore no effectiveness evaluation is presented.

4.8 Desert Tortoise Compensatory Mitigation, BIO-17

As part of the compensatory mitigation for desert tortoise, 50 miles of desert tortoise exclusion fence was required to be installed. The installation commenced along Interstates 15 and 40 in October 2015. Construction was completed on March 17, 2016. The fence is inspected and maintained by a third party with funds provided from an endowment for the compensatory mitigation. A report summarizing fence inspection and maintenance is provided under a separate cover.

4.9 Special-status Plant Impact Avoidance and Minimization, BIO-18

A report summarizing the assessments of the mitigations measures is under a separate cover.

4.10 Streambed Impact Avoidance and Minimization, BIO-20

See **Appendix B** for reports on change of biological conditions from 2018. Each of the reports satisfies this condition.

4.11 Bird or Bats Injuries and Fatalities, BIO-21

Per the requirements of COC BIO-21, the Designated Biologist was informed of any avian or bat injury or fatality discovered on the site in 2018, and each incident was documented and reported as per the ABMMP. Per COC BIO-21 all listed bird or bat species or special-status species observed were submitted to the California Natural Diversity Data Base. The surveying, reporting, and data analysis for avian and bat injury and fatality were performed as prescribed in the ABMMP by WEST Inc. The results of these are presented under separate cover.

4.11.1 Avian and Bat Monitoring and Management Plan (ABMMP)

NRG operators, avian biologists and personnel from West Inc. implemented the ABMMP during 2018. All results and actions, including deterrence measures are reported as part of the ABMMP and are provided under separate cover.

4.12 Desert Tortoises BIO-8, BIO-9, BIO-10

The following section describes the ISEGS desert tortoise best management practices that were prescribed as part of the CEC License Conditions, BLM ROW, and 2011 Revised Biological Opinion. ISEGS has also independently developed additional measures for tortoises.

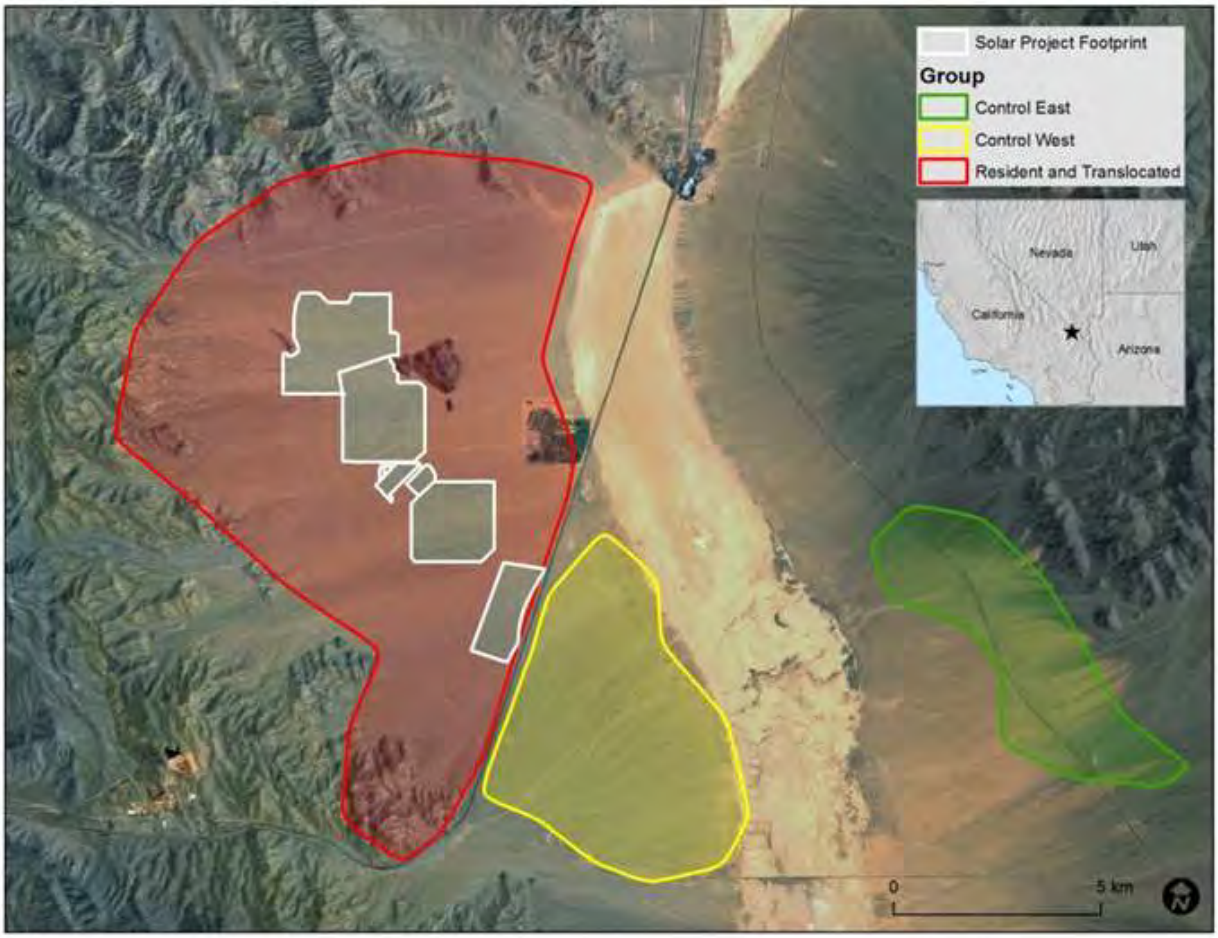
4.12.1 Background

Between October 2010 (ISEGS project construction start) and December 31, 2018, tortoises were numbered on the site, and in the recipient and control areas as part of the project (**Figure 1**). Collectively these tortoises will further be referred to as "monitored tortoises." See **Table 1** below for definitions of ISEGS monitored tortoise types. Monitored tortoises are broken down into three general groups: (1) **translocated tortoises**, or numbered tortoises initially located within the site boundaries (includes long-distance translocation tortoises, short-distance translocation tortoises, Head Start (Juvenile) tortoises, & never tracked); (2) **resident tortoises**, or numbered tortoises initially located in the recipient area surrounding the site; and (3) **control tortoises**, or numbered tortoises initially located in the control area. Other tortoises that exist in the recipient and control areas will be referred to as "unmarked, unmonitored tortoises" throughout the report. See **Appendix C** for the ISEGS 2018 Desert Tortoise Disposition Table. See maps in **Appendix D** for initial and current locations of monitored tortoises.

Table 1: Definition of ISEGS Monitored Tortoise Types

Tortoise Type	Sub-Type	Definition
Translocated	Long-Distance Translocation	Numbered tortoises initially located within site boundaries whose mean location was greater than 500 meters from the perimeter fence.
Translocated	Short-Distance Translocation	Numbered tortoises initially located within site boundaries whose mean location was less than 500 meters from the perimeter fence
Translocated	Head Start (Juvenile)	Numbered tortoises initially located within site boundaries with a strait mid-line carapace length (MCL) of less than 120 mm. Head Start tortoises include tortoises hatched in the holding pens.
Translocated	Never Tracked	Numbered tortoises initially located within the site boundaries with a strait mid-line carapace length (MCL) of less than 120 mm after the commencement of commercial operations.
Resident		Numbered tortoises initially located in the recipient area surrounding the site.
Control		Numbered tortoises initially located in the control area.

Figure 1: Locations of ISEGS Tortoise Groups



Tortoises discovered on site during construction activities and clearance surveys were placed into the quarantine pens to await translocation. During 2012 all tortoises greater than >120 mm midline carapace length (MCL) were translocated into the ISEGS recipient area. Monitoring of tortoise >120 mm MCL began with the Effectiveness Monitoring Program (EMP) from April 2012 to May 2017 followed by the Life of the Project (LOP) monitoring from October 2017 to October 2022. Each of these monitoring programs is investigating drivers of post-translocation survival.

All tortoises <120 mm MCL, known as the Head Start (Juvenile) tortoises were held in the quarantine pens until October 2016 when they were translocated into the recipient area. These tortoises are being monitored until Fall 2021. The monitoring data will be used to assess the success of the translocation .

4.12.2 Effectiveness Monitoring Program

The Effectiveness Monitoring Program (EMP) commenced in April 2012 through May 2017 following the translocation of the 57 short-distance translocated tortoises. The EMP followed the short-distance translocated, resident, and control tortoises for five years. During the five years comprehensive fieldwork was completed to collect data on tortoise survival and its anticipated drivers. The data collected was analyzed to determine the processes and scales influencing tortoise survival over the five-year period. A five-year report was submitted to BLM and USFWS in November 2017 summarizing the results of the Effectiveness Monitoring Program. See **Appendix E** for the five-year report titled, *Process- and Scale-based Determinants of Survival for Translocated Mojave Desert Tortoises in the Ivanpah Valley, California; April 2011 through May 2017***.**

In the fall of 2017, 99 of the EMP tortoises had the transmitters and iButtons removed. There were eight tortoises inaccessible for transmitter and iButton removal during the fall of 2017. The remaining eight tortoises had the transmitters and ibuttons removed during March and April of 2018. In October 2018, BS137, a missing resident tortoise was located in the recipient area. The transmitter and iButton were removed from BS137 upon discovery of the individual. See map in **Appendix F** for final locations of 9 EMP tortoises in 2018.

4.12.3 Life of the Project

NRG continued to monitor what is known as the Life of the Project (LOP) tortoises in 2018. These tortoises were randomly selected from the EMP cohort in fall of 2017. A total of 90 tortoises with a MCL of 180 mm or greater were selected for monitoring for an additional five years from October 2017 to October 2022. See **Table 2** for the initial tortoise numbers for LOP. Of the ninety tortoises, 30 are short-distance translocated, 30 residents, and 30 control. The LOP tortoises are monitored once a month throughout the year in accordance to guidance from BLM and USFWS. GPS data loggers were affixed to each LOP tortoise to collect more detailed spatial data.

Table 2: Initial Tortoise Numbers for LOP

Tortoise Size and Sex	Translocated	Resident	Control	Total
Male ≥ 180 mm MCL	15	15	15	**45**
Female ≥ 180 mm MCL	15	15	15	**45**
Total	**30**	**30**	**30**	**90**

4.12.3.1 GPS Data Loggers

GPS data loggers have become increasingly popular in biological conservation studies. Smaller units with longer battery life and features such as accelerometers make them useful in a range of applications for a variety of species. At ISEGS, the movement and space use metrics collected by the loggers provides a more accurate picture to evaluate a tortoise's behavior and responses to various environmental factors. With GPS data loggers, an animal's location is recorded at an adequate interval to capture movement throughout the landscape. This interval is more frequent than the spatial data collected previously during weekly or every other week visits by field biologists and can provide a more accurate picture of the animal's activity.

For the LOP study, Mobile Action Technology, Inc. i-gotU GT-120 Travel Loggers were placed on each tortoise. The GPS logger is inserted into a custom-made bracket, which is attached to the carapace of a tortoise. The loggers are set to record location data every 30 minutes. This interval provides the optimal balance of battery life and location data collection allowing the GPS loggers to be exchanged on a monthly basis. All 90 LOP tortoises were fitted with a bracket and logger from October 2017 to April 2018.

Over the course of the year, biologists did not observe any unusual behavior that may be a result of the placement of a bracket or GPS logger on the individuals. Tortoises did not display any signs of stress, behavioral modifications, or inability to access burrows including rock and caliche burrows.

During 2018 tortoises were visited monthly to collect behavioral and location data and to exchange/retrieve the logger. See **Table 3** showing logger exchange/retrieval events during 2018.

Table 3: 2018 GPS Logger Exchange/Retrieval Events

Tortoise Type	February 2018	March 2018	April 2018	May 2018	June 2018	July 2018	August 2018	September 2018	October 2018
Control West	1	1	30	30	29	28	27	28	27
Resident	0	5	30	30	30	30	30	28	27
Short Distance Translocated	1	3	30	30	30	30	30	28	29
Totals:	**2**	**9**	**90**	**90**	**89**	**88**	**87**	**84**	**83**

Five loggers went missing in 2018 or were not present on the tortoise's carapace when encountered for a monthly visit. Of the five missing loggers one was found on the mound of a tortoise burrow. There was no indication as to why the loggers went missing but in all five cases the bracket was missing as well.

4.12.3.2 Transmitters

Each of the life of the project tortoises is also equipped with a Holohil Systems Ltd., very high frequency (VHF), RI-2B transmitter. These transmitters have approximately a two-year battery life. Thus, each tortoise is retransmittered approximately every 2 years. In 2018, seventy-eight tortoises were retransmittered with a new transmitter. Through out the transmitters lifetime repairs are required to maintain attachment and position on the tortoise's carapace. Repairs to transmitters can be result of wear over time and/or suspected predators chewing or pulling of the transmitter and/or antenna. When an authorized biologist notices a transmitter or antenna is in need of a repair then the repair is made immediately. There were no transmitter failures during 2018. **Table 4** shows the number of retransmitters and repairs to transmitter body, antenna, or antenna attachment points during 2018.

Table 4: 2018 Retransmitters and Repairs

Tortoise Type	Retransmitter	Repair
Control West	28	12
Resident	22	15
Short Distance Translocated	28	15
Totals:	**78**	**42**

4.12.3.3 Missing Tortoises

There were no missing LOP tortoises in 2018.

4.12.3.4 Tortoise Interventions

The 2011 Biological Opinion requires an approved biologist to intervene if a tortoise is in harm's way or injured. The designated biologist is notified any time a tortoise is in harm's way or injured to determine best course of action to ensure the safety of the tortoise. There were three tortoise interventions in 2018.

BS620 was blocked and entombed in the burrow. A very large rock blocked the entrance to the burrow. Once the large rock was removed a closer inspection revealed the tortoise was partial buried. The burrow was partially excavated to free BS620. There was no sign of trauma to the tortoise from the partially collapsed burrow.

BS90 was found flipped on its carapace in a sandy wash. There were feces, urine, and urine particulates present on the plastron and ground around the tortoise. The tortoise was turned over and offered 400ml of water via nasal oral route.

BS220 was observed having healing trauma to the plastron and forelimbs. Both areas were healing, not malodorous, and tortoise behavior appeared normal. Tortoise was provided 60ml of saline via epicoelomic hydration.

4.12.3.5 Health Analyses and ELISA Testing

Desert tortoise health assessments were not conducted on the LOP tortoises in 2018. These tortoises are slated to have a health assessment during year 4 of the monitoring in 2021.

4.12.3.6 Tortoise Fatalities

There were a total of 6 LOP fatalities in 2018. Of these 6 fatalities one was a short distance translocated, two were resident tortoises, and three were control tortoises. The suspected causes of death for 3 of the fatalities were Canid or Badger. The suspected causes of death for 2 of the fatalities were hyperthermia. The suspected cause of death for the remaining 1 tortoise was unknown. **Table 5** shows breakdown of LOP tortoise Fatalities in 2018.

Table 5: ISEGS Life of the Project Tortoise Fatalities

Tort ID	Tortoise Type	Translocation Type	Sex	MCL (latest)	Date Carcass Found	Suspected Cause of Death
BS621	Control West		Female	200	23-May-2018	Hyperthermia
BS629	Control West		Female	200	23-May-2018	Hyperthermia
BS33	Resident		Female	231	17-Aug-2018	Unknown
BS70	Resident		Female	192	20-Aug-2018	Canid-Badger
BS562	Control West		Male	190	22-Aug-2018	Canid-Badger
BS183	Translocatee (Adult Found Onsite)	2012 Short	Male	263	19-Sep-2018	Canid-Badger

See map in **Appendix G** for LOP fatalities in 2018.

4.12.4 Head Start (Juvenile) Translocation

Juvenile translocation refers to the translocation method employed for tortoises less than 120 mm MCL when initially located on site during construction or hatched in captivity at the quarantine pens. These tortoises were translocated in October 2016 into the Interstate 15 pen ("I-15 pen") and the ISEGS recipient area south of the I-15 pen.

See **Appendix H** for Ivanpah Solar Electric Generating System Juvenile Desert Tortoise Translocation 2018 Annual Report.

4.13 Precipitation Events and Fence Monitoring

Precipitation events were recorded several times during 2018. These events are detailed in **Table 6**. Immediately following each storm, after the cessation of runoff, site fences were inspected and designated biologist and biological monitors worked to temporarily repair any breach and remove debris from tortoise guards. As a result, following each event, the fence integrity was restored sufficiently to prevent tortoise from accessing the cleared areas. Therefore, tortoises did not have the opportunity to enter the site as a result of these measures. All rain data presented in **Table 6** was obtained from the weather station located at the quarantine pens.

Table 6: Precipitation Data for 2018

DATE	Jan-2018	Feb-2018	Mar-2018	Apr-2018	May-2018	Jun-2018	Jul-2018	Aug-2018	Sep-2018	Oct-2018	Nov-2018	Dec-2018
	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	(inches)
1	0	0	0	0	0.07	0	0	0	0	0	0	0
2	0	0	0	0	0.02	0	0	0.44	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0.14	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0.01	0	0.16
7	0	0	0	0	0	0	0	0	0	0	0	0.08
8	0.16	0	0	0	0	0	0.01	0.17	0	0	0	0.01
9	0.78	0	0	0	0	0	0	0	0	0	0	0
10	0.01	0	0.16	0	0	0	0.32	0	0	0	0	0
11	0	0	0.17	0	0	0	0	0.16	0	0.02	0	0
12	0	0.03	0	0	0	0	0.22	0.07	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0.05	0.11	0	0	0	0
15	0	0	0.05	0	0	0	0	0.16	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0.02	0	0	0	0	0.11	0	0
22	0	0	0.04	0	0	0	0	0	0	0.18	0	0
23	0	0	0.04	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0.02	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0.00	0	0	0	0	0	0	0	0	0	0	0
27	0	0.01	0	0	0	0	0.01	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	---	0	0	0	0	0.21	0	0	0	0.15	0
30	0	---	0	0	0	0	0	0	0	0	0	0
31	0	---	0	---	0	---	0.09	0	---	0	---	0.01
MTD	**0.95**	**0.04**	**0.46**	**0.00**	**0.11**	**0.00**	**0.93**	**1.11**	**0.00**	**0.46**	**0.15**	**0.26**
YTD	**4.47**											

In accordance with the 2011 Revised Biological Opinion and the project COCs, all tortoise proof fences and tortoise guards on-site were checked twice monthly and within 24 hours of a significant rain event for breaches by the designated biologist or biological monitor. When fence breaches were identified, they were temporarily repaired by the biologist immediately to maintain the integrity of the fence, and reported to NRG for permanent repair. Issues that had not been addressed in a timely manner with permanent repairs were reported in the monthly fence report. As a result, the integrity of the fence was maintained throughout 2018. The practices associated with monitoring and fence repair are effective.

4.14 Miscellaneous

The Designated Biologist monitors captured venomous snakes within the project boundaries that were reported by operations personnel and sub-contractors. Venomous snakes were safely relocated nearby, but outside the site perimeter. Non-venomous snakes found in harm's way were relocated a short distance away from their capture location, within the project boundary. If not in danger, non-venomous snakes were not relocated.

5.0 Summary of Data

BIO-11 requires an annual report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year. As previously noted, avian data is provided under separate cover. This section provides the details of all wildlife fatalities discovered at the site in 2018. Tortoise fatalities were reported previously in Section 4.12.3.6

5.1 Mammal Fatalities

There was one kit fox fatality reported on-site during 2018. The fatality occurred on January 19, 2018 at approximately 23:00 hours on the Unit 3 access road. The kit fox was reported during the morning of January 20, 2018 but was no longer present along the road or roadside. Smaller mammals, including jackrabbits, wood rats and kangaroo rats were discovered on-site (See Section 5.2, below).

5.2 Wildlife Fatalities

Per the Raven Management Plan BIO-12 all carcasses of small mammals (rabbits and rodents) and reptiles observed in the project area and along access roads were promptly removed by a biological monitor and disposed of in a container with a secured top so that they were not accessible to ravens or other scavengers. The following is a summary of dead wildlife collected on roads or adjacent to roads during 2018.

- 1 Black-tailed jackrabbits
- 2 Coach whip snakes
- 1 Glossy snakes
- 1 Gopher snakes
- 3 Western Zebra-tailed lizards

Appendix A

Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) Tracking Table

Table A- 1
Biological Resources Mitigation Implementation and Monitoring Plan Tracking Table

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
No. 1: Certification by CEC	Expected Date is September 22, 2010 by CEC, and October 6, 2010 by BLM	9/22/2010 & 10/7/2010
Preliminary Stage (Fence)		
No. 2: Biologists and botanists field preparation	July 2010 – September 2010	
	Wildlife: Assemble materials required for clearance surveys and translocating tortoises. Includes fiber-optic scopes, tortoise tags. Obtain approval for Designated Biologists (DM) and Biological Monitors (BM).	9/30/2010
	Plants: During pre-construction, plant activities will include the following: Avoid impacts to rare plants by excluding from the project area a 433-acre area in the northernmost portion of Ivanpah 3 that is densely populated with rare plants; establish two additional Rare Plant Mitigation Areas in the CLA within which direct impacts to rare plants will be completely avoided; demark and/or fence Mojave milkweed and Rusby's desert mallow rare plant localities proposed for avoidance within the heliostat array to protect the rare plants from direct impacts during pre-construction and construction activities; salvage individual Mojave milkweed and Rusby's desert mallow plants that cannot be avoided for use in translocation, revegetation, and rehabilitation; salvage of all rare cactus (desert pincushion and Parish's club-cholla) onsite for use in translocation, revegetation, and rehabilitation.	11/1/2010
No. 3: Site and Construction Logistics Area (CLA) staked by land surveyors	July 2010 - September 2010	9/30/2010 for areas subject to construction in Phase I
	Administer WEAP (refer to attached BIO-6 Worker Environmental Awareness Program).	9/30/2010
	Wildlife: Survey vehicles to remain on existing roads.	9/30/2010
No. 4: Improved Colosseum Road location staked by land surveyors	July 2010 - September 2010	

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	Administer WEAP (refer to attached BIO*-6 Worker Environmental Awareness Program).*	9/30/2010
	Wildlife: Survey vehicles to remain on existing roads.	9/30/2010
No. 5: Weed inspection station established	October 2010 – May 2013	10/6/2010
	Plants: A weed inspection station will be established on the first day of construction. Until the permanent facility is operational (see No. 26) vehicles that require washing will be monitored by security staff and turned back to be washed in Primm before returning to the site. A vehicle log will be included in monthly compliance reports.	10/6/2010
No. 6: 10-foot-wide internal perimeter road (within the staked fence line) is cleared of vegetation and graded	October 2010 – November 2010 (for Phase I of construction)	11/30/2010
	Continue to administer WEAP to all new personnel at site or all subsequent events.	Ongoing
	Administer WEAP (refer to attached BIO-6 Worker Environmental Awareness Program).	11/30/2010
	Wildlife:	
	An AB or BM will be onsite during installation of the temporary desert tortoise fence. If installation of temporary fencing, surveying or clearing is occurring at more than one location, more than one AB may need to be onsite to provide appropriate supervision. After installation of this temporary fencing and prior to initiation of construction activities, an AB and/or BM will perform a pre-construction sweep for desert tortoises. An AB will relocate any desert tortoises found in the project impact area. Desert tortoises will be moved to suitable habitat (at least 300 feet from the project site) outside the impact area and placed in a natural or artificial burrow or under a shrub, depending on time of day and year. An AB will also be available to relocate any desert tortoises that may wander into the impact area during construction. All ABs or BMs will have a copy of the Biological Opinion (Attachment B), Translocation Plan (BIO-9 attached), and be familiar with the COC BIO-11 all activities involving desert tortoise clearance surveys, handling, health assessments, and other related translocation activities.	11/30/2010

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	Concurrent with start of perimeter fencing, construct minimum of 16 desert tortoise holding pens for use in quarantining tortoise removed from Ivanpah 1 and the CLA.	11/30/2010
	Plants: Concurrent with start of perimeter fencing, botanists will install protective fencing for rare plants and salvage any rare plants within the fence line corridor. Environmentally Sensitive Areas (ESAs) will be marked with signs.	11/30/2010
No. 7: Temporary (stand alone) tortoise fence installed on perimeter of Ivanpah 1	September 2010 – October 2010	10/29/2010
	Administer WEAP (refer to attached BIO- 6 Worker Environmental Awareness Program)..	10/29/2010
	Wildlife: An AB or BM will be onsite during installation of the temporary desert tortoise fence. If installation of temporary fencing, surveying or clearing is occurring at more than one location, more than one AB may need to be onsite to provide appropriate supervision. After installation of this temporary fencing and prior to initiation of construction activities, an AB and/or BM will perform a pre-construction sweep for desert tortoises. An AB will relocate any desert tortoises found in the project impact area. Desert tortoises will be moved to suitable habitat (at least 300 feet from the project site) outside the impact area and placed in a natural or artificial burrow or under a shrub, depending on time of day and year. An AB will also be available to relocate any desert tortoises that may wander into the impact area during construction. All ABs or BMs will have a copy of the Biological Opinion (Attachment B), Translocation Plan (BIO-9 attached), and be familiar with the COC BIO-11 for all activities involving desert tortoise clearance surveys, handling, health assessments, and other related translocation activities.	11/4/2010
	Plants: Botanists continue installation of protective fencing for rare plants and salvage plants within the fence line corridor. Environmentally Sensitive Areas (ESAs) will be marked with signs.	10/29/2010
No. 8: Permanent security/Combo fence installed on perimeter of Ivanpah 1	September 2010 – December 2010	12/31/2010
	Wildlife: Same as No. 7. Construction crews will require monitoring by DB/BMs until the fence installation is complete.	12/31/2010

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	Plants: Botanists continue installation of protective fencing for rare plants and salvage plants within the fence line corridor.	10/29/2010
No. 9: Tortoise exclusion fence installed along Colosseum Road	September 2010 – October 2010	10/29/2010
	Wildlife: An AB or BM will be on site during installation of the fence.	10/29/2010
No. 10: Area within fenced perimeters of Ivanpah 1, and later Ivanpah 2 and 3, is completed	Ivanpah 1 and CLA: October 2010; Ivanpah 2: September 2011; Ivanpah 3: September-October 2011	Ivanpah 1 and CLA: 11/4/2010; Ivanpah 2: 9/28/2011; Ivanpah 3: 10/10/2011
	Wildlife: Within 24 hours prior to the initiation of construction of the desert tortoise-exclusion fence, a desert tortoise survey would be conducted by DB/BMs of those linear areas using techniques providing 100-percent coverage of the construction area and an additional transect along both sides of the fence line transect to provide coverage of an area approximately 90 feet wide, centered on the fence alignment. Transects would be no greater than 30 feet apart. Two passes of complete coverage would be conducted. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, would be examined to determine occupancy. Any burrow within the fence line corridor would be collapsed after confirmation that a desert tortoise does not occupy it, or if occupied, the desert tortoise has been removed.	Ivanpah 1 and CLA: 11/4/2010; Ivanpah 2: 9/28/2011; Ivanpah 3: 10/10/2011
	Within 72 hours after the area to be cleared is fully enclosed with tortoise exclusion fencing, a desert tortoise clearance survey would be initiated per USFWS protocol (USFWS 1992) and project specific Guidelines (USFWS 2008). At least three complete clearance sweeps with 100 percent coverage would be conducted as described above. Each separate survey would be walked in a perpendicular direction to allow opposing angles of observation. The area will be considered clear after two complete passes have discovered no new desert tortoises. All ABs or BMs will have a copy of the Biological Opinion (Attachment B), Translocation Plan (BIO-9 attached), and be familiar with the COC BIO-11 for all activities involving desert tortoise clearance surveys, handling, health assessments, and other related translocation activities.	Ivanpah 1 and CLA: 11/4/2010; Ivanpah 2: 9/28/2011; Ivanpah 3: 10/10/2011

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	Conduct concurrent clearance surveys for burrowing owls (BIO-16), Gila monsters and badger (BIO-11).	Ivanpah 1 and CLA: 11/4/2010; Ivanpah 2: 9/28/2011; Ivanpah 3: 10/10/2011
	Note: Nesting bird surveys (BIO-15) are required if construction occurs between February 1 and August 31.	2/1/2012 – 8/31/2012
No. 11: Ivanpah 1, and later Ivanpah 2 and 3, is completed -- *CONTINUED*		
	Plants: Monitoring activities specific to special-status plants include: the Designated Biologist will oversee the salvage and transplantation of special-status plants designated on final project plans as "salvage". Salvaged plants will be installed in the Rare Plant Transplantation Area (RPTA); regular inspections of salvaged plants placed in the RPTA will be conducted by the Botanical Monitors to check that salvaged plants are watered and maintained as needed to maximize survivorship throughout the construction period; salvaged native plants that are stored offsite in a native plant nursery, will also be inspected by the Botanical Monitor to document that plants are maintained in good condition; the Botanical Monitor will oversee construction to confirm that no unauthorized construction activities occur in Rare Plant Avoidance Areas (RPAAs); inspections of all fenced special-status plants within the heliostat array will be conducted by the Botanical Monitor to document that avoidance fencing is maintained in good condition; fencing surrounding the Rare Plant Mitigation Areas will be inspected regularly to check that fencing is maintained in good condition; the Botanical Monitor will monitor general construction activities for compliance with regulatory terms and conditions that pertain to special-status plants; and the Botanical Monitor will notify the project owner, BLM's Authorized Officer, and the CPM of any noncompliance with any biological resources condition of certification.	5/31/2014
Construction of Fiber-optic and Gas Lines		
No. 12: Fiber-optic line construction	April 2011 – July 2012	7/2/2012
	Wildlife: DB/BMs clear area of all desert tortoises immediately prior to construction and monitor construction.	7/2/2012

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
No. 13: Gas line construction	March 2011 – December 2013	12/10/2013
	Wildlife: DB/BMs clear area of all desert tortoises immediately prior to construction and monitor construction outside of fenced perimeter.	12/10/2013
	Plants: Prior to construction, survey and salvage special-status plants and common succulents within the linear right-of-way and sub-station and transplant to onsite nurseries. Monitor the adjacent mitigation areas to ensure construction does not intrude or extend beyond the right-of-way.	12/10/2013
Preliminary Stage (Fence) of Ivanpah 2 and 3		
No. 14: 10-foot-wide internal perimeter road (within the staked fence line) is cleared of vegetation and graded	October 2011 – January 2011	1/5/2012
	Continue to administer WEAP of all new personnel at site or all subsequent events (refer to attached BIO-6 Worker Environmental Awareness Program).	Ongoing
	Wildlife: Same as No. 6	1/5/2012
	Plants: Same as No. 6	1/5/2012
No. 15: Perimeter fence construction in Ivanpah 2	March 2011 – June 2012	6/6/2012
	Wildlife: Same as No. 7 and No.8.	6/6/2012
	Plants: Same as No. 7 and No.8	6/6/2012
No. 16: Perimeter fence construction Ivanpah 3	March 2011 – June 2012	6/13/2012
	Wildlife: Same as No. 7 and No.8.	6/13/2012
	Plants: Same as No. 7 and No.8	6/13/2012
Site Development Stage (Primarily inside fenced areas)		

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
No. 17: Rough Grading of sites	Ivanpah 1 & Common areas: November 2010 – February 2011	2/1/2011
	Ivanpah 2: January 2011 – April 2011	4/1/2011
	Ivanpah 3: April 2011 – June 2011	8/31/2011
	Wildlife: A Biological Monitor will be on site during initial grading to ensure no tortoises remain on the site. If a tortoise is found it will be translocated as previously described.	8/31/2011
	Conduct concurrent clearance surveys for burrowing owls (BIO-16), Gila monsters and badger (BIO-11).	8/31/2011
	Note: Nesting bird surveys (BIO-15) are required if construction occurs between February 1 and August 31.	2/1/2018-8/31/2018
	Plants: Rare plant protection areas, ESAs and RPAAs monitored to ensure construction activities don't intrude. Monitor for newly established special-status species and salvage and transplant to on site nurseries.	5/31/2014
No. 18: Pads, parking areas and construction laydown areas graded if needed, and construction trailers moved to locations within the CLA	November 2010 – January 2011	1/24/2011
	Wildlife: No biological monitoring required for wildlife for these construction activities as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented. Monitoring of overwintering tortoises in holding pens will be ongoing.	5/31/2014
	Plants: Same as No. 17	5/31/2014
No. 19: Locations of roads, buildings and structures staked by land surveyors	November 2010 – May 2013	5/31/2014
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection	5/31/2014

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	measures have been implemented.	
No. 20: Grading of power block, building pads, internal roads and solar field (as necessary)	Ivanpah 1 & Common: November 2010 - October 2011	10/10/2011
	Ivanpah 2: January 2011 – November 2011	11/3/2011
	Ivanpah 3: April 2011 – June 2012	6/5/2012
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented. *(Note: Biological monitoring required as per Biological Opinion)*	5/31/2014
	Plants: Same as No. 17	5/31/2014
No. 21: Vegetation mowed to within 10-12 inches of ground surface	Ivanpah 1, CLA, Ivanpah 2, and Ivanpah 3: December 2010 – November 2012	11/22/2012
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented. *(Note: Biological monitoring required as per Biological Opinion)*	Ongoing as per biological opinion
	Plants: Same as No. 17	Ongoing
No. 22: Colosseum Road graded and paved from golf course to plant	October 2010 – November 2010	July 2011
	Wildlife: DB/BMs clear fenced area of all desert tortoises prior to construction.	11/3/2010
	Plants: No rare plants are located along Colosseum Road.	N/A
No. 23: Internal roads graded, graveled, or	Ivanpah 1: October 2010 – November 2012	9/12/2013

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
paved		
	Ivanpah 2: January 2011- February 2013	11/18/2013
	Ivanpah 3: April 2011 – February 2013	12/4/2013
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented. *(Note: Biological monitoring required as per Biological Opinion)*	Ongoing as per biological opinion
	Plants: Same as No. 17	Ongoing
No. 24: Power equipment and materials brought onsite	November 2010 – May 2014	5/31/2014
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	5/31/2014
	Plants: No monitoring necessary required for plants as long as all of the previously described construction events have occurred and resources protection measures have been implemented.	5/31/2014
No. 25: Fabrication shops erected	November 2010 – June 2011	6/28/2011
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	6/28/2011
	Plants: Same as No. 24	6/28/2011
No. 26: Permanent wheel-washing station established	January 2011 - June 2011	6/30/2011
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection	6/30/2011

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	measures have been implemented.	
	Plants: Same as No. 24	6/30/2011
No. 27: Power block excavated and foundations poured	Ivanpah 1: February 2011 – April 2012	4/3/2012
	Ivanpah 2: April 2011 – July 2012	7/24/2012
	Ivanpah 3: June 2011 - May 2012	5/31/2012
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	5/31/2012
	Plants: Same as No. 24	5/31/2012
No. 28: Installation of underground piping and wiring	Ivanpah 1: December 2010 - May 2012	5/22/2012
	Ivanpah 2: February 2011 - April 2013	4/24/2013
	Ivanpah 3: April 2011 - September 2013	9/19/2013
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	9/19/2013
	Plants: Same as No. 24	9/19/2013
No. 29: Construction of power block	Ivanpah 1: February 2011 – December 2013	12/30/2013
	Ivanpah 2: April 2011 – December 2013	12/31/2013
	Ivanpah 3: September 2011 – December 2013	12/31/2013
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	12/31/2013

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	Plants: Same as No. 24	12/31/2013
No. 30: Heliostat materials brought onsite	February 2011- September 2013	9/30/2013
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	9/30/2013
	Plants: Same as No. 24	9/30/2013
No. 31: Construction of Administration/warehouse building	February 2011 – November 2012	11/7/2012
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	11/7/2012
	Plants: Same as No. 24	11/7/2012
No. 32: Construction of heliostat field	Ivanpah 1: March 2011 - December 2012	12/17/2012
	Ivanpah 2: May 2011 - September 2013	9/10/2013
	Ivanpah 3: May 2012 - October 2013	10/7/2013
	Wildlife: No biological monitoring required for wildlife as long as all of the previously described construction events have occurred (e.g., perimeter fence installed) and resources protection measures have been implemented.	10/7/2013
	Plants: Rare plant protection areas, ESAs and RPAAs monitored to ensure construction activities don't intrude. Monitor for newly established special-status species and salvage and transplant to on-site nurseries.	10/7/2013
Solar plant construction	Ivanpah 1 December 2010 – January 2013	9/20/2013
	Implement all of the preceding measures for construction.	5/31/2014

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
Solar plant construction	Ivanpah 2 January 2011 – April 2013	12/15/2013
	Implement all of the preceding measures for construction.	5/31/2014
Solar plant construction	Ivanpah 3 July 2011 – August 2013	12/6/2013
	Implement all of the preceding measures for construction.	5/31/2014
Removal/Restoration Phase		
Construction completed, all construction equipment and temporary buildings removed.	March 2013 - November 2013	11/30/2013
	Wildlife: The permanent exclusion fencing would be inspected bimonthly and after major rainfall events	Ongoing
	Plants: Areas used for construction that are no longer required for operation are restored per the Closure, Revegetation and Rehabilitation Plan. Special-status plant monitoring will be conducted within the RPAAs.	Ongoing
Operation (Inside fenced areas)		
	Life of the project (45 Years)	Ongoing
	WEAP repeated annually for permanent employees, and will be routinely administered within one week of arrival to any new construction personnel.	Ongoing
	Wildlife: The permanent exclusion fencing is inspected bimonthly and after major rainfall events.	Ongoing
	Implement ongoing measures of Raven Management Plan (BIO-12).	Ongoing
	Implement ongoing measures of Tortoise Translocation Plan. (see BIO-9 and Biological Opinion).	Ongoing
	Implement ongoing measures of Avian and Bat Monitoring and Management Plan (BIO-21)	Ongoing

Event Description	Expected Dates and Essential Biological Resource Protection Measures	Date Completed
	Plants: Maintain nursery plants. Special-status plant monitoring will be conducted within the RPAAs. An adaptive management approach will be used during long-term monitoring as per BIO-14.	Ongoing
Maintenance (Inside and outside of fenced areas)		
Class I activities (do not result in surface disturbance)	Life of the project (45 Years)	Ongoing
	Wildlife: DM/BM administers WEAP and monitors activity outside of fenced area that requires vehicles or construction equipment.	Ongoing
Class II activities (results in minimal surface disturbance)	Life of the project (45 Years)	Ongoing
	Wildlife: *DM/BM administers WEAP and monitors activity outside of fenced area that requires vehicles or construction equipment*	Ongoing
	Plants: *Minimize new disturbance – avoid vegetation.*	Ongoing
Class III activities (result in new, major, surface disturbance outside of fenced areas)	Life of the project (45 Years)	Ongoing
	Wildlife: *Implement measures established for construction activities outside of fenced areas.*	Ongoing
	Plants: Implement appropriate measures in the Closure, Revegetation and Rehabilitation Plan (BIO-14).	Ongoing
Facility Closure		
Decommissioning.	45 years from project's start of operation	Not started
	Implement measures of the Closure, Revegetation and Rehabilitation Plan (BIO-14)	Not started

Appendix B

BIO-20 Biological Change of Conditions Reports

TECHNICAL MEMORANDUM

Condition of Certification BIO-20 Change of Conditions Report for ISEGS, May 2018

PREPARED FOR:	Tim Sisk/NRG Energy Amanda Scheib/Designated Biologist
COPY TO:	Jacobs Environmental Staff
PREPARED BY:	Morgan King/ Jacobs
DATE:	May 7, 2018
PROJECT NUMBER:	701975

Introduction

The California Energy Commission's *Ivanpah Solar Electric Generating System Commissions Decision* (2010) Condition of Certification (COC) BIO-20 states, in part, that Solar Partners' must identify:

> "…any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts… As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project."

Potential changes of conditions include changes to assumptions resulting from new data provided during the operations phase biological resource surveys of Ivanpah Solar Electric Generating System (ISEGS). In spring 2017 and 2018, environmental staff identified the presence of two new plant species, which represents a change in the biological conditions for ISEGS.

New Plant Occurrences

Change of Conditions

The new plant species not previously observed onsite were brassy bryum (*Bryum chryseum*) and rocketsalad (*Eruca vesicaria*).

Brassy Bryum

Brassy bryum is a byrophyte in the moss (Bryaceae) family. This species has a California Native Plant Society rarity status California Rare Plant Rank 4.3, which means it has limited distribution in California (CNPS, 2018).

Bryophytes require a microscope for identification. This species was found in the Northern Rare Plant Mitigation Area (north of the facility) in a rocky limestone outcrop near an ephemeral wash. Samples were taken in April 2017 and a qualified bryologist was able to identify in March 2018. This is the first occurrence of this species in San Bernardino County, California. Since this species is already located in a mitigation area, no further protection is required.

Rocketsalad

Rocketsalad is a non-native species in California, introduced from elsewhere but naturalized in the wild (Calfora, 2018). It occurs throughout California in disturbed locations. This individual was found in highly active area in Construction Logistics Area East, northeast of the Heliostat Assembly Building .

Rocketsalad does not meet the criteria of an ISEGS target weed, defined as a species included on the weed list of the California Department of Food and Agriculture (CDFA), California Invasive Plant Council (Cal-IPC), or Mojave Weed Management Area (MWMA) (CH2M, 2010; CDFA, 2018; Cal-IPC, 2018; MDRCD, 2018). Because this is a non-native species, it was manually removed in accordance with BIO-13 weed management guidelines (CH2M, 2010).

Recommendations

No recommendations are necessary to accommodate this change in conditions. Brassy bryum is protected in current location in the Northern Rare Plant Mitigation Area. Rocketsalad was manually removed in accordance with weed management guidelines (CH2M, 2010). Biological staff will continue to monitor the project site for new plant species while complying with requirements BIO-18 special-status plants and BIO-13 noxious weeds (CEC, 2010).

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CH2M HILL (CH2M). 2010. *Weed Management Plan for the Ivanpah Solar Electric Generating System (Revision 2)*. Sacramento, CA.

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TECHNICAL MEMORANDUM

JACOBS

Condition of Certification BIO-20 Change of Conditions Report for ISEGS, December 2018

PREPARED FOR:	Tim Sisk/NRG Energy Amanda Scheib/Designated Biologist
COPY TO:	CH2M Environmental Staff
PREPARED BY:	Morgan King/Jacobs
DATE:	January 7, 2019
PROJECT NUMBER:	701975CH

Introduction

The California Energy Commission's *Ivanpah Solar Electric Generating System Commissions Decision* (2010) Condition of Certification (COC) BIO-20 states, in part, that Solar Partners' must identify:

> "…any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts… As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project."

Potential changes of conditions include changes to assumptions resulting from new data provided during the operations phase of Ivanpah Solar Electric Generating (ISEGS) surveys. Environmental staff identified one noxious weed species previously observed at ISEGS that had changed agency status with either California Department of Food and Agriculture (CDFA), California Invasive Plant Council (Cal-IPC), or Mojave Weed Management Area (MWMA).

Noxious Weed Status Changes

Change of Conditions

Cal-IPC changed the noxious weed rating of London rocket (*Sisymbrium irio*) from Moderate to Limited.

London Rocket

London rocket is an annual herbaceous plant in the mustard (Brassicaceae) family. It is an invasive non-native species in California, which was introduced from elsewhere but naturalized in the wild. It occurs throughout California, mostly in the southern half of state and in the Central Valley in elevations up to 7,775 feet above mean sea level. It occurs in disturbed areas and individual plants can produce several thousand seeds annually.

When the ISEGS Weed Management Plan was written in 2010, Cal-IPC rated London rocket as Moderate. The definition of Cal-IPC Moderate rated weed is:

> These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread (Cal-IPC, 2018).

In 2018, Cal-IPC downgraded London rocket to Limited rating. The definition of Cal-IPC Limited rated weed is:

> These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic (Cal-IPC, 2018).

London rocket is not included on the CDFA or MWMA lists (CDFA, 2018; MDRCD, 2018).

London rocket was first recorded at ISEGS in 2008 (CH2M, 2010). London rocket has been observed since 2008 and manually removed in accordance with BIO-13 weed management protocols. Occurrences of this species were reported in the BIO-13 Annual Monitoring Reports (Solar Partners, 2015; Solar Partners, 2016; Solar Partners, 2017; Solar Partners, 2018).

Recommendations

Recommend revising the ISEGS Weed Management Plan (Table 1 Observed and Potentially Occurring Noxious Weeds at ISEGS) to include those noxious weed species that have changed CDFA, Cal-IPC, or MWMA status since 2010.

References

California Department of Food and Agriculture (CDFA). 2018. Noxious Weed List – Section 4500 Food and Agriculture Code (PDF). Accessed December 31 2018. http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm.

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Appendix C
ISEGS 2018 Desert Tortoise Disposition Table

Disposition Table Legend	
Term	**Explanation**
DTCC	Desert Tortoise Conservation Center
Inj	Injured
MNP	Mojave National Preserve
NT	Never Transmittered
OSP	Ojai Sulcata Project
USGS	United States Geological Survey
Vet in Apple Valley	Dr. Clifford Jessen, Apple Valley Animal Hospital 18107 US Highway 18 Apple Valley, CA 92307
Vet in San Diego	Dr. Thomas Boyer, Pet Hospital of Penasquitos 9888 Carmel Mountain Rd. Ste F. San Diego, CA 92129

* BS191 and BS193 have approximate Initial Process Dates

Tort ID	Tortoise Type	Initial Process Location (GIS)	Sex	Initial MCL	Recent MCL	Initial Process Date	Transmitter (Yes/No)	2018 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BS02	Translocatee	Ivanpah 1	Male	264	268	10/9/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS04	Translocatee	Ivanpah 1	Male	252	264	10/10/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS06	Translocatee	Ivanpah 1	Male	257	280	10/12/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS09	Translocatee	Ivanpah 1	Male	253	255	10/14/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS10	Resident	Recipient Site	Male	277	277	10/14/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS14	Translocatee	Ivanpah 1	Female	224	237	10/19/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS16	Resident	Recipient Site	Female	224	227	10/19/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS22	Translocatee	Ivanpah 1	Male	231	248	10/22/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS23	Resident	Recipient Site	Female	242	254	10/23/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS25	Translocatee	Ivanpah 1	Female	168	217	10/26/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS27	Translocatee	Common East	Female	232	233	10/19/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS28	Translocatee	Ivanpah 1	Female	217	230	10/28/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS33	Resident	Recipient Site	Female	228	231	10/29/10	No	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Deceased				
BS41	Translocatee	Ivanpah 1	Female	118	202	11/1/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS46	Translocatee	Ivanpah 3	Female	209	224	3/5/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS61	Translocatee	Ivanpah 2	Female	217	223	3/15/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS62	Translocatee	Ivanpah 3	Male	200	245	3/15/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS66	Translocatee	Ivanpah 3	Female	190	235	3/16/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS69	Translocatee	Ivanpah 3	Male	251	272	3/16/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS70	Resident	Recipient Site	Female	131	192	3/17/11	No	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Deceased				
BS79	Translocatee	Ivanpah 2	Female	243	245	3/28/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS84	Resident	Recipient Site	Male	237	251	3/30/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS89	Resident	Recipient Site	Male	250	273	3/30/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS90	Translocatee	Ivanpah 3	Male	270	272	3/30/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS91	Translocatee	Ivanpah 3	Female	235	237	3/30/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS92	Translocatee	Ivanpah 2	Male	269	270	3/31/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS93	Resident	Recipient Site	Male	292	290	3/31/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS100	Translocatee	Ivanpah 1	Male	249	258	10/12/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS101	Resident	Recipient Site	Male	273	276	10/14/10	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS109	Resident	Recipient Site	Male	267	269	4/2/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS113	Resident	Recipient Site	Male	230	256	4/4/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS114	Translocatee	Ivanpah 3	Male	272	273	4/5/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS117	Translocatee	Ivanpah 2	Male	231	253	4/6/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS124	Resident	Recipient Site	Male	235	260	4/13/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS126	Resident	Recipient Site	Female	232	242	4/14/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS127	Resident	Recipient Site	Female	248	257	4/13/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient

Tort ID	Tortoise Type	Initial Process Location (GIS)	Sex	Initial MCL	Recent MCL	Initial Process Date	Transmitter (Yes/No)	2018 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BS131	Resident	Recipient Site	Male	274	274	4/18/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS132	Resident	Recipient Site	Female	205	223	4/19/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS133	Resident	Recipient Site	Female	210	226	4/20/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS135	Resident	Recipient Site	Male	196	242	4/21/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS136	Resident	Recipient Site	Female	228	233	4/21/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS146	Resident	Recipient Site	Female	213	229	4/24/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS147	Resident	Recipient Site	Male	270	271	4/25/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS153	Resident	Recipient Site	Female	237	233	4/26/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS160	Resident	Recipient Site	Male	252	252	4/27/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS161	Resident	Recipient Site	Female	227	240	4/27/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS162	Resident	Recipient Site	Female	231	233	4/28/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS166	Resident	Recipient Site	Female	243	245	4/28/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS173	Translocatee	Ivanpah 2	Female	217	220	5/11/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS183	Translocatee	Ivanpah 2	Male	261	263	7/30/11	No	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Deceased			
BS186	Translocatee	Ivanpah 2	Female	137	225	8/7/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS217	Translocatee	Ivanpah 3	Male	253	268	9/3/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS220	Translocatee	Ivanpah 3	Male	268	265	9/5/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS245	Resident	Recipient Site	Male	281	285	9/10/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS257	Translocatee	Ivanpah 3	Female	140	209	9/14/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS275	Translocatee	Ivanpah 3	Female	205	236	9/20/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS290	Translocatee	Ivanpah 3	Female	170	230	9/25/2011	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS314	Resident	Recipient Site	Male	209	236	10/11/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS327	Resident	Recipient Site	Female	219	244	10/15/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS335	Resident	Recipient Site	Male	271	272	10/17/11	Yes	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient	Recipient
BS541	Control West	Control Site	Male	249	248	10/8/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS545	Control West	Control Site	Female	197	211	10/8/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS549	Control West	Control Site	Male	217	238	10/9/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS550	Control West	Control Site	Male	278	280	10/9/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS553	Control West	Control Site	Male	256	267	10/9/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS556	Control West	Control Site	Female	157	241	10/9/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control

Tort ID	Tortoise Type	Initial Process Location (GIS)	Sex	Initial MCL	Recent MCL	Initial Process Date	Transmitter (Yes/No)	2018 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BS559	Control West	Control Site	Female	232	236	10/10/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS560	Control West	Control Site	Female	228	231	10/11/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS562	Control West	Control Site	Male	118	190	10/11/11	No	Control	Control	Control	Control	Control	Control	Control	Deceased				
BS565	Control West	Control Site	Male	249	258	10/11/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS566	Control West	Control Site	Female	211	240	10/11/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS571	Control West	Control Site	Male	256	260	10/11/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS575	Control West	Control Site	Male	260	258	10/12/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS595	Control West	Control Site	Female	216	227	10/13/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS597	Control West	Control Site	Male	268	272	10/13/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS598	Control West	Control Site	Female	234	238	10/14/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS600	Control West	Control Site	Male	254	260	10/13/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS613	Control West	Control Site	Female	224	223	10/15/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS615	Control West	Control Site	Male	284	282	10/15/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS620	Control West	Control Site	Female	187	211	10/15/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS621	Control West	Control Site	Female	199	202	10/15/11	No	Control	Control	Control	Control	Deceased							
BS629	Control West	Control Site	Female	150	213	10/16/11	No	Control	Control	Control	Control	Deceased							
BS630	Control West	Control Site	Female	143	217	10/16/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS634	Control West	Control Site	Male	130	212	10/16/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS636	Control West	Control Site	Female	271	278	10/16/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS638	Control West	Control Site	Male	260	260	10/16/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS646	Control West	Control Site	Female	227	229	10/17/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS648	Control West	Control Site	Male	261	262	10/17/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS649	Control West	Control Site	Female	246	249	10/17/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control
BS650	Control West	Control Site	Male	264	273	10/17/11	Yes	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control	Control

Appendix D

Maps of ISEGS Initial and Current Locations of LOP Tortoises

636000 637000 638000 639000 640000 641000 642000 643000 644000 645000 646000

3935000 3934000 3933000 3932000 3931000 3930000 3929000

BS126
BS101
BS14
BS06
BS27
BS04
BS25
BS41
BS113
BS10
BS09
BS100
BS02
BS22
BS28
BS16
BS133
BS127
BS124
BS146

N

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo,

Map Symbol

- Initial Tortoise Location (Female)
- Initial Tortoise Location (Male)
- Initial Tortoise Location (< 160 mm)
- Initial Tortoise Location (Unknown Sex)
- Site Boundary
- Cleared Areas
- Ring Roads

0 0.5 1 Kilometers

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure D1
LOP Initial Tortoise Locations
Ivanpah 1 and Recipient Site
Ivanpah Solar Electric Generating System

633000 634000 635000 636000 637000 638000 639000 640000 641000 642000 643000

3940000 3939000 3938000 3937000 3936000 3935000 3934000

BS162
BS89
BS166
BS109
BS161
BS91
BS84
BS70
BS160
BS33
BS90
BS275
BS257
BS290
BS217
BS62
BS46
BS93
BS66
BS131
BS147
BS132
BS69
Ivanpah 3
BS114
BS186
BS79
BS220
BS183
BS153
BS173
BS92
BS117
BS135
BS23
BS136
BS245
Ivanpah 2
BS61
BS314
BS335
BS327

N

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the

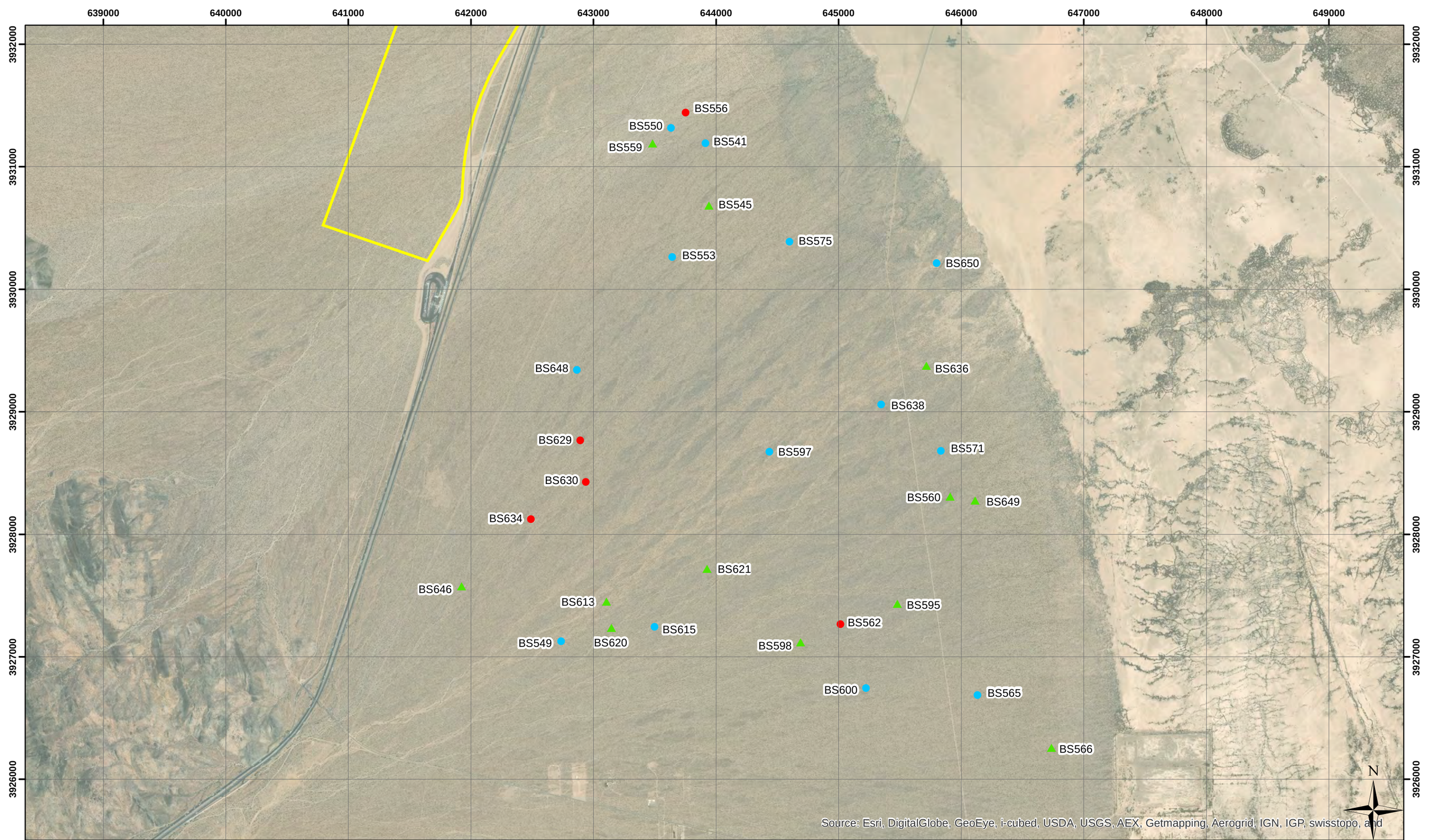
Map Symbol

- ***Initial Tortoise Location (Female)***
- ***Initial Tortoise Location (Male)***
- ***Initial Tortoise Location (< 160 mm)***
- ***Initial Tortoise Location (Unknown Sex)***
- ***Site Boundary***
- ***Cleared Areas***
- ***Ring Roads***

0 0.5 1 Kilometers

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure D2
LOP Initial Tortoise Locations
Recipient Sites- Ivanpah 2 & 3
Ivanpah Solar Electric Generating System



Map Symbol

- *Initial Tortoise Location (Female)*
- *Initial Tortoise Location (Male)*
- *Initial Tortoise Location (< 160 mm)*
- *Initial Tortoise Location (Unknown Sex)*
- *Site Boundary*
- *Cleared Areas*
- *Ring Roads*

0 0.5 1 Kilometers

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure D3
LOP Initial Tortoise Locations
West Control
Ivanpah Solar Electric Generating System

635000 636000 637000 638000 639000 640000 641000 642000 643000 644000 645000 646000

3935000 3934000 3933000 3932000 3931000 3930000 3929000

BS06
BS41
BS101
BS25
BS126
BS14
BS27
BS113
BS02
BS10
BS22
BS16
BS327
Ivanpah 1
BS09
BS04
BS100
BS124
BS314
BS133
BS335
BS127
BS28
BS117
BS146
I-15
Pen
I-15
N

Map Symbol

- *Recent Tortoise Location (Female)*
- *Recent Tortoise Location (<160 mm)*
- *Recent Tortoise Location (Male)*
- *Recent Tortoise Location (Unknown Sex)*
- *(M) Indicates 'Missing' Status*
- *Site Boundary*
- *Cleared Areas*
- *Ring Roads*

0 0.5 1 *Kilometers*

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure D4
LOP Recent Tortoise Locations
Ivanpah 1 and Recipient Site
Ivanpah Solar Electric Generating System

634000 635000 636000 637000 638000 639000 640000 641000 642000

3940000 3939000 3938000 3937000 3936000 3935000

BS186
BS173
BS217
BS109
BS162
BS91
BS161
BS66
BS84
BS89
BS290
BS275
BS62
BS166
BS160
BS135
BS257
BS90
BS131
Ivanpah 3
BS93
BS46
BS132
BS69
BS147
BS220
BS114
BS153
BS79
BS92
BS136
Ivanpah 2
BS23
BS245
BS61
Coloseum Rd
Dalton Rd
N

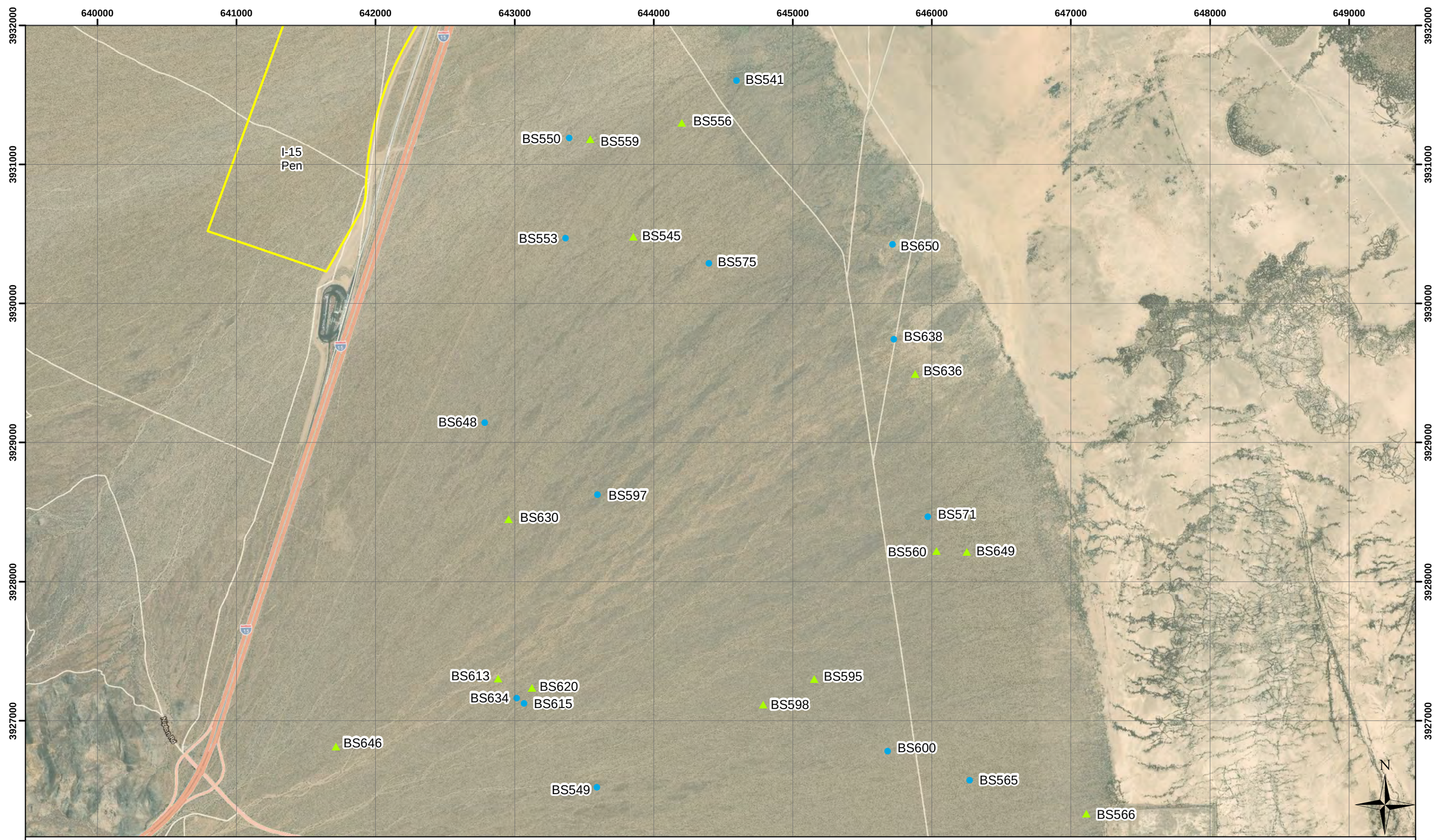
Map Symbol

- Recent Tortoise Location (Female)
- Recent Tortoise Location (<160 mm)
- Recent Tortoise Location (Male)
- Recent Tortoise Location (Unknown Sex)
- (M) Indicates 'Missing' Status
- Site Boundary
- Cleared Areas
- Ring Roads

0 0.5 1 Kilometers

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure D5
LOP Recent Tortoise Locations
Ivanpah 2, 3 and Recipient Site
Ivanpah Solar Electric Generating System



Map Symbol

- *Recent Tortoise Location (Female)*
- *Recent Tortoise Location (<160 mm)*
- *Recent Tortoise Location (Male)*
- *Recent Tortoise Location (Unknown Sex)*
- *(M) Indicates 'Missing' Status*
- *Site Boundary*
- *Cleared Areas*
- *Ring Roads*

0 0.5 1 Kilometers

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure D6
LOP Recent Tortoise Locations
West Control
Ivanpah Solar Electric Generating System

Appendix E

5-year Effectiveness Monitoring Program Report

CONSERVATION
SCIENCE PARTNERS

FINAL REPORT
29 November 2017

For the project entitled:

Process- and Scale-based Determinants of Survival for Translocated Mojave Desert Tortoises in the Ivanpah Valley, California; April 2011 through May 2017

Prepared for:

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners VIII, LLC; and all ISEGS permitting agencies

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Suggested citation: Dickson, B. G., B. P. Wallace, R. D. Scherer, M. E. Gray, and A. Kissel, 2017. Process- and Scale-based Determinants of Survival for Translocated Mojave Desert Tortoises in the Ivanpah Valley, California; April 2011 through May 2017. A report submitted to Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners VIII, LLC, and all ISEGS permitting agencies. Conservation Science Partners. Truckee, California.

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Executive Summary

This report presents the results from a multi-year study (April 2011 through May 2017) of the translocation of federally threatened Mojave desert tortoises (*Gopherus agassizii*) at the Ivanpah Solar Electric Generating System (ISEGS) in the Ivanpah Valley of southern California. Translocation has been implemented in several locations as a method to mitigate potentially harmful effects of anthropogenic activities. However, the factors that have influenced the success of translocation efforts has been poorly understood. This study assessed environmental variables at multiple spatial and temporal scales to evaluate the potential effects and factors that influence desert tortoise survival, including short-distance translocation.

As required and described in the Revised Biological Opinion (2011) and the associated Effectiveness Management Plan (EMP), Mojave desert tortoises that were translocated from within ISEGS boundaries to an adjacent area in the Ivanpah Valley have been monitored over nearly five years to understand the effects of short-distance translocation on tortoise survival and other demographic parameters. Specifically, the two primary objectives of the EMP were to: collect data on tortoise survival and its anticipated drivers and investigate and determine the processes and scales influencing tortoise survival.

To achieve Objective 1, translocated tortoises (n = 73), along with resident (n = 112) and control (n = 149) tortoises (the three groups in this study), have been monitored since 2011, particularly when tortoises are typically most active (i.e., the "active season" between April and October each year). Radio-tracked tortoises were captured every May and September for health assessments and pathogen sampling, downloading of thermal data, and replacement of transmitters, as needed. Data were also collected on environmental variables at local- (e.g., vegetation cover, plant species richness, rainfall, temperature) and landscape-scales (e.g., shrub and wash density, vegetation greenness, terrain characteristics). Analyses were then performed to determine how physical (e.g., soil and vegetation properties, barriers to movement) and biological processes (e.g., tortoise movement patterns, habitat use [i.e., space use], health status, pathogens) influenced tortoise survival among study groups.

Key results related to Objective 1:

- In the first few months of the first active season post-translocation, translocated tortoises increased their movements, showed decreased space use intensity (i.e., exhibited movement behavior that was less concentrated in a particular location), and experienced higher ambient temperatures than did resident and control tortoises. However, space use and thermal conditions of translocated tortoises were indistinguishable from those of control and resident tortoises thereafter.
- Tortoise movements across study groups were influenced by individual tortoise characteristics (e.g., size, sex), landscape features (e.g., vegetation greenness), and weather (e.g., rainfall and temperature). For example, movements increased during periods of greater rainfall and when cooler temperatures coincided with lower rainfall.

To achieve Objective 2, annual and five-year (i.e., cumulative) survival probabilities of translocated, resident, and control tortoises within the Ivanpah Valley study area during the period April 15, 2012, to May 31, 2017, were estimated using known-fate models. Models incorporated several individual-level (e.g., size, sex, body condition) and landscape-scale predictor variables to determine relative influence of those variables on survival among study groups. We analyzed data from two size classes: tortoises with a midline carapace length (MCL) between 120 and 160 mm and tortoises with a MCL of > 160 mm MCL. For each size class, we evaluated the support for survival models that incorporated different variables using contemporary inferential methods, including an information criterion and model-averaging.

Key results related to Objective 2:

- Survival estimates of immature and adult tortoises in the Ivanpah Valley study area (i.e., between 0.89 – 1.0) were among the highest annual survival probabilities for tortoises of any published study to date. In other words, these survival estimates indicate that, on average, between 89% and 100% of tortoises survived each year, with larger (i.e., older) tortoises at the high end of that range.
- Translocation did not negatively affect survival of desert tortoises in this study. Estimates of annual and cumulative survival probability were not statistically different among control, resident, and translocated tortoises for either size class. The lack of support for a difference, in spite of the high precision of the estimates, was likely a consequence of survival estimates for all groups being high (nearly 1.0).
- For tortoises in the smaller size class, topographic roughness had a significantly negative impact on tortoise survival across all study groups.
- For tortoises in the larger size class, survival probability increased with body size across all study groups.
- In addition, survival probability decreased as home range size increased across all study groups.
- Collectively, translocations had short-term impacts on space use and the thermal conditions experienced by desert tortoises at the ISEGS, but those impacts were not apparent one year later, and translocations did not appear to have any negative impacts on the condition, growth, or mortality of tortoises.

Based on the findings described above, we have achieved the two objectives of the EMP within the short-term, five-year duration of the EMP. The results of the study to date allow us to conclude the following:

- Short-distance translocation releases had relatively minimal impacts on desert tortoises in the Ivanpah Valley study area.
- Translocating individuals in the spring may have been important for giving tortoises time to dig burrows and familiarize themselves with their surroundings prior to being exposed to hot summer temperatures.
- Our study indicated that translocation methods that minimize stressful environmental conditions during the period immediately following translocation may have the greatest

success. Examples of methods that likely contributed to high survivorship included that translocated tortoises were released in early spring within 500 meters of their median location prior to being removed from the project site, and they were given access to water the day before release and hydrated immediately prior to release.

- Finally, this study is an important step for science-based, mitigation-driven actions implemented to evaluate and reduce impacts of translocation on the Mojave desert tortoise and other sensitive species.

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1. Background

The Mojave desert tortoise (*Gopherus agassizii*) is listed as threatened under the U.S. Endangered Species Act (ESA) and the California Endangered Species Act due to several threats, including loss and degradation of habitat due to human activities (e.g., urbanization, military training, mining, and energy production), subsidized predation, and disease (USFWS 1990). In recent years, translocation of tortoises has been implemented in several locations in the Mojave Desert to mitigate potentially harmful effects of some of these activities, particularly military training and renewable energy development (Esque et al. 2010, Drake et al. 2012, Farnsworth et al. 2015). However, there remains a need for robust characterization of drivers of tortoise survival following translocation. In this report, we present the results of a multi-year (2011-2017) study designed to evaluate potential effects of translocation on the movement, survival, and health of desert tortoises. The work was conducted at the Ivanpah Solar Electric Generating System (ISEGS) and adjacent areas in the Ivanpah Valley of southern California.

1.1 ISEGS project background

The ISEGS site is located on approximately 1,457 hectares (5.6 square miles) west of the Ivanpah Dry Lake, on Bureau of Land Management (BLM) land west of Interstate 15 (I-15) in San Bernardino County, California (Fig. 1). Construction was initiated in 2010 and completed in May 2014. Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners) are the owners of the Ivanpah Solar Electric Generating System (ISEGS), a nominal 370-megawatt (MW) solar energy project in southern California's Mojave Desert, near the Nevada border. The project was developed by BrightSource Energy, Inc. and is operated for Solar Partners by NRG Energy Services, LLC (NRG). The project site consists of three solar power electrical generating facilities: Ivanpah 1 (the southern unit) covers approximately 370 hectares (1.4 square miles); Ivanpah 2 (the middle unit) covers approximately 436 hectares (1.7 square miles); and Ivanpah 3 (the northern unit) covers approximately 500 hectares (1.9 square miles). The remaining disturbance areas include common access roads, gas lines, generation tie-lines, and construction and operations facilities. All three phases share an administration building, an operations and maintenance building, a substation located between Ivanpah 1 and 2, and paved roads to access each site. The project ties into the existing Kern River Gas Transmission Line about 0.8 km (0.5 mile) north of the Northern Rare Plant Mitigation Area and into the Southern California Edison 230/115 kilovolt (kV) line that crosses between the Ivanpah 1 and 2 sites.

Each unit consists of solar arrays of heliostats (or mirrors) that focus solar energy on central solar power tower receivers near the center of each of the heliostat arrays. Ivanpah 1 (nominal 120 MW) has a heliostat array consisting of approximately 53,500 heliostats. Ivanpah 2 and 3 (nominal 125 MW each) have heliostat arrays consisting of approximately 60,000 heliostats. The heliostat array of each unit is arranged around a single centralized solar power tower (SPT) that is 140 meters (459 feet) in height, including a boiler and superheater panel with an upper

steam drum and protective ceramic insulation panels (20 meters [65.5 feet]) on top. Each solar power plant has a power block in the approximate center of the heliostat array. The power block includes an SPT, a receiver boiler, a steam turbine generator (STG) set, an air-cooled condenser, and other auxiliary systems.

Because the ISEGS project site is located in known desert tortoise habitat, the BLM granted the project a right-of-way grant in accordance with Section 7 of the ESA. To guide the translocation strategy and associated monitoring, the federal agencies (US Fish and Wildlife Service [USFWS] and BLM) with authority for managing the desert tortoise and its habitat issued a final Biological Opinion (USFWS 2010; 2011) that mandated the following:

> "During monitoring, BrightSource will investigate the drivers of post-translocation survival. Specifically, it will investigate the interdependent roles of desert tortoise movement patterns, habitat use, health status, environmental toxicants, road noise and vibration, and physical features (e.g., habitat structure, composition, and fragmentation, soil properties) and processes (e.g., precipitation and temperature gradients) across a focal study landscape (i.e., translocated, recipient, and control populations within Ivanpah Valley). BrightSource will compare the information collected on the movements, home ranges, habitat characteristics, disease prevalence, and survival of the resident and control populations with that collected on translocated desert tortoises. BrightSource will perform health assessments on the monitored populations at least twice per year."

In accordance with the monitoring requirements outlined in the 2011 Biological Opinion (USFWS 2011), a comprehensive Effectiveness Monitoring Program (EMP) was developed to characterize conditions that influence survival of translocated desert tortoises. The EMP and its objectives are briefly described in the following section. For more details, see Dickson and Farnsworth (2012).

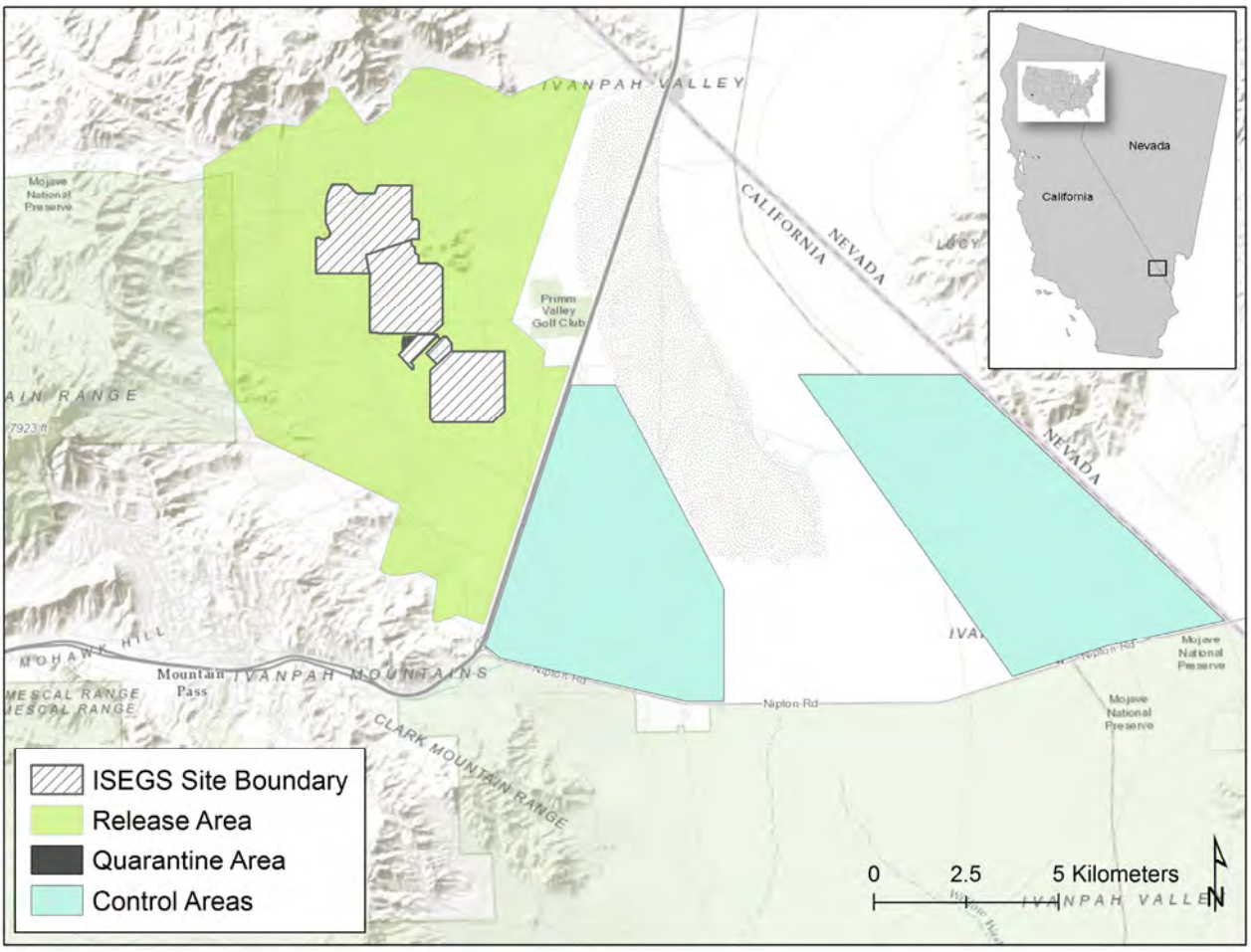

Figure 1. ISEGS project footprint within the Ivanpah Valley study area in southern California described in the Effectiveness Monitoring Plan (EMP).

1.2 EMP overview and objectives

The Revised Biological Opinion (USFWS 2011) outlined five broad biotic and abiotic factors hypothesized to be primary drivers of tortoise survival: weather and climate (i.e., precipitation and temperature), disease, vegetation, physical features (e.g., soil and topography), and the direct and indirect anthropogenic impacts (e.g., noise and vibration, environmental toxicants, barriers to movement). As described in the Revised Biological Opinion (USFWS 2011), the relative manner in which these drivers impact survival—either through direct effects on tortoise populations or as interacting effects working in concert—remains uncertain, but should be accounted for when isolating the effects of translocation from other potential drivers of survival.

To fulfill the requirements of the Biological Opinion (USFWS 2011), the EMP focused on the following specific objectives (see Dickson and Farnsworth 2012 for details):

- **Objective 1**: **Collect data on tortoise survival and its anticipated drivers** using a

combination of comprehensive fieldwork—including tortoise tracking—and contemporary remote sensing. These data are crucial for understanding how translocation affects survival and individual and population scales over short- and long-term periods.

- **Objective 2: Investigate and determine the processes and scales influencing tortoise survival**. In order to understand individual- and population-level survival processes, along with the relationships among interacting drivers from individual to population scales, data must be synthesized and compared across ecological levels (scales) using an appropriately conceived modeling framework.

In particular, the EMP was developed to comprehensively address the potential impacts of how physical (e.g., habitat characteristics, vegetation cover, soil properties, barriers to movement) and biological processes (e.g., tortoise movement patterns, habitat use, health status, pathogens) influence tortoise survival on multiple spatial and temporal scales. The EMP was principally designed to measure and identify these drivers of survival for translocated tortoises, resident tortoises (i.e., those already living in the area to which tortoises were translocated), and control tortoises (i.e., those living in areas outside of the ISEGS project site) within the Ivanpah Valley study area described in the EMP (hereafter "Ivanpah study area"; Fig. 1). Studying resident and control tortoises allowed us to isolate the effects—if any—of translocation from other potentially confounding variables (e.g., environmental variables). This study has monitored tortoise survival and its potential drivers for the first five years following short-distance translocation.

1.3 Purpose of this report

The purpose of this report is to present results of work at the ISEGS project site between April of 2011 and May of 2017 that supported the two EMP objectives associated with tortoise translocations (Section 1.2). This report provides updates, where necessary, to information provided in previous seasonal or annual reports to NRG Energy, Inc., as well as updates to results to this work previously published in the peer-reviewed scientific literature (namely, Farnsworth et al. 2015, Brand et al. 2016, and Sadoti et al. 2017). In addition, this report presents results of known-fate survival models designed to identify potential individual- and landscape-scale drivers of post-translocation survival over the five-year period between May of 2012 and May of 2017. The Revised Biological Opinion (USFWS 2011) and the EMP (Dickson and Farnsworth 2012) emphasized post-translocation survival estimates as the primary priority for the ISEGS project; thus, this report provides greater detail about the survival modeling framework and results than previous reports or publications.

In the sections that follow, we describe methods, results and interpretation, and conclusions related to work addressing the EMP objectives—particularly the survival analyses—described above. Section 2 presents the methodological steps, including information about the ISEGS study area, fieldwork to collect data outlined in the EMP, as well as data analysis approaches (Section 2.3), and description of the modeling approach for the comprehensive survival analysis (Section 2.4). Section 3 presents results and interpretations of data collection and analyses

(Sections 3.2), including the comprehensive survival analyses (Section 3.3). Section 4 presents brief conclusions based on findings to date. Subsequent sections present acknowledgements (Section 5), literature cited (Section 6), and appendices (Sections 7 and 8).

Further details on the Ivanpah Valley study area, study design, and data analysis approaches can be found in Farnsworth et al. (2015), Brand et al. (2016), and Sadoti et al. (2017). Importantly, these peer-reviewed scientific publications, which were co-authored by the authors of the present report, were designed to inform and evaluate the study design and key elements of the EMP, as proposed. Thus, these papers are frequently referenced throughout this report.

2. Field methods and analytical approaches

2.1 Study area

The Ivanpah Valley presently encompasses three active renewable energy facilities including ISEGS, and is recognized as important for maintaining linkages between Mojave desert tortoise conservation areas in California and Nevada (USFWS 2011). The Ivanpah Valley study area encompassed three contiguous tracts of BLM-administered land approximately 75 km southwest of Las Vegas, NV (Fig. 1). In addition to a concentrated solar thermal power plant, the ISEGS facility includes fences surrounding the project footprint that prohibit the passage of tortoises. In addition, the area is bisected by I-15 and includes paved public roads accessing ISEGS, numerous unpaved roads, a golf course, elevated power transmission lines and towers, as well as two other solar power plants.

Elevation across the valley ranges from 790 to 1830 m, with vegetation consisting of Mojave Desert scrub dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Average annual precipitation is approximately 20.1 cm, and rainfall usually peaks in July-August and during winter (1981-2010; Global Historical Climatology Network station USC00267369, Searchlight, NV). Soil types vary from silt/clay to sand/loam, with desert tortoises typically occupying the relatively low-lying alluvial fans, plains, and colluvial/bedrock slopes.

2.2 Tortoise handling, translocation, and study groups

All tortoise capture, handling, and marking procedures were done in accordance with official USFWS protocols, including those put forth in the June 10, 2011, Revised Biological Opinion (USFWS 2011) and the 2009 Desert Tortoise Field Manual. In addition, a condition of certification (BIO-9) in the California Energy Commission ISEGS Commission Decision (07-AFC-5C), requires a Desert Tortoise Translocation Plan. Section 1.3 of the approved Desert Tortoise Translocation Plan goals were to: 1) translocate all desert tortoises from fenced areas to nearby suitable habitat; 2) minimize impacts on resident desert tortoises outside fenced areas; 3) minimize stress, disturbance, and injuries to translocated tortoises; and 4) assess the success of

the translocation effort through monitoring. The fieldwork conducted according to the EMP framework met these goals. Tortoise handling and translocation methods were explained in detail in the EMP (Dickson and Farnsworth 2012) and are summarized briefly below.

Beginning in October of 2010, USFWS-authorized biologists located and captured tortoises within the ISEGS project boundary and placed them in quarantine pens established on the project site to ensure that none of the individuals slated for translocation exhibited signs of disease or tested positive for *Mycoplasma* species. All tortoise handling and tracking procedures were explicitly mandated and permitted by the USFWS (USFWS 2010). During spring 2012, short distance translocation tortoises were hydrated immediately prior to release per USFWS direction. An additional hydration event was added, all short distance translocated tortoises were soaked in water for one hour during the day prior to their release.

As specified by the Revised Biological Opinion (USFWS 2011), translocated tortoises were defined as those individuals moved from quarantine pens to the release area because they had grown to have a midline carapace length (MCL) of at least 120 mm by April of 2012, when the primary translocation event occurred. Most tortoises remaining in the quarantine pens after this date were < 120 mm. Tortoises that were captured inside the project footprint and within 500 meters from the project boundary were originally referred to as “translocated-short” or “short-distance translocated” tortoises. Tortoises that were found inside the project footprint at a distance greater than 500 m from the boundary—referred to as “translocated-long” or “long-distance translocated” tortoises—were moved to an enclosed area along I-15 in late 2012. Tortoises were tracked prior to being removed and taken to the quarantine pens, which allowed identification of at least a portion of the tortoise’s previous home range prior to release. This was necessary because the Biological Opinion mandated that translocated animals be released within 500 m of their median location prior to being removed from the project site and placed into the quarantine pens. For further details on tortoise handling and translocation protocols, see the Revised Biological Opinion (USFWS 2011) and ISEGS EMP (Dickson and Farnsworth 2012).

We established three unique study groups for monitoring and analysis within the Ivanpah Valley study area: translocated tortoises, resident tortoises, and control tortoises. Translocated and resident tortoises occupied the release area (8,798 ha) surrounding the ISEGS project site (Fig. 1). As described above, the translocated group (*n* = 90 total) included short-distance translocated tortoises (*n* = 73) and long-distance translocated tortoises (*n* = 17). In 2011, surveys in the area surrounding the ISEGS project site and in control areas were conducted to locate, measure, and, as appropriate, track tortoises with very high frequency radio transmitters, with the goal of establishing a resident group and a control group (Fig. 1). The resident group (*n* = 112) referred to tortoises already living in areas to which tortoises removed from the ISEGS project site were translocated, and it was established to examine the potential influence translocated tortoises might have on patterns of habitat use (also referred to as “space use” in this report) of tortoises with an established home range. Control tortoises (*n* = 149) occupied two areas on the east side of I-15 (western area: 3,560 ha; eastern area: 4,220 ha), opposite the ISEGS site (Fig. 1). The control group (initially referred to as two groups in

prior publications and reports: "control west" [*n* = 115] and "control east" [*n* = 34]) was established as a baseline for comparison with translocated tortoises and occupied areas representative of the variability in habitat and environmental conditions that existed across the release area. Individuals from the eastern control area were monitored until May 2016.

In this report, presentation of data collection and analysis of environmental variables generally maintains the subgroups of translocated and control tortoises (as well as the resident group), unless otherwise noted. However, to maximize group-level sample size, the survival analysis used a single translocated group (i.e., short-distance translocated), a single control group that pooled tortoises from both control areas, and the resident group.

2.3 Data collection on tortoise survival and anticipated drivers

This section summarizes methods for collecting and analyzing data described in the EMP that were anticipated to potentially inform survival analyses—i.e., in fulfillment of Objective 1. Detailed field protocols are presented in Appendix A, and a full list of individual and environmental variables measured or derived for proposed use in survival analyses are presented in Appendix B. Additional details about how these variables were used in the comprehensive survival analyses are presented in Section 2.4.

Mortality data collection

Basic data on tortoise mortality were collected over the period April 15, 2012, to May 31, 2017. Upon finding a deceased tortoise, information on date, time, location, and the apparent circumstances of its death was recorded. These data included notes of trauma on the tortoise (e.g., tooth or chew marks, missing limbs, etc.), other evidence of predators (e.g., scat, hair, tracks), sign from other tortoises, and other potential indicators that may have provided insight into the cause of death. Finally, photos were taken of the tortoise and its surroundings. In most instances, the circumstances surrounding the death of an animal were not observed; therefore, the available evidence was used to determine a *suspected* cause of death. In some cases, it was not possible to make a determination and the cause of death was categorized as "unknown."

Movement processes: Radio tracking and space use analyses

Studies on Mojave desert tortoises have identified that differential space use patterns can occur between the sexes, and for immature versus adult tortoises (Harless et al. 2009, Nussear et al. 2012, Farnsworth et al. 2015). We compared space use patterns of translocated tortoises to those of resident and control tortoises to evaluate the success of translocation and to provide insights into drivers of survival across the study area.

Tortoises in each study group were equipped with radio transmitters (Holohil Systems Ltd., Ontario, Canada) using the method described in Boarman et al. (1998). All tortoises were tracked on an approximately weekly basis between 2012 and 2017, typically during mid-February through mid- October, between the hours of 0600 and 1800, regardless of prevailing weather conditions. Outside of the active season, tortoises were tracked every other week, in accordance with the Revised Biological Opinion (USFWS 2011). During each encounter,

biologists recorded geographic (Universal Transverse Mercator [UTM]) coordinates and information about a tortoise's location relative to landscape features (e.g., burrow, shrub, open area), and its activity (e.g., walking, basking, mating). Transmitters were replaced when the factory-calculated battery life remaining on a given transmitter reached a minimum of 10%.

Within each active season and study group, we derived estimates of space use for each tortoise using all encounters obtained in that season (see also Farnsworth et al. 2015). Briefly, we used a kernel density estimation approach (Worton 1989) on data for all individuals with ≥ 25 encounters during an active season, which was meant to balance the selection of an appropriate minimum number of encounters with removal of individuals from the dataset. We used the Geospatial Modeling Environment (Beyer 2012) in ArcGIS (version 10.3, Esri, Redlands, CA, U.S.A.) to calculate 95% fixed-kernel density estimates and resultant utilization distributions at a 30-m pixel resolution. These variables describe a three-dimensional probability density function, such that they exhibit higher probability mass (i.e., reflect higher space use intensity) in portions of the surface having a greater density of encounters. Throughout this report, we also refer to the area under the utilization distribution as the home range of an individual. Because tortoise encounters occurred on a weekly basis, we were not concerned about potential issues of spatial or temporal serial autocorrelation. We used the ArcGIS to relate individual encounters to kernel density estimates (i.e., utilization distribution pixels) by intersecting each utilization distribution with the locations used to derive it.

In addition to the utilization distribution analyses, we used the encounter data to create a proxy for movement based on distance and elapsed time between encounters (after Farnsworth et al. 2015). We calculated the straight-line distance between consecutive encounters for each tortoise using UTM coordinates, and then scaled this distance by the number of days between consecutive encounters to obtain a movement rate (meters per day).

We also explored how space use patterns, including burrow use and burrow-switching distance, were related to individual-level predictor variables and environmental predictor variables operating at multiple scales (for details, see Sadoti et al. 2017). For example, we analyzed tortoise utilization distributions in relation to remotely sensed (e.g., aerial photograph and satellite-based information) data that quantified static habitat features relevant to tortoise life history, such as shrub and wash presence and density across the study area. Resultant, derived data layers were used for analyses presented in Farnsworth et al. (2015) and Sadoti et al. (2017).

Local-scale environmental variables

Local-scale environmental variables can be important proximate influences on desert tortoise movements, space use patterns, and fitness. For example, shrub type and density, as well as burrow availability, provide critical shelter from extreme environmental conditions and predators. To assess local scale environmental variables, we performed vegetation surveys to measure and quantify key vegetation attributes, including cover, height, and species composition of shrub vegetation across the study area (see Appendix A, Sections 7.1 and 7.2 for protocols).

Overall, 100 x 100-m vegetation plots (*n* = 32) were sampled each year in spring and fall from 2012 through 2016 (Fig. 2). A change in sampling protocol occurred from 2012 to 2013 to increase the sample size from 400 points per plot to 1,000 points per plot to enhance overall efficiency and increase sample sizes for analyses. Therefore, the species counts reported for 2012 are not directly comparable to the 2013-2015 data. In addition, sampling in 2012 was restricted to the spring. Starting in 2013, we also collected data in the fall to capture the fall forage pulse from the region's monsoon season.

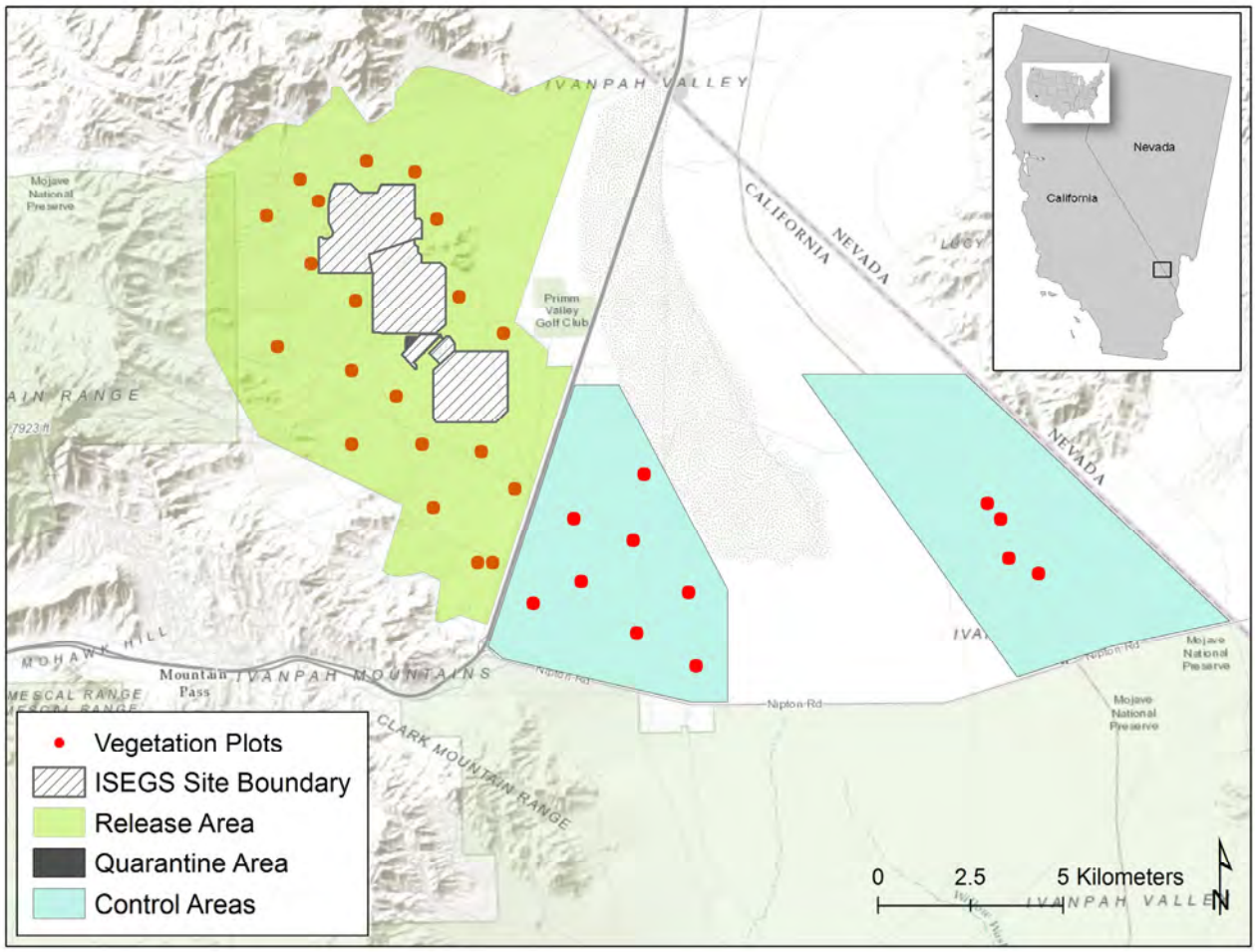

Figure 2. Vegetation monitoring plots within the Ivanpah Valley study area.

To capture annual and seasonal microclimatic variation, 18 rain gauges were installed in August of 2012 and six automated weather stations were installed across the study area in May of 2013 (Fig. 3) (see Appendix A, Section 7.2 for protocol). All weather stations began to download data consistently on May 29, 2013, and recorded weather variables at one-hour increments. The stations collected data on temperature and precipitation at fifteen minute intervals, as well as data on humidity and other weather-based parameters. Weather station data were downloaded 3-4 times per year.

Local-scale environmental variables were not used as standalone predictor variables in survival analyses because these data could not be reasonably linked to the individual tortoise utilization distributions used to estimate survival (Appendix B). However, these variables were useful for verifying the accuracy of remotely sensed data, which were used to derive dynamic, landscape-scale predictor variables that were ultimately used in our survival models (see Section 3.2 and Appendix B).

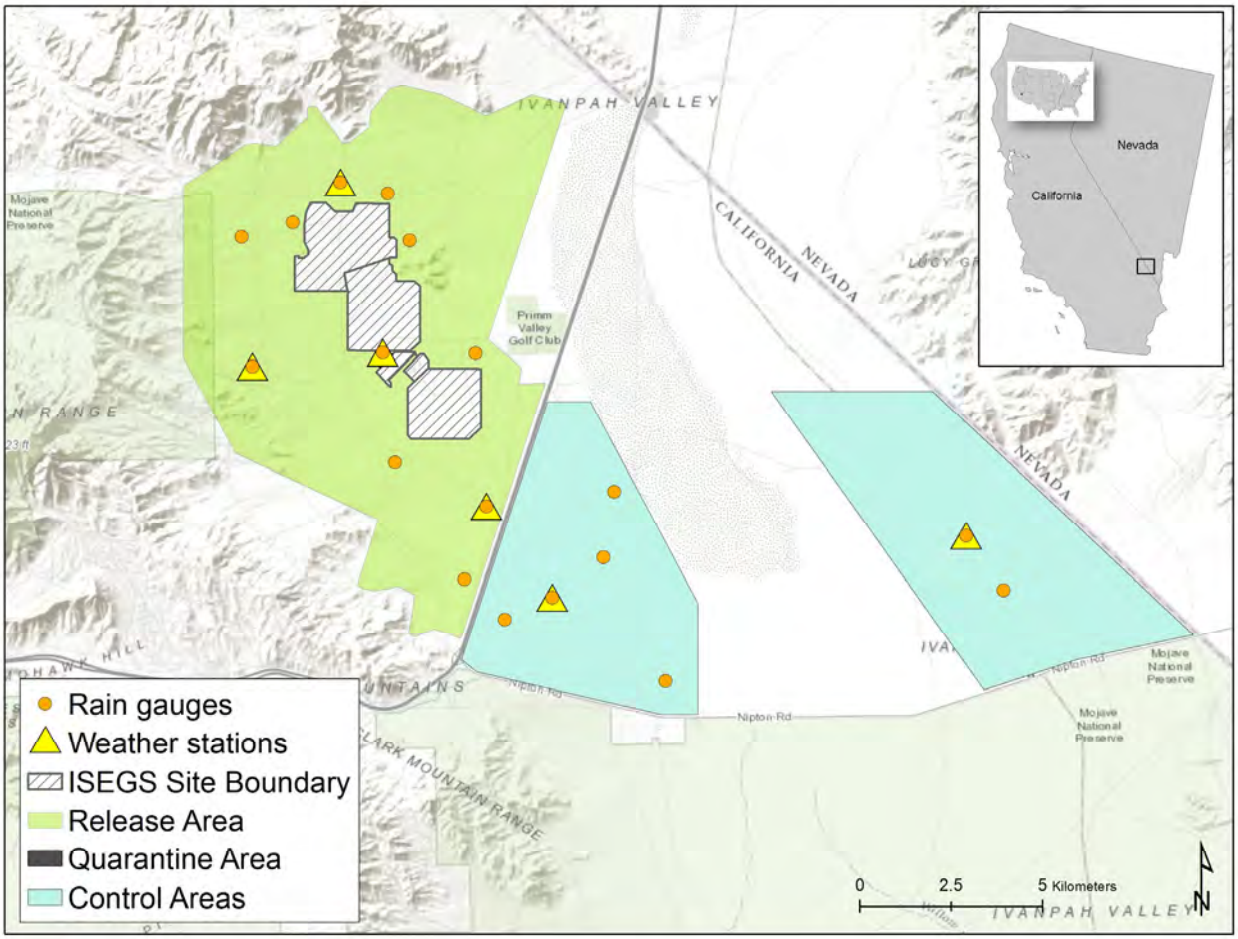

Figure 3. Rain gauges and weather stations within the Ivanpah Valley study area.

Landscape-scale environmental variables

To quantify landscape-scale variables hypothesized to influence tortoise survival and other demographic or behavioral parameters, we derived multiple data layers developed from remotely sensed data (high-resolution aerial photography and satellite-based information), including shrub density, wash density, the normalized difference vegetation index (NDVI; an estimate of vegetation cover or forage availability), and temperature and precipitation (see Section 2.4, Appendix B for full list of environmental variables measured or derived for this study). We also obtained or derived data layers describing elevation, slope, aspect, topographic roughness, soil type and texture, road and fence density, and burrow density. Detailed descriptions of the data and methods used to derive our landscape-scale variables can be found

in Farnsworth et al. (2015) and Sadoti et al. (2017). The subset of landscape-scale variables used in the survival analyses are further described below (Sections 2.4 and 3.3, and Appendix B).

Thermal assessments

To monitor post-translocation thermoregulatory behavior and its relationship to survival, a subset of radio-telemetered tortoises (*n* = 236; 74 translocated, 75 residents, and 87 controls) was also fitted with temperature data loggers (Thermochron iButton® DS1922L, Maxim Integrated, San Jose, CA; width 1.6 cm, height 0.5 cm, weight < 3 grams) to record temperatures experienced by tortoises (see Appendix A, Section 7.3 for attachment protocol). We concurrently recorded ambient temperatures and temperatures in refuges (i.e., burrows, shrubs, and other cover sites) to enable comparison between environmental temperatures and those experienced by tortoises. Thus, we were able to compare thermal conditions experienced by animals in different study groups, with a focus on whether translocation impacted behavioral thermoregulation (work described in Brand et al. 2016).

Brand et al. (2016) focused on two predictor variables: average daily maximum temperatures and the length of time that tortoises spent ≥ 35°C per day. This ≥ 35°C threshold reflects the putative preferred maximum temperature based on previous studies of tortoise behavioral thermoregulation and thermal constraints on tortoise activity (Zimmerman et al. 1994; Sieg et al. 2015). We integrated these same thermal predictor variables into the survival modeling framework (see below) in an effort to control for thermal conditions when testing for an effect of translocation on tortoise survival (Section 2.4).

Health assessments and pathogen transmission

We conducted bi-annual (May and September) health assessments beginning in spring 2012 to quantify general patterns in health status among tortoises and study groups (see Appendix A, Section 7.4 for protocol). We conducted visual health assessments that included, but were not limited to, documenting clinical signs of upper respiratory tract disease (i.e., discharge from nares and/or eyes, swelling and/or redness of eyes, lethargic behavior, poor body condition), shell disease (i.e., lesions typical of cutaneous dyskeratosis, peeling laminae or scutes, other lesions of the bone or scute, mold, and fungus), and trauma (i.e., missing or other trauma to the limbs and trauma to the shell). We used protocols developed by the USFWS to evaluate body condition scores (Lamberski 2013) and test whether tortoise condition varied among study groups and over time. Blood and oral samples were also collected and tested via an enzyme-linked immunosorbent assay (ELISA) at the University of Florida, a method that detects exposure to the bacteria *Mycoplasma agassizii* and *M. testudineum*. Since implementation of the EMP began in April, 2012, 4,158 samples have been collected for the purpose of ELISA testing, including samples from individuals in each study group. We report the results of ELISA testing in this report, but—as described in Section 3.2—there were too few ELISA-positive tortoises to include infection status as a predictor variable in survival analyses.

Anthropogenic impacts: metals toxicity, barriers, noise and vibration

Metals toxicity

Because potentially toxic substances have been found in higher concentrations in sick tortoises versus controls (Jacobson et al. 1991), we hypothesized that environmental contaminants would negatively affect tortoise health and survival (Chaffee and Berry 2006). Between 2013 and 2015, we sampled tortoise blood using a novel "dried blood spot" technique (see Appendix A, Section 7.5). Samples were collected from tortoises across the study area from fall 2013 through spring 2015 to measure concentrations of heavy metals, including iron, arsenic, cadmium, mercury, lead, selenium, thallium, titanium, and uranium. This method had significant advantages because it was efficiently implemented during standard health assessments and was non-invasive relative to typical tissue sampling procedures for metal concentration analyses (Appendix A, Section 7.5). However, metal concentrations in blood are ephemeral and—when present—reflect recent exposure or remobilization from storage in the liver for reproduction (Grillitsch and Schiesari 2010). Therefore, we acknowledge that using blood as the tissue of analysis posed a tradeoff between sampling efficiency and reduced tortoise handling and the ambiguous temporal signal of metal concentrations in blood relative to other tissues (e.g., liver, muscle, bone, scute) (Grillitsch and Schiesari 2010).

Samples collected during necropsies that could be preserved (including bone, scute, liver, lung, kidney, and muscle) were also submitted for analysis (see Appendix A, Section 7.5 for sampling protocols related to metal concentrations). Finally, to quantify metal toxins in the tortoises' habitats, soil and plant samples were also collected (in 2012 and in 2013 and 2014, respectively) from across the study site for 29 elements, including heavy metals, as well as essential and trace elements. However, tissue, soil, and plant data were not included in survival analyses because they were not expected to be directly related to tortoise survival.

Anthropogenic barriers, noise, and vibrations

High-speed road networks, including highways and freeways, can be detrimental to native species of wildlife at individual and population levels (Forman et al. 2003) by creating barriers to movement and increasing stress through effects such as noise propagation (Wikelski and Cooke 2006, Eigenbrod et al. 2009). To quantify the disturbance potential of I-15 and surrounding roads with heavy vehicle traffic, we measured road noise and vibration at 80 points within vegetation monitoring plots, along with transects from I-15. We also measured noise emitted from the three ISEGS towers during operational and non-operational conditions, as well as background noise levels within the project area (see Appendix A, Section 7.6 for protocols).

We used the SPreAD-GIS software package (Reed et al. 2010) to predict noise propagation across the study area due to vehicle traffic, construction, and testing of the ISEGS towers in 2013. In 2013, Ivanpah (tower) 1 was constructed and being tested, and Ivanpah (towers) 2 and 3 were being constructed. Thus, the noise that was measured was indicative of construction and not operations. In addition, there were multiple sound sources reported around the towers, including heavy equipment. To estimate noise propagated from each tower, we used 90th percentile values of weekly noise measured at each tower from April through October 2013. We used maximal values because measurements were taken ~200-m away from the towers, whereas SPreAD-GIS assumes that measurements are taken 15 m from the sound

source. We used average weather measurements (temperature, relative humidity, wind speed, wind direction, and cloud cover) taken at the same locations in 2013 as input into SPreAD-GIS. To estimate noise propagated from I-15, we averaged noise measurements taken at four sample locations at a distance of 15 m from the interstate. We assumed that this was constant for the I-15 corridor passing through the study area and throughout 2013. We used average April through October 2013 weather variables from the single weather station closest to I-15. Desert tortoise hearing is apparently most sensitive to sounds between 125 and 750 Hz (Bowles et al. 1999). The SPreAD-GIS tool models noise propagation in eight discrete frequency bands within the range 400 – 2000 Hz, so average noise from the towers and I-15 was modeled at three discrete frequencies: 400, 500, and 630 Hz.

Data on tortoise space use intensity in 2013 were compared to our modeled estimates of noise propagation in that year. Noise propagation estimates (i.e., log-transformed kernel density estimate values) were integrated into an analysis that had originally been designed to test for an effect of individual-level (e.g., sex, translocation status) and environmental (e.g., shrub and wash density, burrow use) predictor variables on space use intensity (as detailed in Farnsworth et al. 2015), and to evaluate what additional explanatory power these noise sources contributed to an analysis of tortoise space use in 2013. Within an information-theoretic framework (see Section 2.4 for more details), we used a linear mixed-effects model structure and an information-theoretic approach (Burnham and Anderson 2002) to estimate and compare the determinants of space use intensity, given the log-transformed kernel density estimate values and explanatory variables described above. To compare the relative strength of association between demographic and environmental variables and the noise propagation estimates, we used multi-model inference (i.e., all-subsets modeling, as opposed to a smaller candidate set; see below) to compute model-averaged regression coefficients, unconditional standard errors, and cumulative Akaike's information criterion (AIC) weights of evidence (ranging from 0 – 1.0) as measures of relative variable importance, where higher weights indicated greater importance (Burnham and Anderson 2002).

Several anthropogenic variables were included in the survival analyses described below. Approaches for including data on metal concentrations in the survival analyses also are further described below (Sections 2.4 and 3.2). Road and fence densities (described in Sadoti et al. 2017) were included in the survival analysis to examine potential effects on survival of anthropogenic barriers to tortoise space use and direct mortality from vehicle collisions. However, noise and vibration were not included in this analysis because they were expected to be potential influences on proximate tortoise behavior and space use, but not expected to be directly related to tortoise survival.

2.4 Comprehensive survival analysis

Based on the principal objectives of the EMP, we considered survival probability to be the primary metric for evaluating the effects of translocation. At the request of federal agency biologists, we used the tortoise tracking data and a known-fate model (White and Garrott 1990) to estimate annual and cumulative survival probabilities. We also used the known-fate model

to evaluate the effects of several variables on survival probability. Throughout our description of the survival analyses and the associated results, we refer to these variables as predictor variables. A known-fate model is used to estimate survival probability when marked individuals can be located with certainty (e.g., when animals are radio-telemetered). To estimate annual survival probability, the model requires yearly data on the fates (alive or dead) of individuals throughout the duration of the study, and we used the data collected during annual spring health assessments as the focal sampling period (even though alive/dead status was known for other times of year). Therefore, estimates of survival probability are for the period from May in a given year to May the following year We refer to these periods as survival intervals. We had data from every spring health assessment from 2012 to 2017 and, therefore, were able to estimate survival probability over five intervals. In addition to estimating annual survival probability, we derived estimates of cumulative survival probability (i.e., the probability a tortoise survives from May of 2012 to May of 2017 [five years]).

We performed analyses on two datasets: 1) tortoises with MCL between 120 and 160 mm (hereafter, 120/160 MCL dataset), and 2) tortoises with MCL > 160 mm (hereafter, > 160 MCL dataset). Tortoises were assigned to a particular size class—120/160 or >160—based on their MCL measurement at the beginning of a survival interval. For example, a tortoise with an MCL of 130 mm during the health assessment in the spring of 2013 was included in the 120/160 dataset. However, if this tortoise grew to 170 mm by the health assessment in the spring of 2015, it was included in the > 160 dataset thereafter. As described above (Section 2.2), we used three study groups in the survival analyses: a resident group; a control group, which included tortoises from both control areas; and a translocated group, which included only short-distance translocated tortoises. Only short-distance translocated tortoises were used in survival analyses because they were placed into the release area, whereas long-distance translocated tortoises remained in the enclosed area near I-15. Tortoises from the eastern control area were not monitored after May 2016; thus, survival probabilities for these tortoises were not estimated for the final interval (May 2016 to May 2017).

We used an information-theoretic approach (Burnham and Anderson 2002) to draw inferences from the data described above. Given the data, this approach includes the following steps: 1) developing a 'competing' set of hypotheses regarding the causes of variation in the response variable (e.g., survival probability); 2) converting these hypotheses into mathematical models (the set of models is referred to as the 'candidate set'); and 3) using an information criterion to identify the model or set of models from which inference should be made. We used AIC adjusted for small sample size (AIC_C) to compare models. When interpreting a set of candidate model results, the model with the lowest AIC_C value has the most support (and highest 'rank'), although other models may also be supported, such as those within 8 AIC_C units of the highest-ranked model (see Anderson 2008). We used this common guideline in evaluating the models in each of the candidate sets of models described below.

As an additional step to inference, we compared models that included effects of predictor variables to a model with no predictor variables (a 'null' or 'intercept-only' model; Anderson 2008) and examined 95% confidence intervals around estimates of regression coefficients. If a

model with effects of one or more predictor variables had a lower ranking than the model with no predictor variables, we concluded that the variable did not affect survival. Similarly, if the 95% confidence intervals around estimates of regression coefficients included 0, we concluded that the effect was negligible. Because we used an information-theoretic approach to inference, we did not rely on arbitrary alpha levels or *p*-values for inferences about predictor variables.

Data for the development of predictor variables were not available for all tortoises in all years. For example, as noted above, a subset of radio-tracked tortoises was fitted with temperature data loggers. Therefore, the dataset for evaluating effects of temperature on the survival probability of tortoises had fewer individuals than the dataset for evaluating effects of group on survival probability. To maximize the number of tortoises in each analysis, we developed different datasets to evaluate the effects of predictor variables on survival. We separately analyzed each dataset using the following predictor variables (see Appendix B for more details):

- Analysis 1: 'individual-level' predictor variables (study group [control, resident and translocated tortoises; see Section 2.1 for descriptions of groups], sex, and size [MCL]),
- Analysis 2: all the predictor variables in Analysis 1 plus body condition score
- Analysis 3: all the predictor variables in Analysis 1 plus the toxicity predictor variables (iron, selenium, and lead concentrations in tortoise blood)
- Analysis 4: all the predictor variables in Analysis 1 plus the thermoregulation predictor variables (average daily maximum temperature during the active season, and the amount of time tortoises are exposed to temperatures ≥ 35°C during the active season)
- Analysis 5: all the predictor variables in Analysis 1 plus the landscape-scale predictor variables (e.g., home range area, shrub density).

Analysis 1 had the highest sample size in terms of the number of tortoises enlisted in this study; therefore, of the different survival analyses in this report, we consider Analysis 1 to be the most robust evaluation of the effect of short-distance translocation on survival probability of tortoises. For Analyses 2 through 5, we shifted the focus to evaluate effects of other predictor variables and differences in the effects of predictor variables among groups. For example, in the analysis of effects of metals toxicity, we fit models to address the question: are concentrations of iron, selenium, and lead correlated with tortoise survival, and do the correlations differ among control, resident, and translocated tortoises? However, if an effect of group was supported in Analyses 2 through 5, we compared estimates of annual and cumulative survival probability among groups and provided figures of the estimates. Prior to modeling, we centered and standardized values for all continuous predictor variables based on recommendations in Schielzeth (2010). We diagnosed multicollinearity among variables using a variance inflation factor (VIF; Neter et al. 1996), and we also assessed univariate correlations using a correlation matrix. No variables had a VIF > 2.0 or a Pearson's correlation coefficient > 0.70. We also performed model-averaging, for annual and cumulative survival probability only, to draw inference from more than one model when multiple models were supported by the data.

For the complete list of individual-level predictor variables and environmental predictor variables, see Appendix B.

Analysis 1 - Treatment group, sex, and size

In the > 160 dataset, there were 125 tortoises in the control group, 95 tortoises in the resident group, and 67 tortoises in the translocated group. We used MCL measurements from the spring health assessments in a year to predict tortoise survival probability over the following survival interval (i.e., we used MCLs from the health assessment in the spring of 2012 to model the probability of survival from May, 2012 to May, 2013). Known-fate models cannot accommodate missing data for predictor variables. Therefore, if MCL was not collected for a tortoise during a spring health assessment, we removed the data for the tortoise for that particular survival interval or used MCL data from another source. For example, in < 1% of cases, we used data from the health assessment in the previous fall as a substitute for missing MCL data, because tortoises are expected to grow very little from a health assessment in the fall to a health assessment in the following spring.

Sex was not determined for the majority (55%) of individuals in the 120/160 dataset, and a preliminary analysis indicated that the data were not adequate for estimating effects of year. Therefore, the models included in the analysis of this dataset only assessed effects of group and MCL on survival probability, as well as their interaction.

For the > 160 dataset, with the exception of five individuals, the sexes were known. We retained the five individuals in the dataset, but we classified them as unknown sex. In a preliminary analysis, we evaluated the hypothesis that survival probability differed between males, females and individuals of unknown sex. Effects of sex were not supported, and we therefore combined the sexes in the final analysis. Due to the larger sample of tortoises in the > 160 dataset, we were able to evaluate more complex models of survival probability. In addition to effects of group and MCL, we also included effects of year in the candidate set, because we hypothesized that translocation could have short-term effects on survival probability, similar to the short-term effects on movement and thermoregulatory behaviors that we previously reported (Farnsworth et al. 2015, Brand et al. 2016, Sadoti et al. 2017).

Analysis 2 - Body condition score

We used the body condition score from the health assessments (see Section 2.3 and Appendix A, Section 7.4) in spring of each year to model survival probability over the subsequent interval. Because body condition score can change over short periods of time, we did not use scores from previous or subsequent health assessments as replacements for missing scores, as we did for MCL. Rather, tortoises with missing scores over an interval did not contribute to estimates of survival probability over those intervals. Body condition scores were missing for a small percentage (< 1%) of tortoises.

As discussed above, the sexes of most individuals in this dataset were not known. Therefore, the models in the analysis of the 120/160 dataset included effects of group, size (MCL), and body condition. Body condition scores ranged from 3 to 5 in the dataset, but only a single

tortoise had a score of 3 at the beginning of one interval so we combined the scores of 3 and 4. Therefore, models with an effect of body condition evaluated the hypothesis that annual survival probability of tortoises with scores of 4 (lower body condition) differed from tortoises with scores of 5 (higher body condition). The 120/160 dataset included 24 tortoises in the control group and eight tortoises each in the resident and translocated groups.

In the analysis of the > 160 dataset, we included effects of group, size (MCL), and body condition in the candidate set of models. We conducted preliminary analyses of the data and found no evidence of sex effects and excluded effects of sex in the final analysis. The range of body condition scores was 3 to 6, but over 96% of the scores were 4 (59%) or 5 (37%). Therefore, we combined scores of 3 and 4 into one category and scores of 5 and 6 into a second category, and models with an effect of body condition evaluated the hypothesis that annual survival probability of tortoises with scores of 3 or 4 differed from tortoises with scores of 5 or 6. In the > 160 dataset, there were 125 tortoises in the control group, 95 tortoises in the resident group, and 67 tortoises in the translocated group.

Analysis 3 - Toxicity

From the fall of 2013 to the spring of 2015, blood samples were collected during health assessments (see Section 2.3 and Appendix A, Section 7.5). We used the metal concentration data generated from blood samples collected in the spring of 2014 and 2015 to model annual survival probability from May of 2014 to May of 2015 and May of 2015 to May of 2016. For many toxicants, concentrations were below detection limits. However, for iron and selenium, concentrations were above detection limits for all individuals, and for lead, concentrations were above detection limits for over 96% of sampled tortoises in 2014 and over 91% of tortoises in 2015. The detection limit for lead was 10 parts per billion, and we assigned a value of 0 to all individuals for which lead concentrations were below the detection limit. Iron concentrations were measured in parts per million, and selenium concentrations were measured in parts per billion.

After excluding individuals with no information on survival between 2014 and 2016 or no toxicology data, the sample size for the 120/160 dataset was very small and had no mortalities. Therefore, we did not analyze those data. For the analysis of the > 160 dataset, candidate models included the effects of group, concentrations of each of the three toxicants, and interactions between group and toxicant concentrations. Preliminary analyses indicated no effect of sex. Therefore, we did not include effects of sex in the final set of candidate models. Because an association between MCL and annual survival probability was strongly supported in previous analyses, however, we included the effect of MCL in this analysis. The > 160 dataset included 106 tortoises in the control group, 78 tortoises in the resident group, and 54 tortoises in the translocated group.

Analysis 4 - Predictor variables related to thermoregulation

We used the data from the temperature data loggers (iButtons) on radio-telemetered tortoises (see Section 2.3 and Appendix A, Section 7.3) to evaluate possible effects of the thermoregulatory behavior of tortoises on survival probability.

For the 120/160 dataset, data were only available for 22 tortoises (11 control tortoises, four resident tortoises, and seven translocated tortoises) after removing individuals for which temperature data from loggers were not collected. In addition, only three years of survival data remained (2012-2013, 2013-2014, and 2014-2015). Therefore, we fit simple models to the data. The models in the candidate set included effects of MCL, the average daily maximum temperature experienced by tortoises during the active season, and the amount of time tortoises were exposed to temperatures ≥ 35°C in each active season.

A higher sample size was available for the >160 dataset, so the candidate set of models included effects of the average daily maximum temperature and the amount of time ≥ 35°C for each active season, as well as interactions between these predictor variables and group. We also included MCL in the models. The > 160 dataset included 84 tortoises in the control group, 73 tortoises in the resident group, and 53 tortoises in the translocated group.

Analysis 5 - Landscape-scale predictor variables
We identified landscape-scale predictor variables that represented aspects of tortoise home ranges that could affect probabilities of annual survival, including abiotic and biotic habitat characteristics (shrub, burrow and wash density, NDVI, bulk density of soils, topographic roughness), weather (precipitation and maximum temperature during active seasons), and anthropogenic impacts (road and fence density; see Appendix B for descriptions of the predictor variables used in the survival analyses).

The 120/160 dataset had a small number of tortoises. It only included 39 individuals (23 control tortoises and eight each of the resident and translocated tortoises) and only three mortalities. Therefore, we only fit models with landscape-scale predictor variables, MCL, and group effects.

With the > 160 dataset, we evaluated candidate models that included effects of each of the predictor variables, as well as a model with no predictor variables. We also evaluated models that combined the effects of predictor variables with effects of groups and MCL. Finally, to assess the possibility of differential responses to the predictor variables by tortoises in different groups, we evaluated models with interactions between group and each of the predictor variables. The > 160 dataset included 123 tortoises in the control group, 93 tortoises in the resident group, and 65 tortoises in the translocated group.

3. Results and interpretation

3.1 Summary of data collection and survival modeling results

Between spring 2012 and spring 2017, we conducted five complete rounds of bi-annual health assessments, during which every tortoise was located, its survival status verified, and its health status – including disease – reviewed. During the study, health assessments and radio tracking were performed on 352 individual tortoises (139 females, 163 males, and 50 of unknown sex),

temperature data were obtained on 270 tortoises, and heavy metal concentrations from blood samples were quantified for 284 tortoises. In the next two sections, we present results from collection and analyses of field data (Objective 1; Section 3.2), and describe and interpret the results of the survival modeling (Objective 2; Section 3.3). Here, we provide brief summaries of results of work toward each objective.

Key results related to Objective 1 (data collection and analyses of anticipated drivers of survival) included:

- In the first two months of the first active season post-translocation, translocated tortoises increased their movements, showed decreased space use intensity (i.e., exhibited movement behavior that was less concentrated in a particular location), and experienced higher ambient temperatures than did resident and control tortoises. However, space use and thermal conditions of translocated tortoises were indistinguishable from those of control and resident tortoises thereafter (Farnsworth et al. 2015, Brand et al. 2016).
- Tortoise movements across study groups were influenced by individual tortoise characteristics (e.g., size, sex), landscape features (e.g., vegetation greenness), and weather (e.g., rainfall and temperature). For example, movements increased during periods of greater rainfall and when cooler temperatures coincided with lower rainfall (Sadoti et al. 2017).

Key results related to Objective 2 (investigation of processes and scales that influence tortoise survival) included:

- Survival estimates of tortoises in the Ivanpah Valley study area (i.e., between 0.89 – 1.0) were among the highest annual survival probabilities for tortoises of any published study to date.
- Translocation did not negatively affect survival of desert tortoises in this study. Estimates of annual and cumulative survival probability were not statistically different among control, resident, and translocated tortoises for either size class. The lack of support for a difference, in spite of the high precision of the estimates, was likely a consequence of survival estimates for all groups being high (nearly 1.0). Because no statistical difference of survival of the three groups was apparent, the inference of the effects of translocation versus environmental variables during this period of study was limited.
- For tortoises in the smaller size class, topographic roughness had a significantly negative impact on tortoise survival across all study groups.
- For tortoises in the larger size class, survival probability increased with body size across all study groups.
- In addition, survival probability decreased as home range size increased across all study groups.
- Collectively, translocations had short-term impacts on space use and the thermal conditions experienced by desert tortoises at the ISEGS, but those impacts were not apparent one year later, and translocations did not appear to have any negative

impacts on the condition, growth, or mortality of tortoises.

3.2 Data collection on tortoise survival and anticipated drivers

Mortality data collection

Through the end of May of 2017, mortalities of 64 radio-tracked tortoises were documented within the Ivanpah Valley study area, with the most prevalent apparent cause of death being predation by canids (Tables 1 and 2).

Table 1. Suspected cause of death for tortoises in the smallest size class (120-160 mm MCL). The number of tortoises in each category is presented for the Ivanpah Valley study area in general and for each of the study groups monitored during the period April 15, 2012, to May 31, 2017.

Suspected cause	Control East	Control West	Resident	Short-distance Translocated	Long-distance Translocated	Total
Ants	0	1	0	0	0	1
Canid	1	3	4	1	0	9
Crushed	0	0	0	1	0	1
Eagle	0	0	0	0	0	0
Entombed	0	0	0	0	0	0
Euthanized	0	0	0	0	0	0
Hyperthermia or flipped on back	1	1	1	1	0	4
Unknown	0	0	0	0	1	1
Total	2	5	5	3	1	16

Table 2. Suspected cause of death for tortoises in the largest size class (MCL > 160 mm). The number of tortoises in each category is presented for the Ivanpah Valley study area in general and for each of the study groups monitored during the period April 15, 2012, to May 31, 2017.

Suspected cause	Control East	Control West	Resident	Short-distance Translocated	Long-distance translocated	Total
Ants	0	0	0	0	0	0
Canid	1	3	9	6	2	21
Crushed	1	1	1	0	0	3
Eagle	0	0	0	1	0	1
Entombed	0	0	1	1	0	2
Euthanized	1	0	0	0	1	2
Hyperthermia or flipped on back	1	4	1	5	0	11
Unknown	0	2	3	3	0	8
Total	4	10	15	16	3	48

Movement processes: Radio tracking and space use analysis

Translocated tortoises had larger home ranges and lower indices of space use intensity (i.e., had less concentrated movements) compared to resident and control groups during the first two months of the first active season post-translocation, but these patterns were not present in the second season (Farnsworth et al. 2015). Similarly, average daily displacement was greater for translocated tortoises than for resident and control tortoises during the 2012 active season only; in subsequent active seasons, displacement of all study groups was similar (Fig. 4). Thus, translocation apparently resulted in one active season of increased movement, followed by space use patterns in subsequent seasons that were indistinguishable from control tortoises (see also Farnsworth et al. 2015) (Table 3).

Space use patterns among study groups varied with sex and age (Farnsworth et al. 2015). Male tortoises had significantly larger home ranges than females, while immatures had significantly smaller home ranges than either adult male or adult female tortoises. Males typically had greater home range overlap with each other than did females with other female tortoises.

Overall space use intensity increased (e.g., reflecting a smaller home range) as the number of times a tortoise was classified as being in a burrow increased (Farnsworth et al. 2015; Sadoti et al. 2017). In addition, decreasing space use intensity was correlated with increasing wash density (Fig. 5). Furthermore, within a tortoise active season, movement rate between burrows occurred at two scales in the Ivanpah study area: a local scale that represented concentrated activity around a single burrow or 'home base,' and larger scale movements that represented migrations to new home bases based on factors associated with population characteristics, weather, and human infrastructure using generalized mixed effects models (Sadoti et al. 2017) (Fig. 6). Tortoises were more likely to move among activity centers when they were further from minor roads and in the vicinity of barrier fencing, and movement between activity centers was more common during periods of greater rainfall and during periods where cooler temperatures coincided with lower rainfall. However, topographic effects (e.g., slope, roughness), local burrow density, and wash density were not significant influences on probability of movement between activity centers, even when included in models with NDVI as a predictor variable.

Table 3. Average tortoise home range (i.e., utilization distribution) area in hectares (ha) presented by study group and year. Note that in the survival analyses presented below, these study groups were pooled into three groups: controls, residents, and translocated (Sections 2.4 and 3.3). Home range area was only calculated for individuals with ≥ 25 encounters during an active season. Note also that the short-distance translocated (short-translocated below) 2012 study group had a substantially larger average home range than the other study groups, a result that was not apparent in 2013-2016. There were too few long-distance translocated (long-translocated below) 2012 encounter records to develop a home range estimate for that study group in 2012. We did not estimate home range areas for control east individuals in 2016 because they were not available for study after May 2016.

Study Group	*n*	Avg UD Area (ha)	SE
2012			
Control East	33	32.44	12.20
Control West	107	25.12	3.56
Resident	99	45.69	7.92
Short-Translocated (2011)	15	32.70	9.91
Short-Translocated (2012)	54	113.30	23.28
2013			
Control East	31	29.08	4.18
Control West	104	34.08	5.63
Resident	99	47.14	7.52
Short-Translocated (2011)	16	70.07	22.06
Short-Translocated (2012)	47	105.23	61.10
Long-Translocated (2012)	17	54.10	17.49
2014			
Control East	28	31.28	7.15
Control West	100	46.01	6.62
Resident	91	51.40	8.37
Short-Translocated (2011)	15	44.06	10.30
Short-Translocated (2012)	43	45.78	11.34
Long-Translocated (2012))	14	44.49	18.04
2015			
Control East	26	30.14	5.80
Control West	93	27.44	3.64
Resident	88	52.80	13.62
Short-Translocated (2011)	14	48.17	11.03
Short-Translocated (2012)	41	35.43	5.09
Long-Translocated (2012))	14	29.37	7.92
2016			
Control West	91	24.55	2.85
Resident	85	43.58	8.39
Short-Translocated (2011)	14	52.48	9.48
Short-Translocated (2012)	38	57.44	17.04
Long-Translocated (2012)	33	32.44	12.20

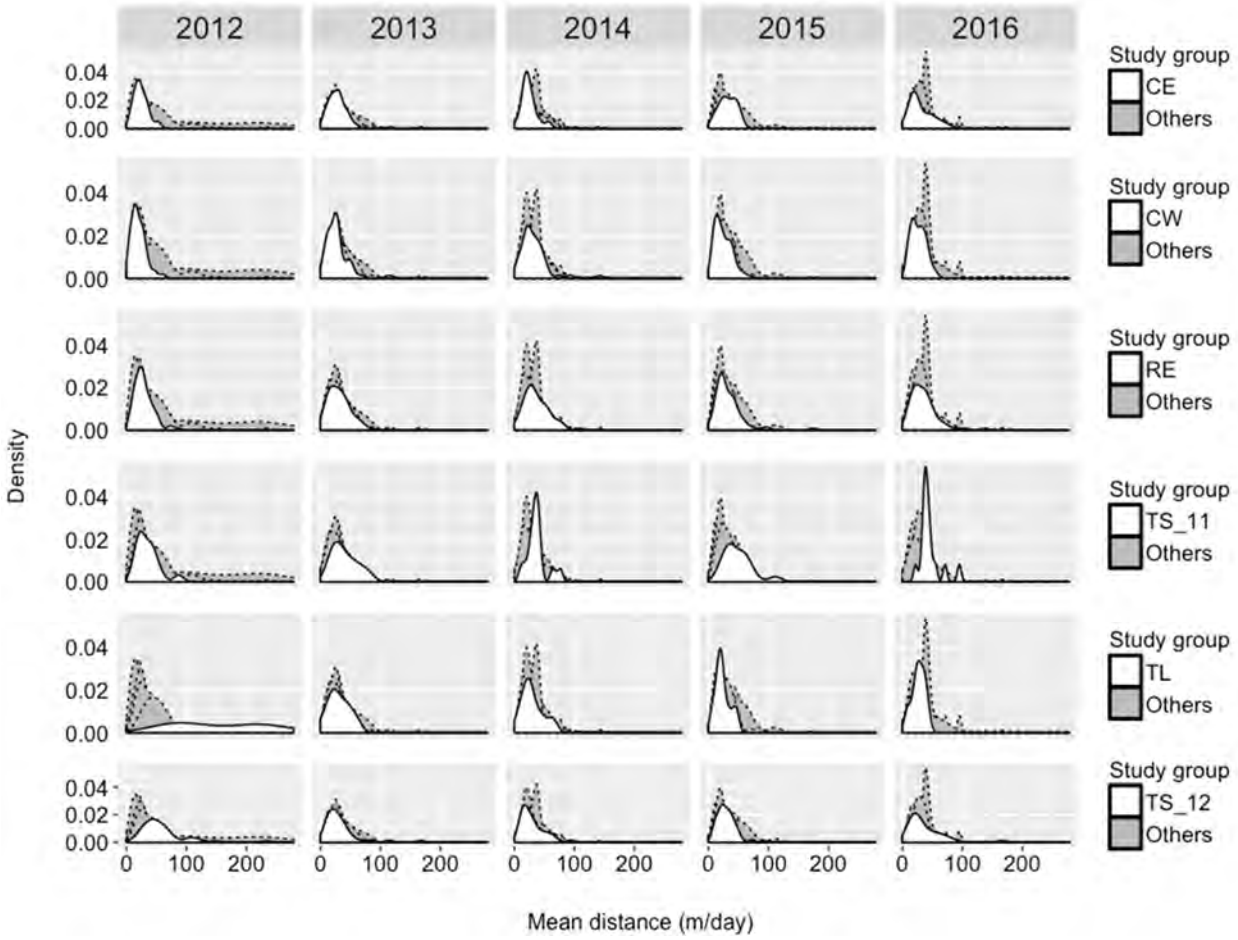

Figure 4. Density plots of the distribution of time-scaled distances (in meters, adjusted for days between subsequent encounters) for tortoises monitored during the 2012-2016 active seasons (approximately April through October). Study group abbreviations are: CE = control east, CW = control west, RE = residents, TS_11=translocated short 2011, TL = translocated long (i.e., I-15 pen), and TS_12 = translocated short 2012. Note that CE individuals were not monitored after May 2016. The distributions shown in white in each row represent one of the five study groups (indicated by the legend for each row), while shaded distributions represent all other groups. Note the difference in distributions between the 2012 translocated tortoises and all other study groups in 2012 (lower left panel), a result that was not observed for 2013 through 2016.

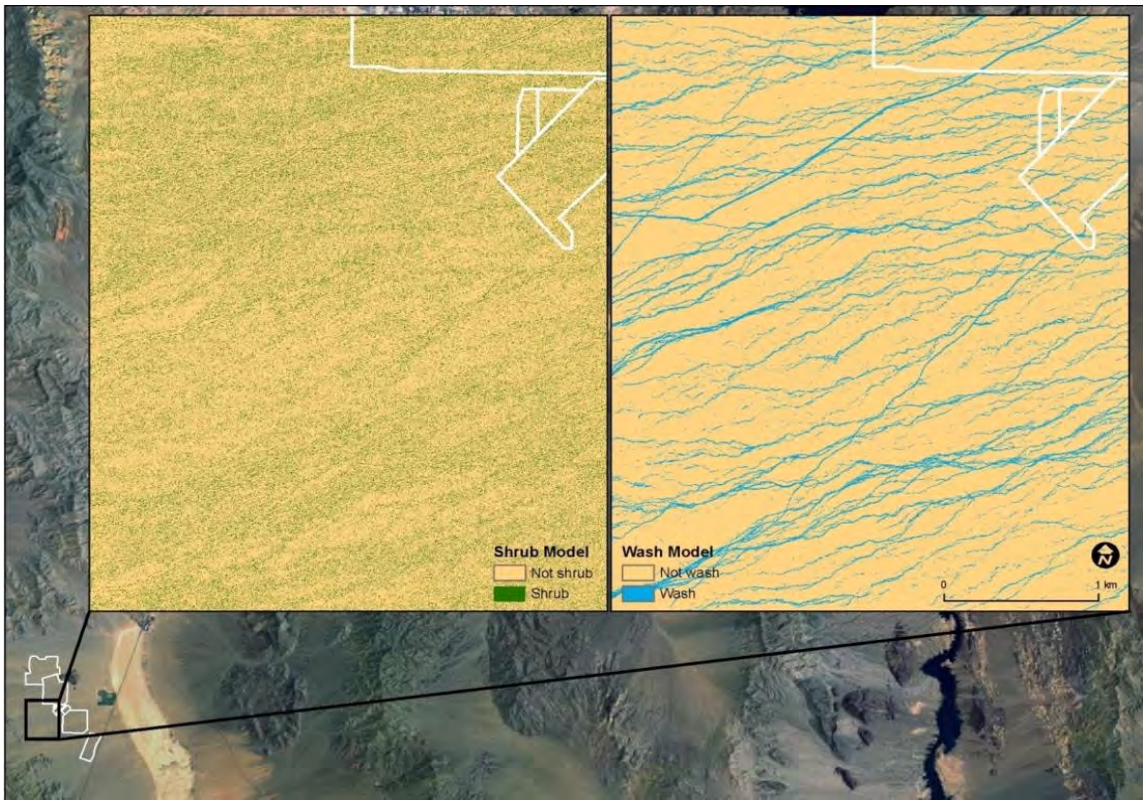

Figure 5. Examples of shrub (left) and wash (right) density layers, derived with 1-m resolution digital orthophotos and machine learning algorithms (detailed in Farnsworth et al. 2015).

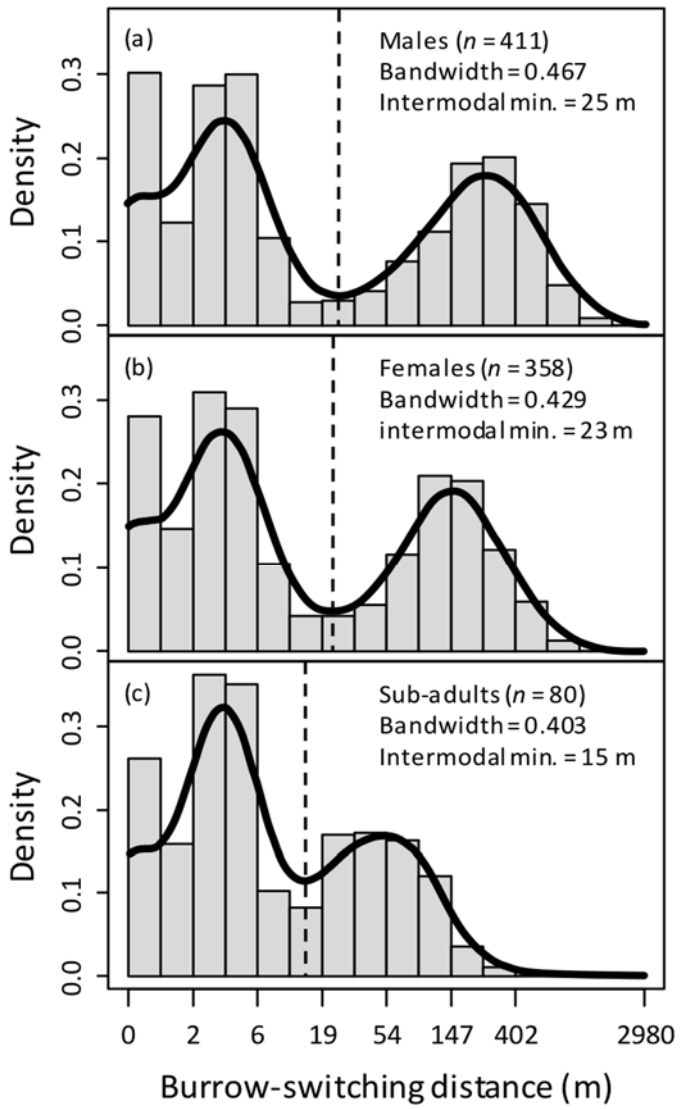

Figure 6. Bimodal distributions of burrow-to-burrow movement distances by desert tortoises within (< intermodal minima indicated by dashed lines) and between (> intermodal minima) activity centers, based on weekly (5–8 day) radio-tracking encounters in the Ivanpah Valley (from Sadoti et al. 2017). These patterns were predicted for males (a), females (b), and subadults (i.e., immatures) (c) based on factors associated with population characteristics, weather, and human infrastructure using generalized mixed effects models.

Local- and landscape-scale environmental variables

Environmental conditions with the Ivanpah Valley varied temporally and spatially. Plant species richness was generally higher in spring than fall throughout the study period (Table 4). Annual and seasonal summaries of temperature and rainfall show that temperatures were lower and rainfall more abundant in the warm seasons of 2013 and 2014 than during the subsequent two

warm seasons (Tables 5 and 6). The warm season was defined as July 4 to October 14 and the cool season was defined as October 15 to April 14 (Hereford et al. 2004). These data also show that average total rain was higher in the 2013 and 2014 warm seasons than in the 2013 and 2014 cool seasons.

Table 4. Plant species richness across 32 plots sampled in the spring of 2012 and the spring and fall of 2013 through 2016 within the Ivanpah Valley study area. Note that the sampling protocol changed between the 2012 and 2013 seasons, as described in Section 2.3 of this report.

Season	Year	Mean Species Richness	Standard Deviation
Spring	2012	11.28	6.50
Spring	2013	24.28	11.40
Spring	2014	33.23	19.38
Spring	2015	32.29	17.95
Spring	2016	21.81	13.65
Fall	2013	23.03	7.17
Fall	2014	21.71	7.67
Fall	2015	11.55	6.69
Fall	2016	13.78	6.42

Table 5. Summary of temperature based on six on-site weather stations established in the Ivanpah Valley study area. The warm season was defined as July 4 to October 14 and the cool season was defined as October 15 to April 14.

Season	Year(s)	Avg Max Temp (°C)	Avg Min Temp (°C)
Warm	2013	33.05	18.95
Warm	2014	34.74	19.97
Warm	2015	35.80	20.78
Warm	2016	35.36	20.13
Cool	2013-2014	18.07	4.45
Cool	2014-2015	19.75	6.29
Cool	2015-2016	17.93	4.91
Cool	2016-2017	18.14	5.86

Table 6. Summary of rainfall based on six on-site weather stations within the Ivanpah Valley study area. The warm season was defined as July 4 to October 14 and the cool season was defined as October 15 to April 14.

Season	Year(s)	Avg Total Rainfall (mm)
Warm	2013	128.02
Warm	2014	132.08
Warm	2015	65.53
Warm	2016	30.48
Cool	2012-2013	51.56
Cool	2013-2014	78.23
Cool	2014-2015	85.85
Cool	2015-2016	95.50
Cool	2016-2017	128.02

As mentioned above, local-scale environmental variables were not used as standalone predictor variables in survival analyses. However, robust relationships between local-scale environmental variables and remotely sensed data confirmed that the latter data types could be used as dynamic predictor variables in our survival analyses. The positive correlation (Pearson correlation coefficient = 0.75) between vegetation trends observed in plot-level data (Table 4) and remotely sensed NDVI data confirmed that changes in plant cover across the study area are reflected in changes in the NDVI signal (Fig. 7), illustrating how trends in green-up translate to specific forage availability, and, by extension, individual and group-level movement and survival over time. Likewise, temperature (Pearson correlation coefficient = 0.96; Fig. 8) measured at weather stations was correlated with remotely derived measures of temperature. Monthly precipitation derived from rain gauges was similar to remotely derived measures, with differences between the two metrics varying across months (Fig. 9).

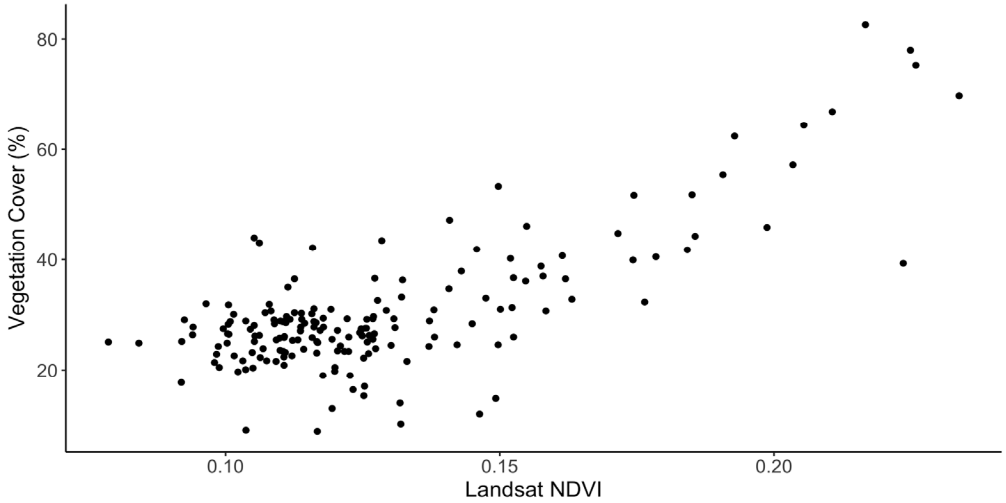

Figure 7. Scatter plot of Landsat NDVI and plot-level vegetation cover (*n* = 177) in the fall and spring of 2013-2015. The Pearson correlation coefficient between these plot-level data and remotely sensed data is 0.75, indicating that higher NDVI values correspond to greater plant cover across the study area.

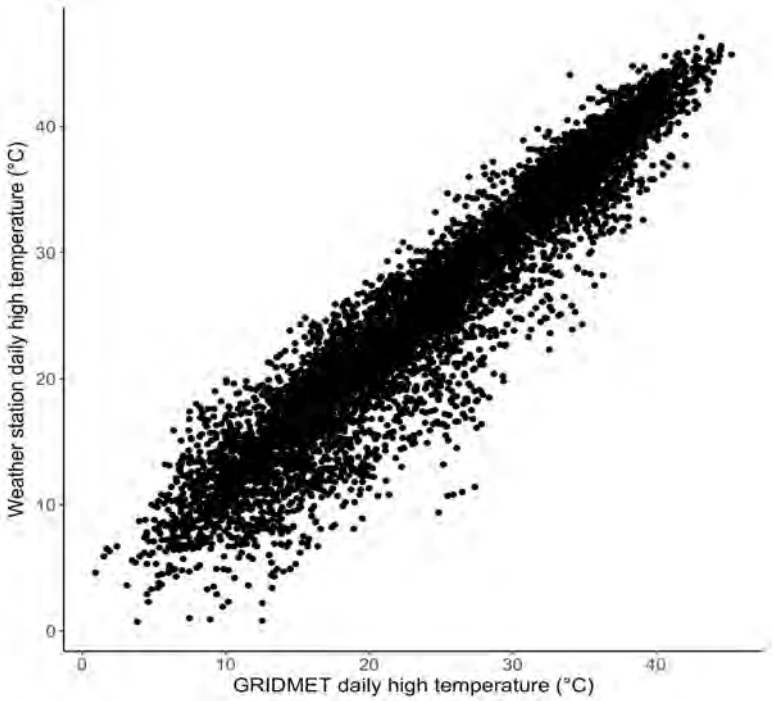

Figure 8. Scatter plot of daily gridded 4-km temperature data (GRIDMET; Abatzoglou 2011) and daily weather station data from 2013-2015 (Pearson correlation coefficient = 0.96).

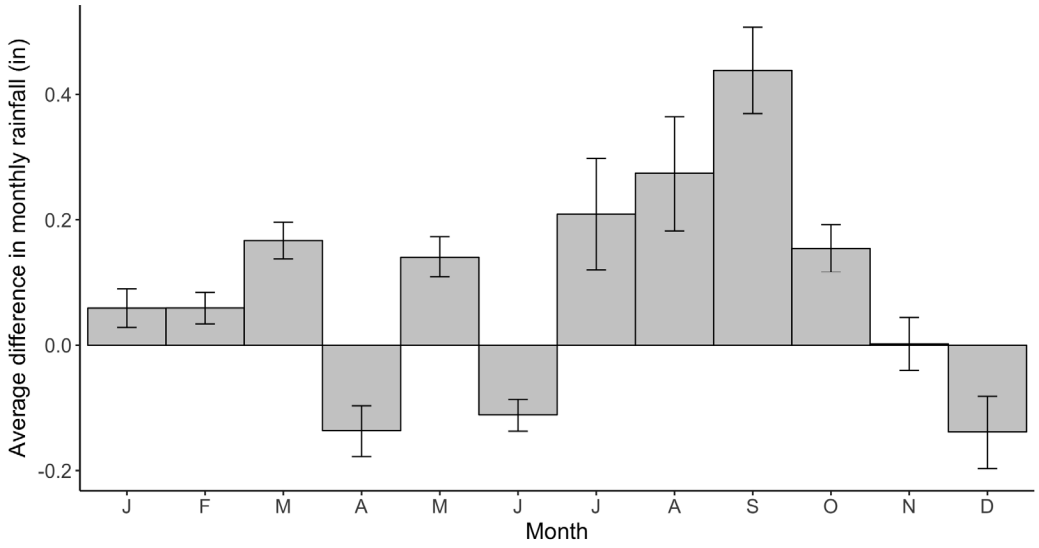

Figure 9. The average difference (error bars = standard errors) in monthly rainfall between (1) local measures derived from 18 rain gauges within the Ivanpah Valley study area, and (2) remotely-derived measures based on daily gridded 4-km rainfall data (GRIDMET; Abatzoglou 2011). Data are from 2012-2016.

Thermal assessments

Generalized estimating equations (i.e., mixed models) were used to evaluate the thermal conditions experienced by tortoises. For the period 2012-2014, maximum daily tortoise temperature increased with maximum daily ambient temperature, then leveled off at highest ambient temperatures, indicating that tortoises in all three study groups—translocated, resident, and control—were able to behaviorally thermoregulate at these high temperatures (Brand et al. 2016).

We also found that the thermal conditions experienced by translocated tortoises were more extreme initially, but that the differences between the translocation group and the other study groups diminished over time (Fig. 10). During the first month post-translocation, translocated tortoises were exposed to significantly higher average maximum daily temperature (37.1°C, 95% CI: 36.7-37.5°C) than resident (34.8°C, 34.2-35.4°C) and control (35.9°C, 35.9-36.2°C) tortoises; those differences were smaller in the second month, with no differences thereafter during the first active season (Brand et al. 2016) (Fig. 10). Similarly, during the first month, translocated tortoises also spent more time per day above 35°C (138 minutes, 95% CI: 120-155 mins) than resident (51 mins; 35-67 mins) and control (57 mins; 46-69 mins) tortoises, with smaller effects in the second and fourth months, and no differences in subsequent years (Fig. 10). Despite these initial differences, the maximum temperature experienced by translocated tortoises in the first month was within the range of temperatures experienced by tortoises in the other study groups.

Thermal conditions varied by sex and age, in addition to translocation treatment. During the first year, adult translocated males had higher temperatures than females, which Brand et al. (2016) suggested was perhaps due to the establishment of larger home ranges or a greater number of burrows used by males during summer (Rautenstrauch et al. 2002, Harless et al. 2009). Resident immature tortoises had higher temperatures than translocated or control tortoises, which could suggest displacement or increased movements of resident immature tortoises following introduction of translocated tortoises to their home ranges; however, mechanisms are unknown and the sample size of resident immature tortoises was low (n = 5; Brand et al. 2016). As described by Brand et al. (2016), initial differences in thermal conditions among groups may have converged over time because tortoises were released with time to find or construct burrows during cooler environmental temperatures in spring (Henen 1997, Nussear et al. 2012).

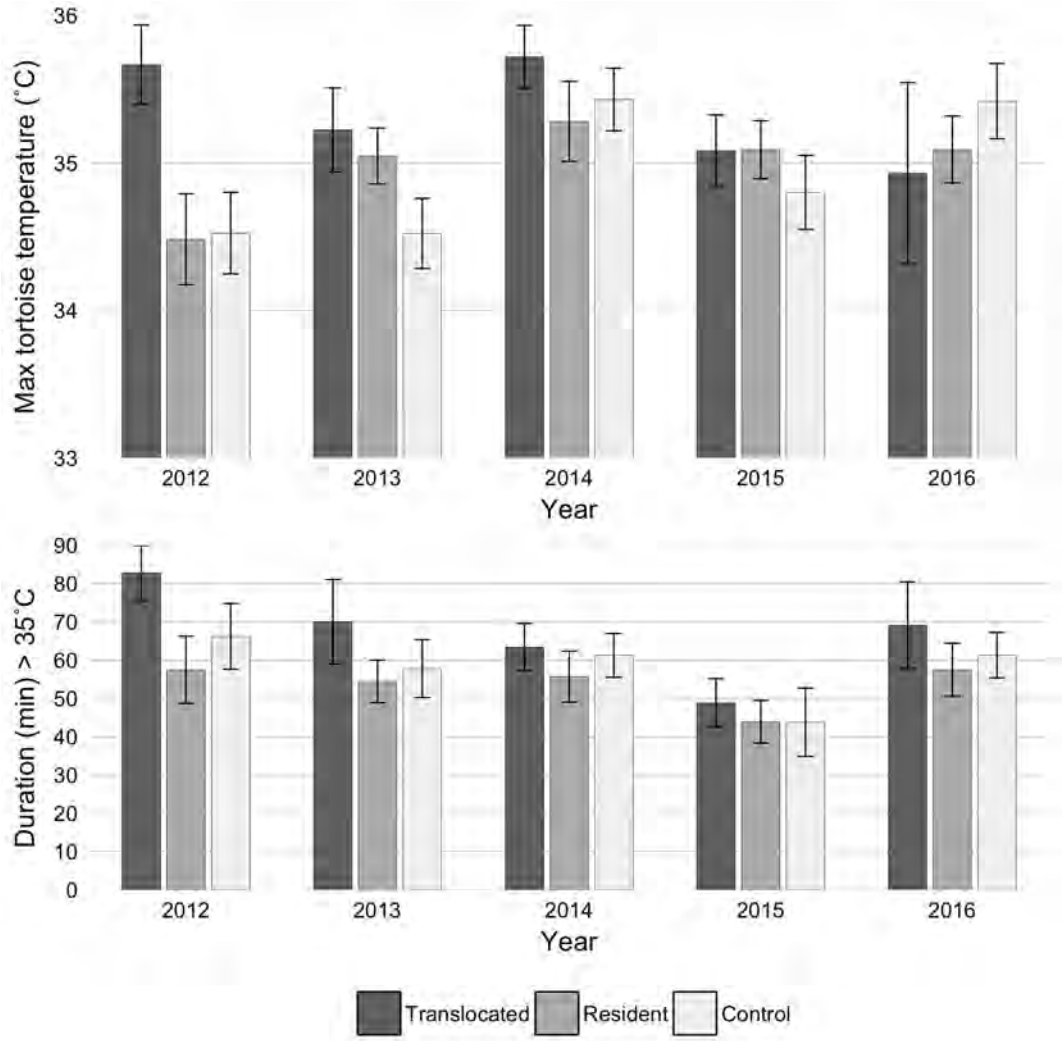

Figure 10. Mean maximum daily temperatures (top) and mean daily duration spent ≥ 35°C (bottom) for translocated (short- and long-distance; *n* = 74 total), resident (*n* = 75), and control (east and west; *n* = 85 total) tortoises during active seasons between 2012-2016. (Note: Brand et al. (2016) showed similar data and trends, but only for 2012-2014 and the translocated group only included short-distance translocated tortoises.)

Health assessments and pathogen transmission

Tortoise body condition was similar among study groups. For example, the average body condition score calculated for each study group in each year (April 2012 through September 2016 varied between 4.25 and 4.94, suggesting little variability across study groups or over time. Based on the USFWS index (Lamberski 2013), these estimates suggest that tortoises in all study groups, on average, were in good condition. Over the long-term, tortoises in all groups exhibited increases in the average percent change in body condition and carapace length, further indicating that translocated individuals did not experience a decline in body condition over time (Brand et al. 2016).

Our health assessments detected evidence of tortoise exposure to the bacteria *M. agassizii* and *M. testudineum*. Only two tortoises (#646 and #05) tested positive for both *Mycoplasma* spp. bacteria (Tables 7 and 8).

Through May 2017, 18 individual tortoises tested positive for *M. agassizii* over the 11 health assessment survey occasions, with a total of 32 ELISA-positive samples (Table 7). Some individuals tested positive on more than one occasion. There were 14 positive tests (nine individuals) among translocated tortoises, 15 positive tests (seven individuals) among control tortoises, and three positive tests (two individuals) among resident tortoises. In 2012, there appeared to be a cluster of test-positive control tortoises; however, that pattern did not persist (Fig. 11). For individuals testing positive on consecutive health occasions, it could not be determined if they remained antibody positive from one exposure event or if repeated exposures occurred between seasons. However, there were notable exceptions. For example, tortoise #552 tested positive in the spring and fall of 2013, but then was test-negative until the spring and fall of 2015, when it seroconverted (i.e., tested positive again), possibly indicating a new exposure event. Tortoise #554 (a control female) exhibited a similar pattern (Table 7).

For *M. testudineum*, 15 individual tortoises tested positive for *M. agassizii* over the 11health assessment survey occasions, with a total of 22 ELISA-positive samples (Table 8). There were nine positive tests (three individuals) among translocated tortoises, eight positive tests (seven individuals) among control tortoises, and five positive tests (five individuals) among resident tortoises. Two tortoises (#613 and #05) had repeated test-positive samples.

The prevalence of infected tortoises in the Ivanpah study area (maximum 3.2% of tortoises sampled during each health assessment, typically between 0% and 2%) was low compared to prevalence documented at other sites during previous studies (Jacobson et al. 2014). This low prevalence might be due to isolation from other tortoise populations due to surrounding anthropogenic and geographic features such as I-15, the Clark Mountains, and Las Vegas. As mentioned in Section 2.3, ELISA test status was not included as a predictor variable in survival estimates due to the relative infrequency of ELISA-positive tortoises.

Table 7. Prevalence of *M. agassizii* (i.e., percentage of tortoises that tested positive, shown with number positive and total number sampled) among tortoises enrolled in the EMP across seasons and years and identification of ELISA test-positive individuals. Sex and group are indicated as follows: F = female, M = male, J = juvenile, CW = control west, TS_{11} = translocated-short 2011, R = resident, TS_{12} = translocated-short 2012.

Season	Prevalence	Tortoise ID (sex, study group)
Spring 2012	0.9% (3/343)	554(F,CW), 549(M,CW), 646(F,CW)
Fall 2012	0.8% (3/368)	546(M,CW), 549(M,CW), 646(F,CW)
Spring 2013	1.7% (6/363)	06(M,TS_{11}), 172(M,R), 546(M,CW), 552(M,CW), 564(F,TS_{12}), 646(F,CW)
Fall 2013	0.8% (3/375)	94(M,TS_{12}), 552(M,CW), 647(J,CW)
Spring 2014	0.0% (0/389)	
Fall 2014	0.5% (2/390)	08(F,TS_{11}), 223(TS_{12})
Spring 2015	1.7% (5/288)	05(M,TS_{12}), 08(F,TS_{11}), 113(M,R), 114(M,TS_{11}), 552(M,CW)
Fall 2015	1.6% (6/372)	05(M,TS_{12}), 62(M,TS_{11}), 100(M, TS_{11}), 113(M, R), 552(M,CW), 623(F,CW)
Spring 2016	0.4% (1/276)	05(M,TS_{12})
Fall 2016	0.4% (1/243)	05(M,TS_{12})
Spring 2017	0.8% (2/239)	05(M,TS_{12}), 554(F,CW)

Table 8. Prevalence of *M. testudineum* (i.e., percentage of tortoises that tested positive, shown with number positive and total number sampled) among tortoises enrolled in the EMP across seasons and years and identification of ELISA test-positive individuals. Sex and group are indicated as follows: F = female, M = male, J = juvenile, CW = control west, TS_{11} = translocated-short 2011, R = resident, TS_{12} = translocated-short 2012.

Season	Prevalence	Tortoise ID (sex, study group)
Spring 2012	3.2% (10/312)	09(M,TS_{12}), 515(F,CE), 23(F,R), 524(M,CE), 70(F,R), 89(M,R), 230(M,R), 565(M,CW), 613(F,CW), 597(M,CW)
Fall 2012	0.9% (3/326)	316(M,R), 613(F,CW), 586(M,CW)
Spring 2013	0.3% (1/309)	05(M,TS_{12})
Fall 2013	0.7% (2/294)	05(M,TS_{12}), 646(F,CW)
Spring 2014	0.0% (0/293)	
Fall 2014	0.0% (0/291)	
Spring 2015	0.4% (1/277)	05(M,TS_{12})
Fall 2015	0.4% (1/278)	05(M,TS_{12})
Spring 2016	0.4% (1/276)	05(M,TS_{12})
Fall 2016	0.8% (2/243)	05(M,TS_{12}), 265(F,TL_{12})
Spring 2017	0.4% (1/239)	05(M,TS_{12})

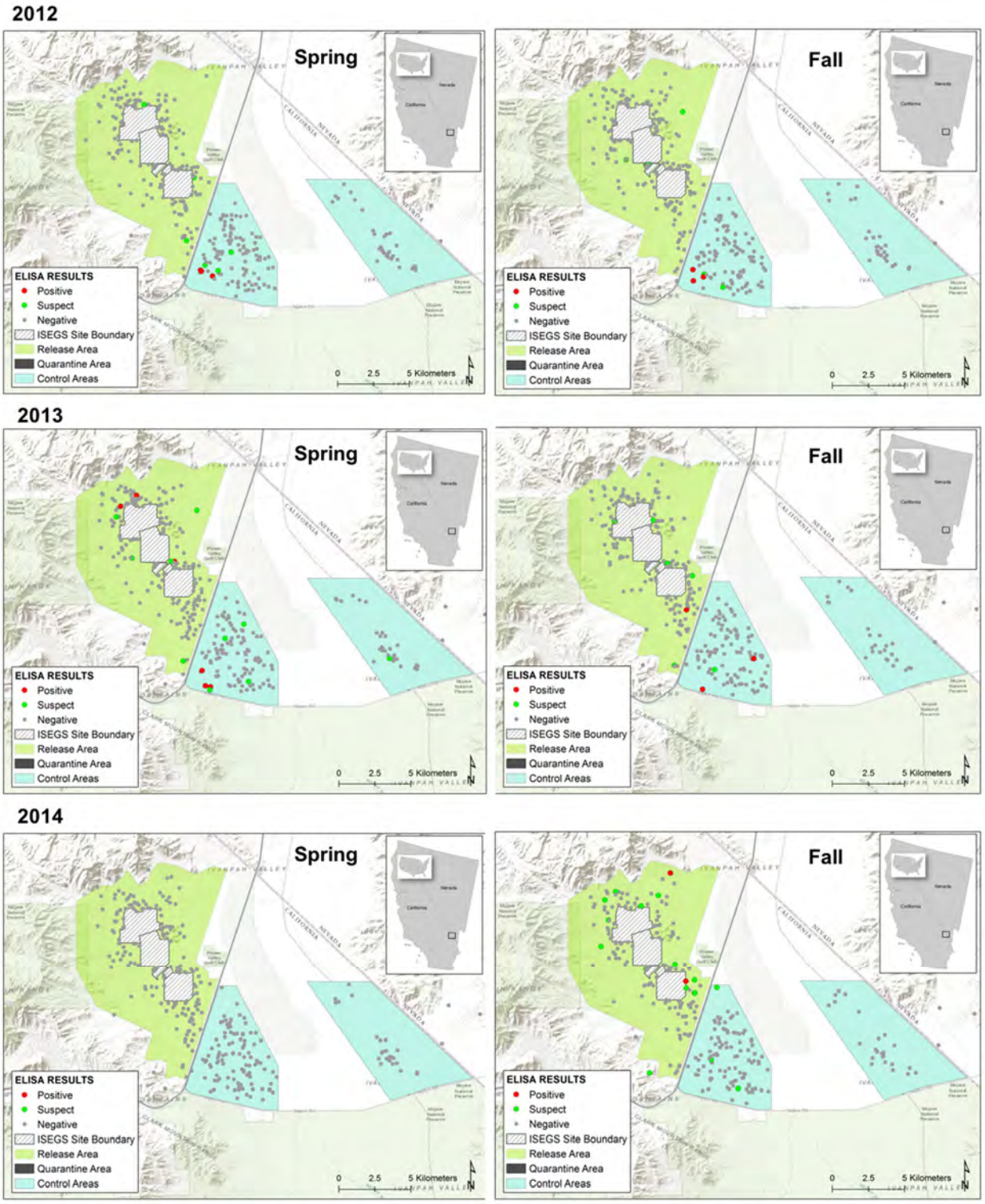

Figure 11. Spatial distribution of ELISA test results for the bacterium *M. agassizii* in tortoises during the spring (left column) and fall (right column) of 2012 through 2016 within the Ivanpah Valley study area (continues on following page). Red dots indicate positive tests, green dots indicate suspect results, and gray dots indicate negative tests.

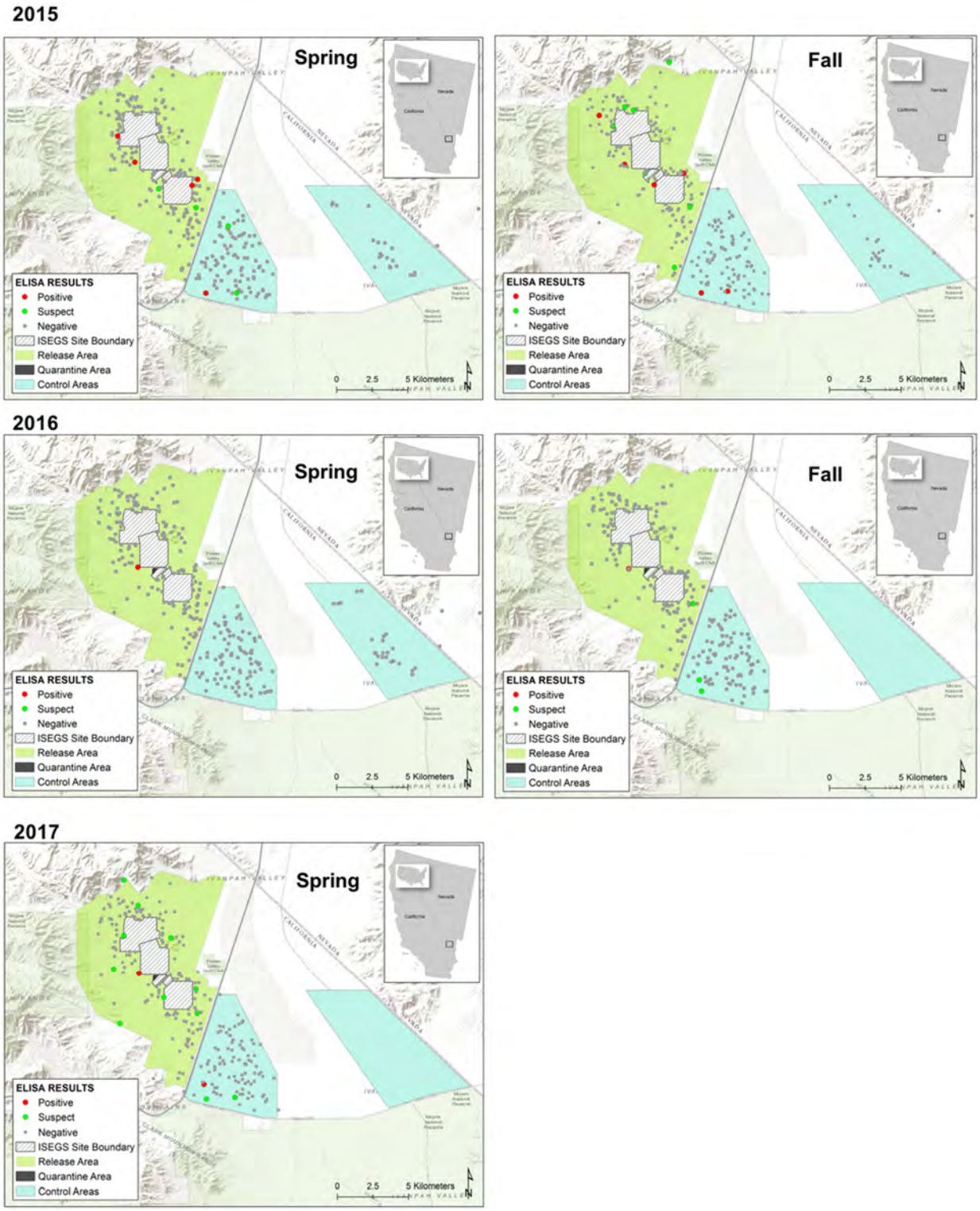

Figure 11 (continued). Spatial distribution of ELISA test results for the bacterium *M. agassizii* in tortoises during the spring (left column) and fall (right column) of 2012 through 2016 within the Ivanpah Valley study area (continues on following page). Red dots indicate positive tests, green dots indicate suspect results, and gray dots indicate negative tests.

Anthropogenic impacts

Metal toxicity

Concentrations of several metals in tortoise blood samples never (e.g., mercury, titanium, thorium, and uranium) or rarely (i.e., typically 0-7% of samples in a given season for cadmium and arsenic) exceeded minimum levels of detection. Lead, selenium, and iron concentrations were generally detectable (i.e., 67%-100% of samples in a given year), but were typically lower than or within published ranges for turtles, reptiles, and other vertebrates (Nagle et al. 2001; Hamilton et al. 2004; Burger et al. 2007; Buekers et al. 2009; Martinez-Lopez et al. 2009; Grillitsch and Schiesari 2010; Yu et al. 2011) (Fig. 12).

Figure 12. Spatial distributions of lead (Pb) (A), selenium (Se) (B), and iron (Fe) (C) concentrations in blood samples collected from desert tortoises within the Ivanpah Valley study area. For Pb and Se, dark blue circles were below detection limits, light blue were above detection but below minimum values reported in peer-reviewed literature (see text for details), and all other values were within the range of literature values. Fe values are shown in generalized bins because no published values were available.

Anthropogenic noise

Sound levels ranged from 23 to 55 decibels (dB) and averaged 38 dB (SD = 5) across the study area. Vibration levels ranged from 0.0001 to 0.03 mm/sec and averaged 0.004 mm/sec (SD = 0.004). Across the four transects extending from the I-15 corridor, the maximum sound level

ranged from 71 to 77 dB at locations proximate to the interstate (15 to 25 m), whereas the minimum sound level ranged from 31 to 43 dB at locations further from the interstate (655 to 1000 m). For reference, the common noise level of light auto traffic is 50 dB, and continuous vibration from traffic at 0.51 mm/sec is at the threshold of human perception.

Given the data, anthropogenic noise had little or no effect on translocated or resident tortoises (Table 9). Although our results suggested that construction noise levels in 2013—may have influenced tortoise space use in that year, it should be noted that the data we analyzed did not emerge from an experiment conducted over multiple seasons. In 2013, the only year when sound data were collected, the construction noise by unknown sex interaction term had high relative importance ($w_+(j) = 0.99$) and was positive, providing evidence for a relationship between construction noise and an increase in the concentration of space use for tortoises of unknown sex (i.e., immature tortoises) after controlling for a number of other variables (Table 9; Fig. 13). The remaining noise variables all had much less support in the data. In this analysis, 13% of the unknown sexes were translocated tortoises and 29% were resident.

Table 9. Model-averaged parameter estimates ($\tilde{\beta}$) and cumulative Akaike's Information Criterion weights (w_+) for all variables used to model space use intensity in the 2013 active season. Model variables included noise propagation from the around the ISEGS towers and the I-15 corridor, as well as density of all road types in the Ivanpah study area.

Variable	$\tilde{\beta}$	**SE**	w_+
Intercept	*2.53*	*0.09*	--
Sex Male	-1.15	0.11	1.00
Sex Unknown	1.04	0.21	1.00
Construction Noise*Sex Unknown	0.44	0.22	0.99
I-15 Noise*Sex Male	-0.03	0.04	0.55
Construction Noise	-0.04	0.07	0.50
I-15 Noise	-0.01	0.03	0.45
Construction Noise*Sex Male	0.04	0.08	0.44
Road Density	0.01	0.02	0.40
Translocated	-0.06	0.14	0.39
Control East	-0.04	0.14	0.32
I-15 Noise*Sex Unknown	-0.01	0.06	0.29
Resident	0.00	0.07	0.28

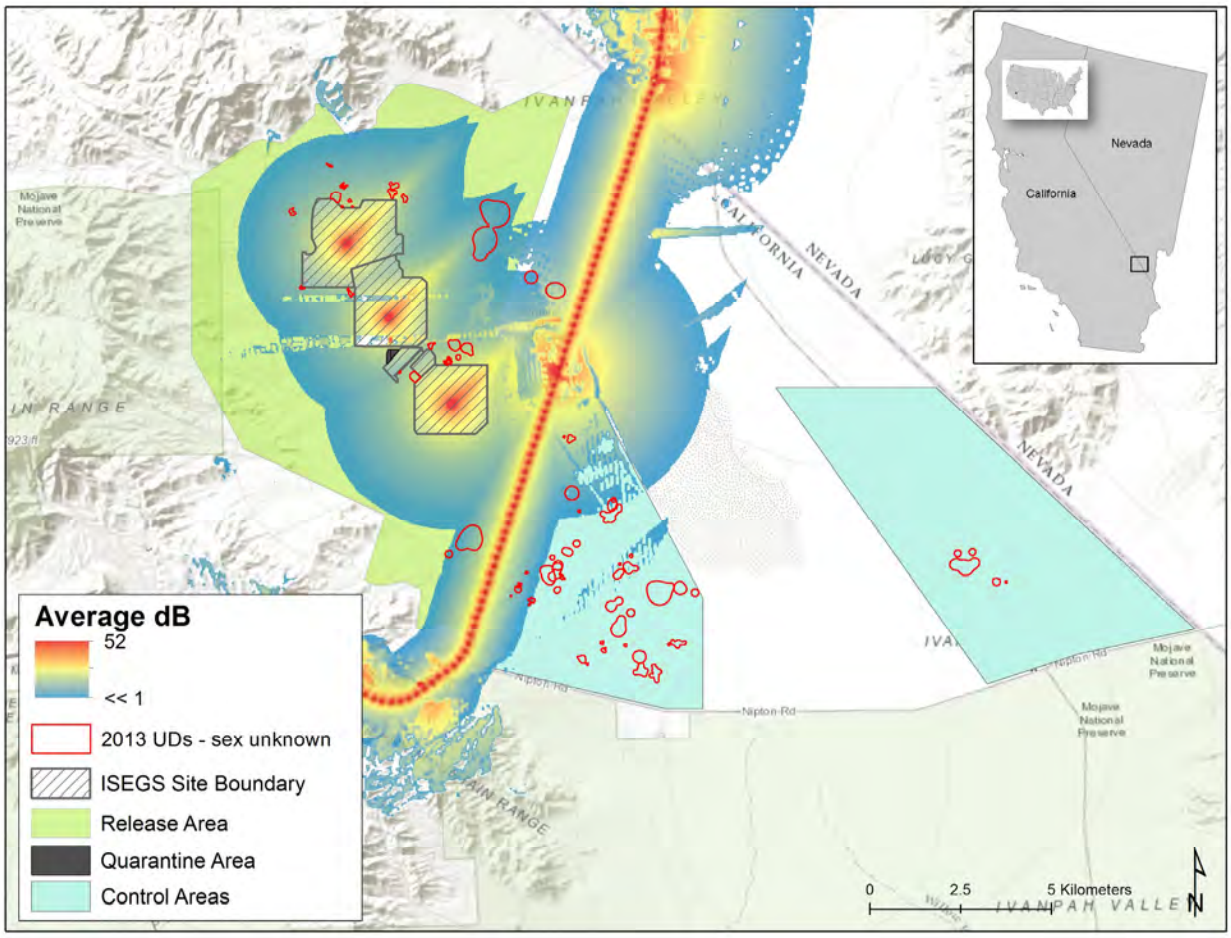

Figure 13. Noise propagation (sounds levels in dB) from the I-15 corridor and construction at the ISEGS facility, averaged across the frequencies 400, 500, and 630 Hz within the Ivanpah Valley study area in 2013. Noise levels and weather were sampled in the field, and SPreAD-GIS software (Reed et al. 2010) was used to model propagation across the study area in 2013. Home ranges (utilization distributions; UDs) of tortoises of unknown sex (n = 28) in 2013 are displayed in red outlines because our model of space use intensity indicated that construction noise had a positive effect on space use intensity for tortoises of unknown sex (predominantly immatures) in 2013.

3.3 Comprehensive survival analysis

In this section, we describe the results of the five survival analyses described in Section 2.4. We briefly summarize those analyses (i.e., which variables were included) and the key inferences drawn from the two datasets (i.e., 120/160 and > 160 mm MCL) (Table 10). As mentioned in Section 2.4, we consider Analysis 1 to be the most robust evaluation of the effect of short-distance translocation on survival probability of tortoises in this study because Analysis 1 had the largest sample sizes among groups.

Table 10. Summary of the key inferences regarding effects of individual- and landscape-scale predictor variables on survival probability in tortoises at the Ivanpah Valley study area, and for each of the five analyses. 'N/A' indicates that data were not available (i.e., too few records existed) for tortoises from 120-160 mm MCL to perform Analysis 3. Descriptions of predictor variables are in Appendix B, Table 8.2.

		Key Inferences by Dataset	
Analysis No.	**Predictor Variables**	**120/160 MCL**	**> 160 MCL**
Analysis 1	Treatment group, Size (Midline Carapace Length [MCL]), and Sex	i) No effects of predictor variables	i) Annual survival probability increases with size ii) Annual and cumulative survival probabilities are not statistically different among tortoises in different groups or among sexes
Analysis 2	Body condition	i) No effects of predictor variables	i) Annual survival probability increases with size ii) Annual and cumulative survival probabilities are not statistically different among tortoises in different groups, among sexes or among body condition scores
Analysis 3	Iron, Selenium and Lead concentrations in blood	N/A	i) Annual survival probability increases with higher concentrations of selenium in the blood of tortoises for all groups and increases with higher concentrations of iron in the blood of translocated tortoises ii) Annual survival probability is not affected by concentration of lead in the blood of tortoises or the size of tortoises and is not statistically different among tortoises in different groups or among sexes
Analysis 4	Maximum temperature and Duration ≥ 35°C	i) No effects of predictor variables	i) Annual survival probability increases with size ii) The evidence for effects of both temperature-related predictor variables was equivocal, and annual survival probability is not statistically different among tortoises in different groups or among sexes
Analysis 5	Home range size, Burrow density, Shrub density, Wash density, Topographic roughness, Soil bulk density, Mean NDVI, Coefficient of variation of NDVI, Road density, Fence density, Precipitation, and Maximum temperature	i) Annual survival probability decreased with increasing topographic roughness	i) Annual survival probability increases with size and decreases with size of tortoise home range ii) There was no support for any other landscape-scale predictor variables and no evidence that annual survival probability was different among groups or sexes

Analysis 1 - Treatment group, sex, and size

Survival of tortoises in the smallest size class (120/160 MCL dataset) did not vary by study group or size (MCL). The highest-ranked model was a model with no predictor variables (Table 11). In addition, model-averaged estimates of annual and cumulative survival probability were nearly identical for control, resident, and translocated tortoises, and the 95% confidence intervals for the three groups broadly overlapped (Figs. 14 and 15).

Table 11. Candidate model-selection results for the evaluation of effects of group and midline carapace length (MCL) on tortoises in the 120/160 MCL dataset. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, k = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight. We did not include fixed effects of sex and year due to insufficient data.

Model	-2LL	k	AIC_C	ΔAIC_C	w_i
No Predictor Variables	45.1	1	47.1	0.0	0.49
MCL	43.5	2	47.7	0.6	0.37
Group	44.2	3	50.6	3.5	0.09
Group+MCL	43.0	4	51.6	4.5	0.05
Group*MCL	42.5	6	55.9	8.8	0.00

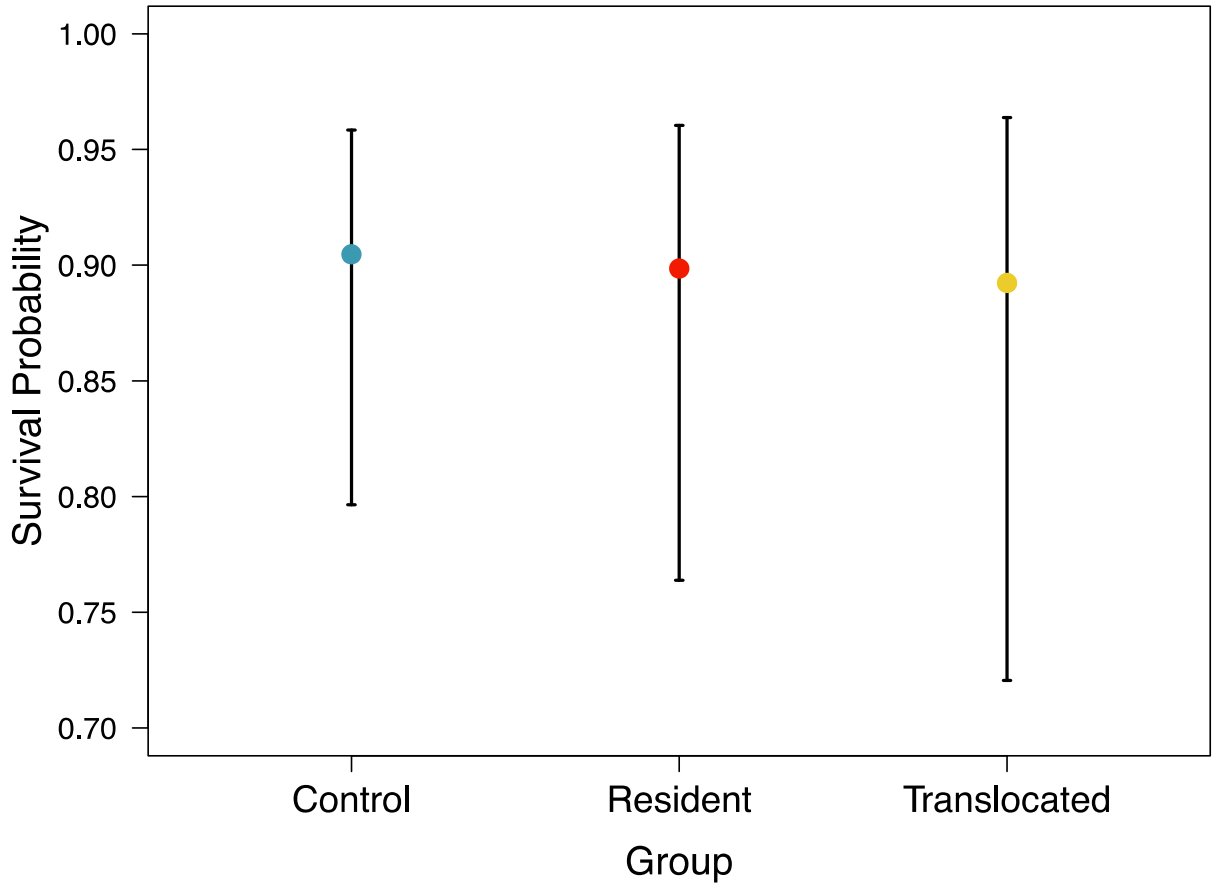

Figure 14. Model-averaged estimates of annual survival probabilities from May 2012 to May 2017 for control, resident, and translocated tortoises in the Ivanpah Valley study area from the analysis of data on the smaller size class of tortoises (120 to 160 mm MCL). Error bars around estimates represent 95% confidence intervals. We do not show estimates for each survival interval, because the estimates for each group are the same across intervals (i.e., year effects were not included).

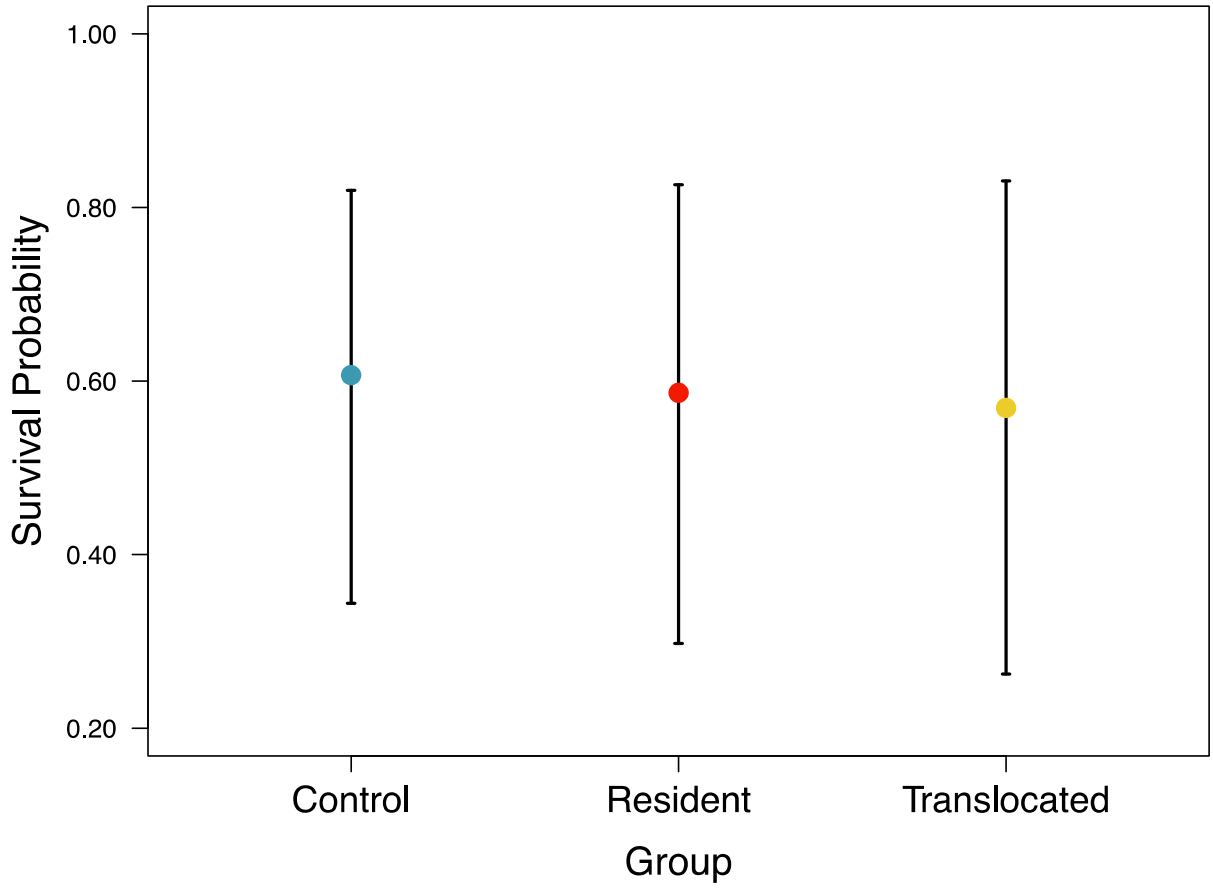

Figure 15. Model-averaged estimates of cumulative survival probabilities from May 2012 to May 2017 for control, resident, and translocated tortoises in the Ivanpah Valley study area from the analysis of data on the smallest size class of tortoises (120-160 mm MCL). Estimates are for tortoises of average size (MCL). Error bars around estimates represent 95% confidence intervals.

Survival of tortoises in the largest size class (> 160 MCL dataset), in contrast, varied by size. MCL was included in each of the five highest-ranked models (Table 12) and the 95% confidence interval (CI) around the estimated regression coefficient for MCL in the highest-ranked model (0.58 [0.27 - 0.88]) did not overlap 0. The estimates of survival probability from the highest-ranked model for the smallest and largest tortoises in the > 160 dataset were 0.89 (0.77 – 0.95) and 1.00 (0.98 - 1.00), respectively. The highest-ranked model also included an effect of group (Table 12). Although estimates of regression coefficients from this model indicated higher annual survival probabilities for control tortoises relative to translocated tortoises (with an estimated regression coefficient for control tortoises of 0.76 [0.01 – 1.51]), several lines of evidence cast doubt on whether the apparent effect is biologically meaningful. First, the second-ranked model did not include a group effect, and it had nearly identical support in the data ($\Delta AIC_C = 0.3$). Second, the model that included only a group effect was not supported in the data. Finally, the estimate of annual survival probability for translocated tortoises from the highest-ranked model (conditioned on group and MCL) was 0.96, indicating that estimates for control tortoises cannot be considerably higher. Indeed, estimates for control tortoises only

increased to 0.98. The lack of support for a difference among groups, in spite of the high precision of the estimates, was likely a consequence of survival estimates for all groups being high (nearly 1.0). In other words, these survival estimates indicate that nearly 100% of tortoises in any study group survived a given year and are similar to or higher than other published estimates of annual survival probabilities for immature and adult tortoises (Doak et al. 1994, Zylstra et al. 2013, Nafus et al. 2017). Finally, there were no statistical differences in model-averaged annual (Fig. 16) or cumulative (Fig. 17) survival estimates among groups.

Table 12. Candidate model-selection results for the evaluation of effects of group, midline carapace length (MCL), and year on tortoises in the > 160 dataset. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, k = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight.

Model	**-2LL**	***k***	**AIC_C**	**ΔAIC_C**	**w_i**
Group+MCL	357.8	4	365.8	0.0	0.43
MCL	361.9	2	365.9	0.1	0.41
Year+MCL	357.1	6	369.2	3.4	0.08
Group*MCL	357.5	6	369.6	3.7	0.07
Year*MCL	354.0	10	374.1	8.3	0.01
No Predictor Variables	375.2	1	377.2	11.4	0.00
Group	371.6	3	377.6	11.8	0.00
Group+Year	367.4	7	381.5	15.7	0.00
Group*Year	360.3	15	390.7	24.9	0.00

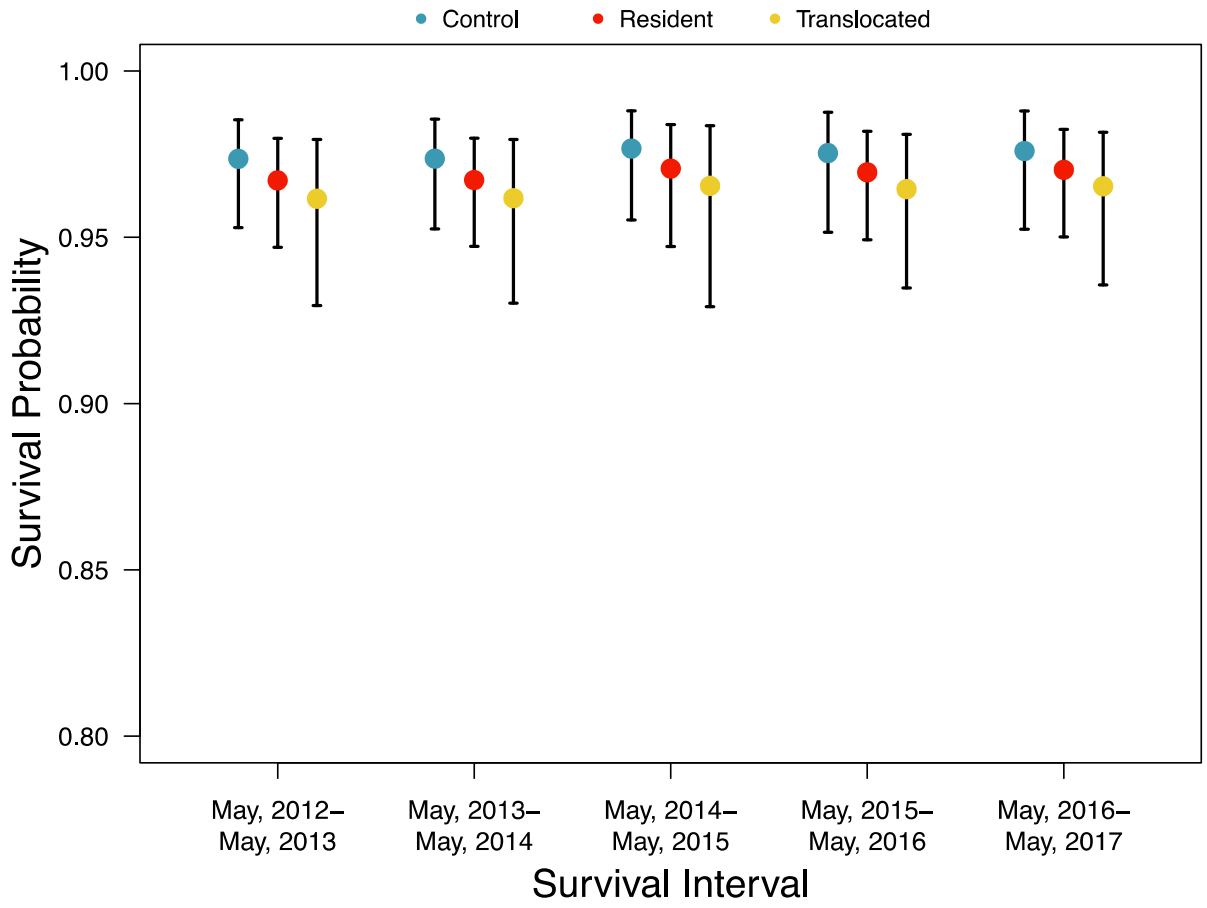

Figure 16. Model-averaged estimates of annual survival probabilities from May 2012 to May 2017 for control, resident, and translocated tortoises in the Ivanpah Valley study area from the analysis of data on the largest size class of tortoises (> 160 mm MCL). Estimates are for tortoises of average size (MCL). Error bars around estimates represent 95% confidence intervals.

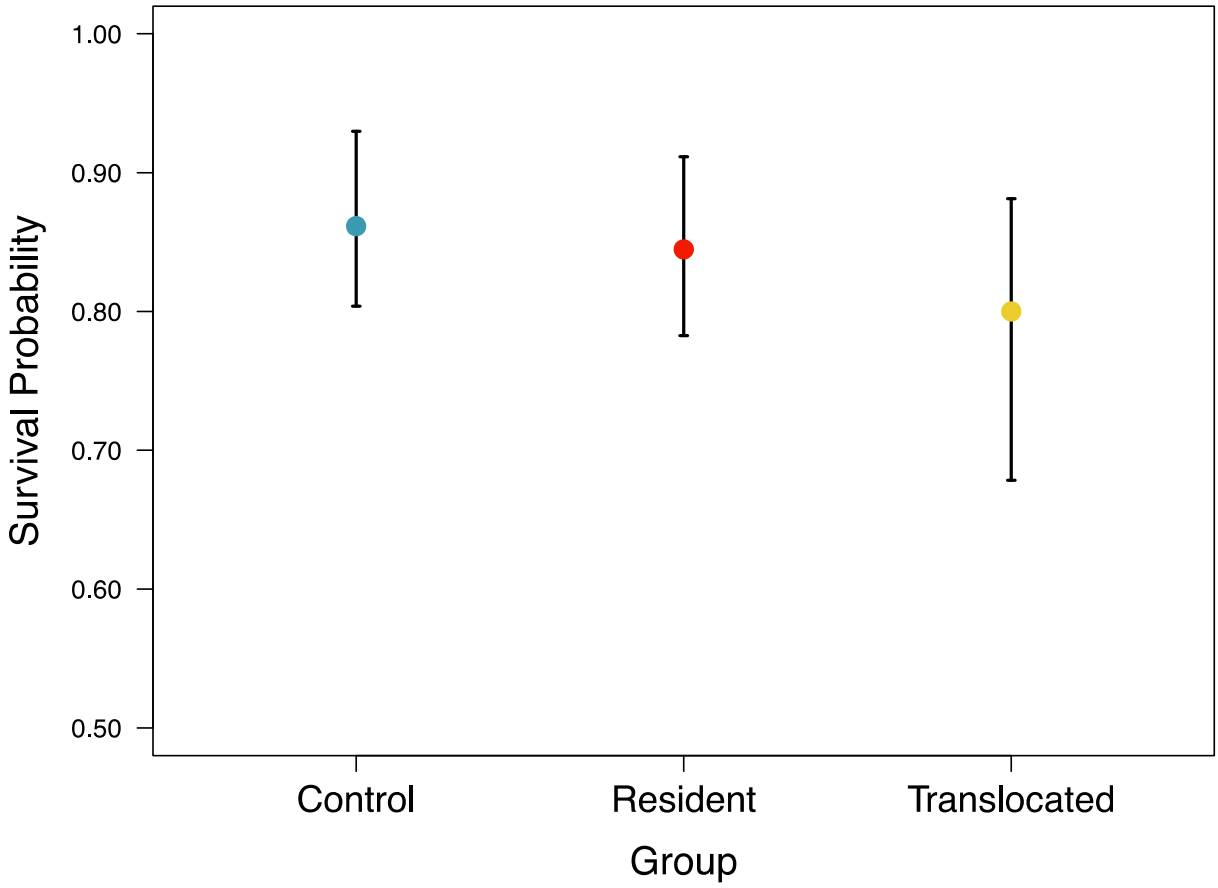

Figure 17. Model-averaged estimates of cumulative survival probabilities from May 2012 to May 2017 for control, resident, and translocated tortoises in the Ivanpah Valley study area from the analysis of data on the largest size class of tortoises (> 160 mm MCL). Estimates are for tortoises of average size (MCL). Error bars around estimates represent 95% confidence intervals.

Analysis 2 - Body condition score

When assessing the effect of body condition, we found that the highest-ranked model in our analysis of the 120/160 dataset was a model with no predictor variables (Table 13). The 95% confidence intervals around estimates of regression coefficients for all predictor variables overlapped 0, indicating that body condition did not affect survival in desert tortoises in the Ivanpah Valley.

Table 13. Candidate model-selection results for the evaluation of effects of group, midline carapace length (MCL), and body condition score (BCS) on tortoises in the 120/160 dataset. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, *k* = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight.

Model	-2LL	*k*	AIC_C	ΔAIC_C	w_i
No Predictor Variables	45.1	1	47.1	0.0	0.36
MCL	43.5	2	47.7	0.6	0.27
BCS	44.9	2	49.1	2.0	0.13
MCL+BCS	43.3	3	49.7	2.6	0.10
Group	44.2	3	50.6	3.5	0.07
Group+MCL	43.0	4	51.6	4.5	0.04
Group+BCS	43.9	4	52.5	5.4	0.02
Group*MCL	42.5	6	55.9	8.8	0.00
Group*BCS	43.9	6	57.3	10.2	0.00

In a comparable analysis using the > 160 dataset, we found additional evidence that size influenced survival. The four highest-ranked models each included the effect of MCL (Table 14), and the estimate of the regression coefficient from the highest-ranked model indicated a positive association between MCL and survival probability (the estimate (0.54 [0.23 – 0.86]). The estimate was similar to the estimate from Analysis 1. The two highest-ranked models also included an effect of group, and the estimate of the regression coefficient for the control tortoises was 0.99 (0.20 – 1.79), suggesting a higher survival probability for control tortoises. However, as we noted above in Analysis 1, this effect does not appear to be biologically meaningful; models that did not contain the group effect were also supported, and model-averaged estimates of survival probability (conditioned on MCL) for translocated and control tortoises were only slightly different (0.96 [translocated] vs. 0.98 [control]; Fig. 18). Models that included an effect of body condition score had little support in the data. Estimates of the regression coefficients for body condition from the models were near 0, and their 95% confidence intervals overlapped 0.

Table 14. Candidate model-selection results for the evaluation of effects of group, midline carapace length (MCL), and body condition score (BCS) on tortoises in the > 160 dataset. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, *k* = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight.

Model	**-2LL**	***k***	**AIC_C**	**ΔAIC_C**	***w_i***
Group+MCL	336.8	4	344.9	0.0	0.59
MCL	343.4	2	347.4	2.5	0.17
Group*MCL	342.0	6	348.1	3.2	0.12
BCS+MCL	336.4	3	348.5	3.6	0.10
Group*BCS	340.4	6	352.5	7.6	0.01
Group	348.0	3	354.0	9.2	0.01
Group+BCS	347.2	4	355.2	10.3	0.00
No Predictor Variables	353.7	1	355.7	10.8	0.00
BCS	352.4	2	356.4	11.6	0.00

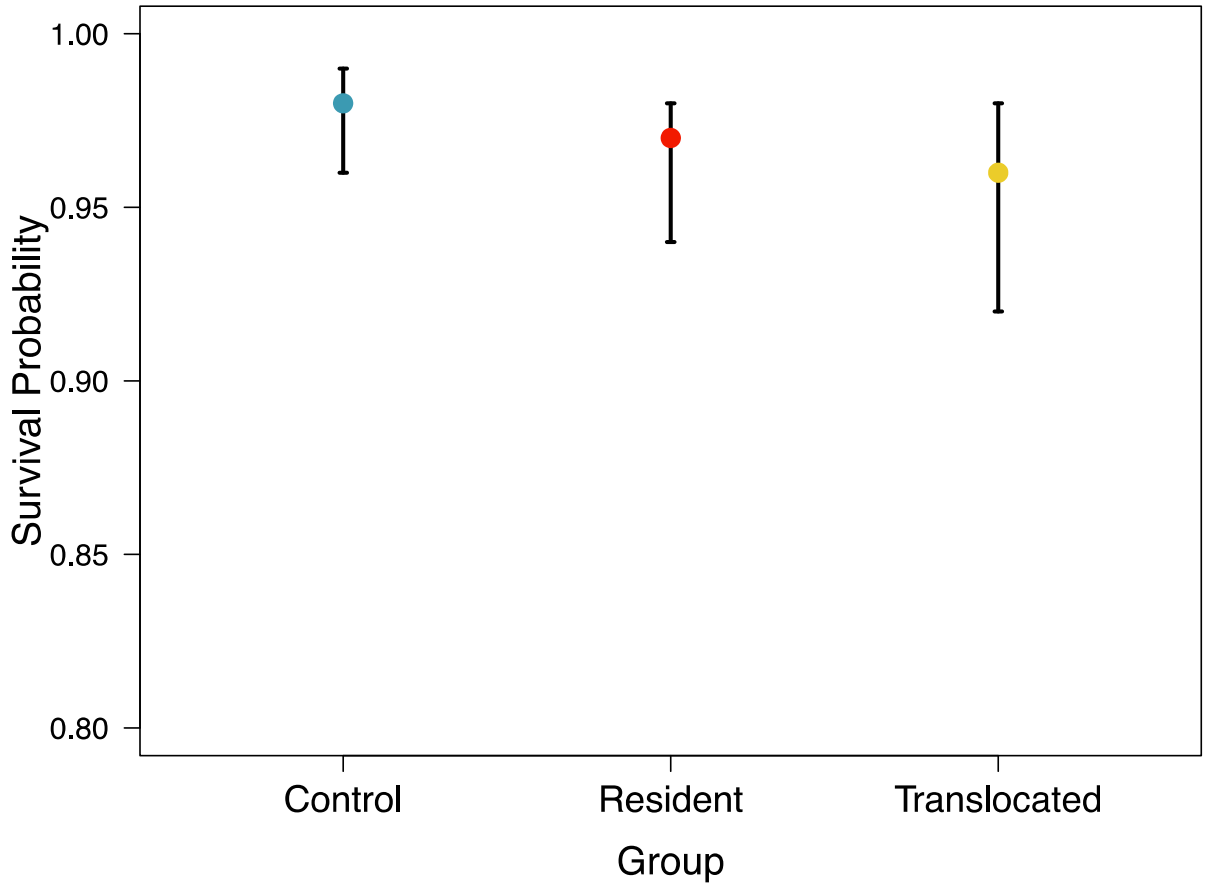

Figure 18. Model-averaged estimates of annual survival probabilities from May 2012 to May 2017 for control, resident, and translocated tortoises in the Ivanpah Valley study area from the analysis of data on the largest tortoises (> 160 mm MCL). Estimates are for tortoises of average size (MCL) and for tortoises with body condition scores of three or four. Error bars around estimates represent 95% confidence intervals. Note that there was no effect of year, thus annual estimates of survival are the same for every year.

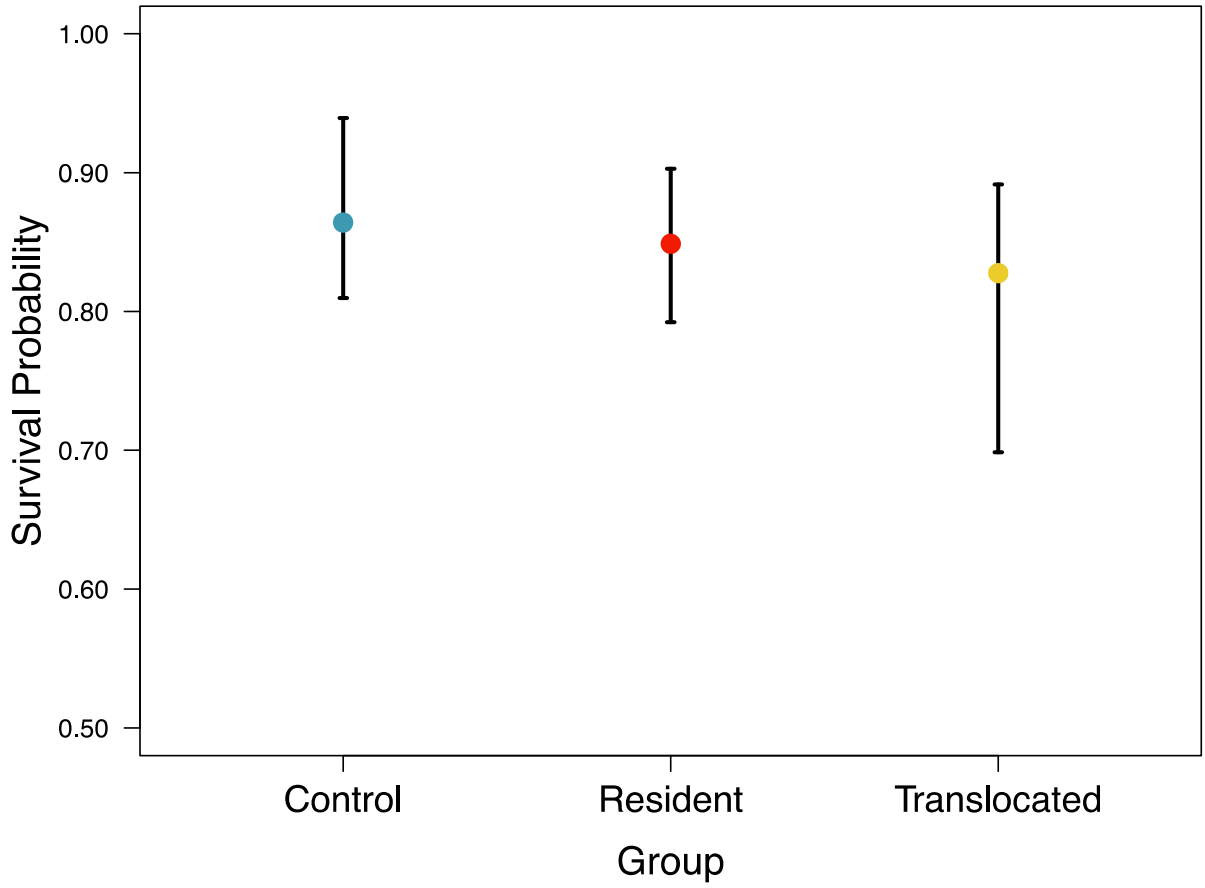

Figure 19. Model-averaged estimates of cumulative survival probabilities from May 2012 to May 2017 for control, resident, and translocated tortoises in the Ivanpah Valley study area from the analysis of data on the largest tortoises (> 160 mm MCL). Estimates are for tortoises of average size (MCL) and for tortoises with body condition scores of three or four. Error bars around estimates represent 95% confidence intervals.

Analysis 3 - Toxicology

Metal concentration was associated with survival in desert tortoises, possibly indicating a positive effect of increasing concentrations of essential elements (Hamilton et al. 2004). As mentioned above, the sample size for the 120/160 dataset was very small and had no mortalities; therefore, we did not estimate survival probabilities for tortoises in this dataset. However, for the >160 dataset, the highest-ranked candidate models included effects of selenium and iron concentrations and an interaction between iron concentration and group (Table 15). No other models were higher ranked than the model with no predictor variables. The estimate of the regression coefficient for selenium from the highest-ranked model was 0.99 (0.04 – 1.94), indicating that tortoises with higher selenium concentrations in their blood had higher annual survival. The estimated regression coefficient for iron from the second-ranked model was 0.58 (-0.02 – 1.86), suggesting no relationship between iron concentrations and annual survival probability when individuals were pooled across groups. We found no evidence

that survival probability was affected by lead concentrations and size or that it differed among groups or sexes.

Table 15. Candidate model-selection results for the evaluation of effects of group, iron, selenium and lead concentrations, and MCL on tortoises in the > 160 dataset. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, k = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight.

Model	-2LL	k	AIC_C	ΔAIC_C	w_i
Selenium	110.3	2	114.3	0.0	0.34
Iron	111.3	2	115.3	1.0	0.20
Group*Iron	104.4	6	116.7	2.4	0.10
No Predictor Variables	115.2	1	117.2	2.9	0.08
Group+Selenium	109.2	4	117.4	3.1	0.07
MCL	113.8	2	117.9	3.6	0.06
Group+Iron	110.3	4	118.4	4.1	0.04
Lead	114.6	2	118.6	4.3	0.04
Group*Selenium	107.5	6	119.8	5.5	0.02
Group	114.2	3	120.3	6.0	0.02
Group+MCL	113.2	4	121.4	7.0	0.01
Group+Lead	113.5	4	121.6	7.3	0.01
Group*Lead	110.6	6	122.9	8.6	0.00
Group*MCL	112.7	6	124.9	10.6	0.00

Analysis 4 – Thermoregulation

Thermal conditions did not appear to influence the survival of tortoises in the smallest size class. When analyzing the 120/160 dataset, none of the candidate models were ranked higher than the model with no predictor variables (Table 16). As we noted above (Section 2.4), group and sex effects were not evaluated in this analysis due to small sample sizes.

Table 16. Candidate model-selection results for the evaluation of effects of thermoregulation predictor variables and midline carapace length (MCL) on tortoises in the 120/160 dataset. "Maximum" refers to the average daily maximum temperature experienced by a tortoise during an active season, and "duration" refers to the average daily duration of time tortoises experienced temperatures ≥ 35°C during an active season. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, k = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = AIC_C of the highest ranked model subtracted from the AIC_C of a model, and w_i = Akaike weight.

Model	-2LL	k	AIC_C	ΔAIC_C	w_i
No Predictor Variables	23.8	1	26.0	0.0	0.49
MCL	23.6	2	28.1	2.1	0.18
Maximum	23.7	2	28.1	2.1	0.17
Duration	23.8	2	28.2	2.2	0.16

For the > 160 dataset, each candidate model was ranked higher than the model with no predictor variables (Table 17). The effects of MCL and group had particularly strong support, as they were in five and three, respectively, of the five highest-ranked models (Table 17). Although models with predictor variables describing tortoise temperatures were included in strongly supported models, 95% CIs around estimates of regression coefficients from some models included 0 and did not include 0 in other models. Therefore, the evidence from our analyses for effects of temperature on annual survival probability in tortoises is equivocal.

As in previous analyses, there was strong support for a positive effect of MCL on annual survival probability. The estimate of the regression coefficient for MCL from the highest-ranked model was 0.41 (0.04 – 0.78). The estimate of the regression coefficient from the highest-ranked model for the effect of being a control tortoise was 1.03 (0.12 – 1.93). However, as previously discussed, the effect does not appear to be biologically meaningful; model-averaged estimates of annual survival probability (conditioned on either thermal variable) were similar among control and translocated tortoises (0.95 [translocated] and 0.98 [control]; Fig. 20). The 95% CIs around the estimate of the regression coefficient for the effect of being a resident tortoise included 0, indicating that survival probability did not differ between resident and translocated tortoises (Fig. 20). Estimates of cumulative survival probability were also similar among groups, and their 95% CIs broadly overlapped (Fig. 21).

Table 17. Candidate model-selection results for the evaluation of effects of group, thermoregulation predictor variables, and midline carapace length (MCL) on tortoises in the > 160 dataset. "Maximum" refers to the average daily maximum temperature experienced by a tortoise during an active season, and "duration" refers to the average daily duration of time tortoises experienced temperatures ≥ 35°C during an active season. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, k = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight.

Model	**-2LL**	***k***	**AIC_C**	**ΔAIC_C**	**w_i**
Group+MCL+Duration	263.1	5	273.1	0.0	0.18
Group+MCL	265.3	4	273.4	0.2	0.16
Group+MCL+Maximum	263.5	5	273.6	0.4	0.15
MCL+Maximum	267.9	3	273.9	0.7	0.13
MCL+Duration	268.4	3	274.4	1.3	0.10
MCL	270.7	2	274.7	1.6	0.08
Group+Duration	267.9	4	275.9	2.8	0.05
Duration	272.4	2	276.5	3.3	0.03
Maximum	272.7	2	276.7	3.5	0.03
Group*MCL	265.3	6	277.3	4.2	0.02
Group*Maximum	265.3	6	277.4	4.2	0.02
Group+Maximum	269.3	4	277.4	4.2	0.02
Group	273.1	3	279.2	6.0	0.01
Group*Duration	267.4	6	279.5	6.4	0.01
No Predictor Variables	278.2	1	280.2	7.0	0.01

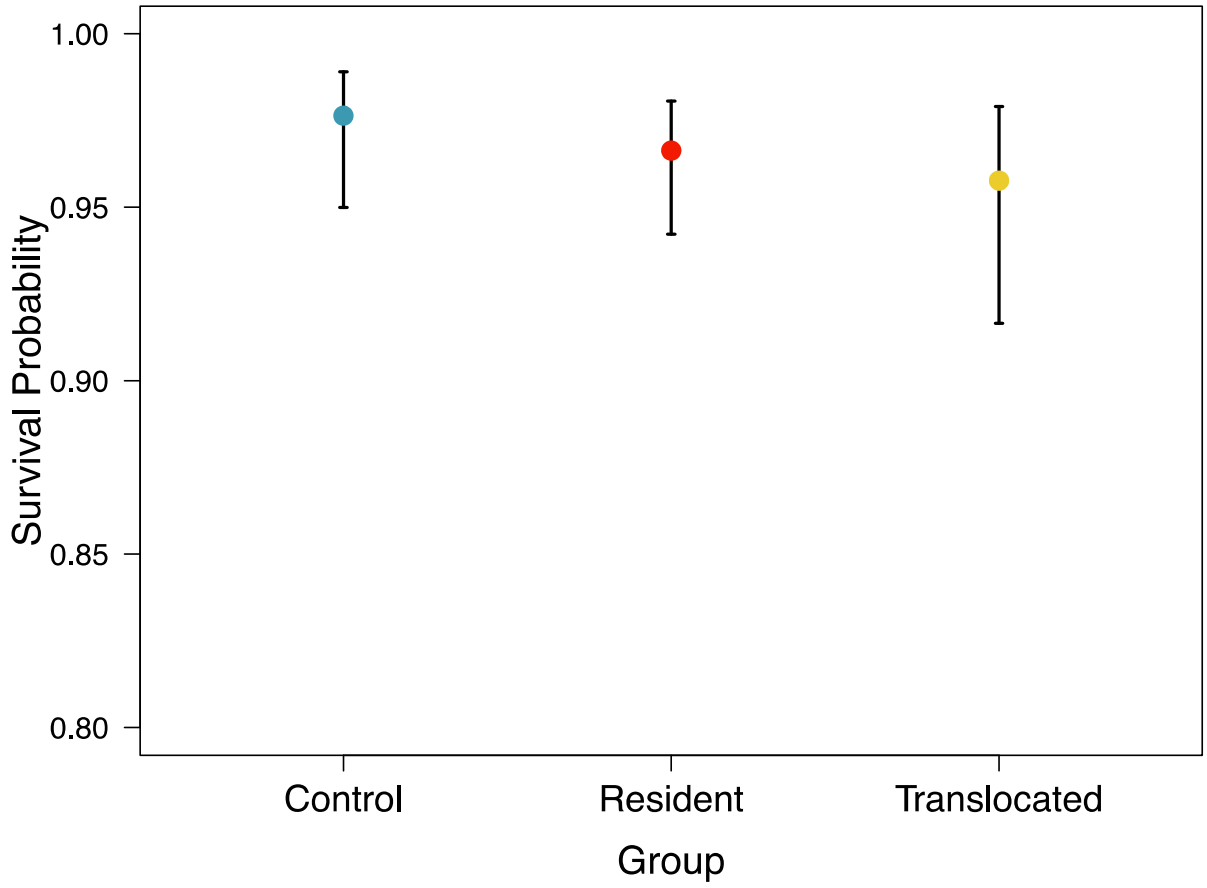

Figure 20. Model-averaged estimates of annual survival probabilities from May 2012 to May 2017 for control, resident and translocated tortoises in the Ivanpah Valley study area from the analysis of data on tortoises in the largest size class (> 160 mm MCL). Estimates are for tortoises of average size (MCL) and for tortoises that experienced the average duration of time exposed to ≥ 35°C and the average daily maximum temperature. Error bars around estimates represent 95% confidence intervals. Note that there was no effect of year, thus annual estimates of survival are the same for every year.

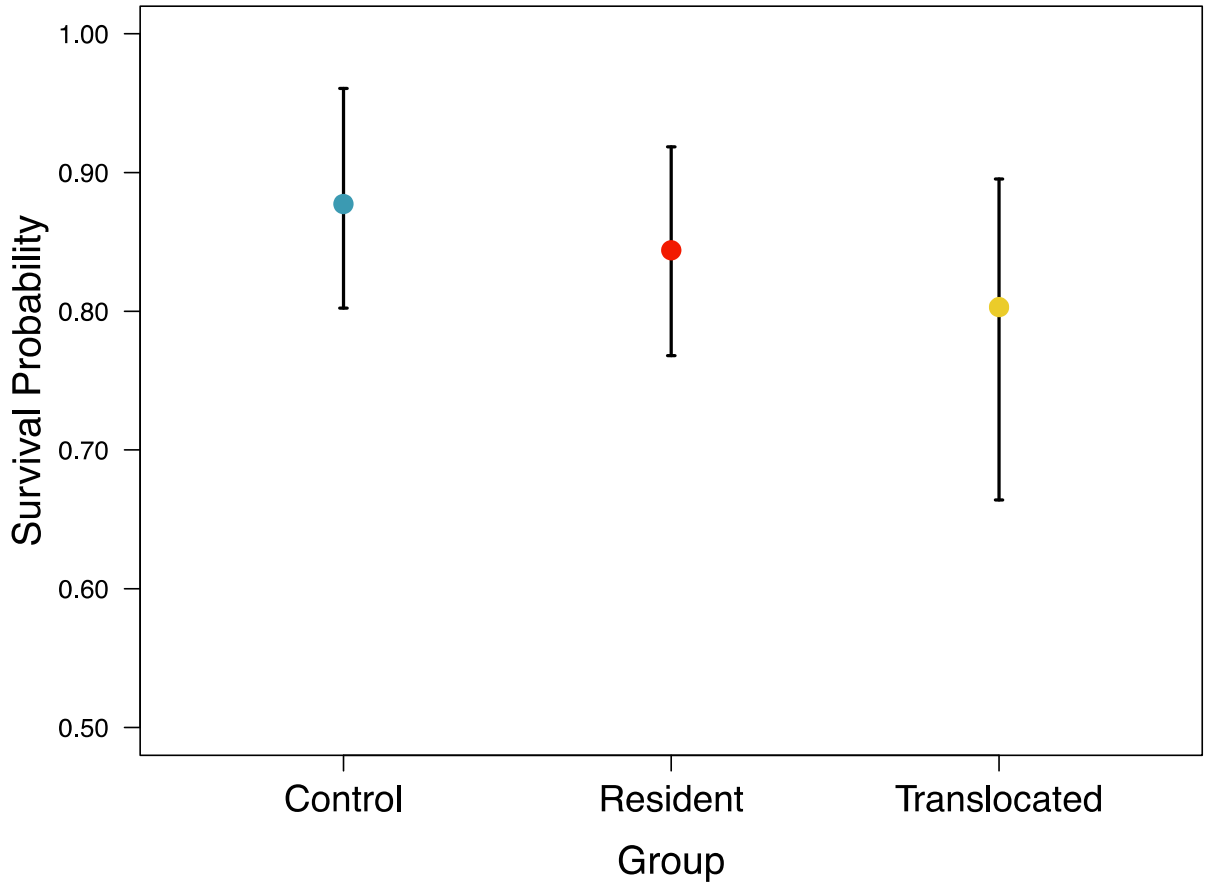

Figure 21. Model-averaged estimates of cumulative survival probabilities from May 2012 to May 2017 for control, resident and translocated tortoises in the Ivanpah Valley study area from the analysis of data on tortoises in the largest size class (> 160 mm MCL). Estimates are for tortoises of average size (MCL) and for tortoises that experienced the average duration of time exposed to ≥ 35°C and the average daily maximum temperature. Error bars around estimates represent 95% confidence intervals.

Analysis 5 - Landscape-scale predictor variables

Topography (i.e., roughness of home ranges) was found to influence the survival of tortoises in the smallest size class. The two highest-ranked models for the 120/160 dataset included the effect of topographic roughness (Table 18) and the estimated regression coefficient for that predictor variable was -1.19 (-2.31 – -0.07), suggesting some evidence for tortoises having lower survival in areas with higher topographic roughness. Effects of group were also included in the highest-ranked models (Table 18); however, 95% confidence intervals around the effects of being a control or resident tortoise included zero. There was no evidence that any of the other predictor variables were strongly associated with survival probability.

Table 18. Candidate model-selection results for the evaluation of effects of group, landscape-scale predictor variables, and midline carapace length (MCL) on tortoises in the 120/160 dataset. The entire candidate set of models is not included due to the low level of support of most of the predictor variables. The model with the group effect was lower-ranked than other models but is included for comparison. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, *k* = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight. Landscape-scale environmental variables in models are: Roughness = topographic roughness of a home range, Precipitation = total precipitation at a home range for each active season (see Appendix B for additional details).

Model	-2LL	*k*	AIC_C	ΔAIC_C	w_i
Roughness	30.6	2	34.8	0.0	0.76
Group+Roughness	30.6	4	39.2	4.4	0.08
No Predictor Variables	40.4	1	42.5	7.7	0.02
Precipitation	38.4	2	42.6	7.8	0.02
Group	38.6	3	45.0	10.2	0.00

In contrast, home range size was found to influence survival of individuals in the > 160 dataset. Sixteen models were within 8 AIC_C units of the highest-ranked model and were more supported than the model with no predictor variables (Table 19). However, when examining estimates of regression coefficients and their 95% confidence intervals, we found that there was strong support for an effect of size (MCL) and tortoise home range size. The estimated regression coefficient for home range size was -0.20 (-0.39 – -0.02), indicating that tortoises with larger home ranges have lower survival, and the estimated regression coefficient (from the highest-ranked model) for MCL was 0.67 (0.21 – 1.11). For all other landscape-scale predictor variables, 95% confidence intervals around estimates of regression coefficients included 0, indicating no support. In addition, there was no evidence for an effect of group in this analysis.

Table 19. Candidate model-selection results for the evaluation of effects of group, landscape-scale predictor variables, and midline carapace length (MCL) on tortoises in the > 160 dataset. The entire candidate set of models is not presented due to the low level of support of most of the models. The model with the group effect and the model with no predictor variables were lower-ranked than other models but are included for comparison. Columns show: -2LL = -2 times the log of the likelihood function at its maximum, k = number of parameters in model, AIC_C = Akaike's Information Criterion value adjusted for small sample size, ΔAIC_C = difference between AIC_C of a given model and the AIC_C of the highest ranked model, and w_i = Akaike weight. Names in models are: area = home range size of tortoises, road = road density, soilBD = soil bulk density, fence = fence density, burrow = burrow density, Tmax = average daily maximum temperature, NDVI.CV = the coefficient of variation of NDVI values, wash = wash density, shrub = shrub density, NDVI.MEAN = the mean of NDVI values, precipitation = total precipitation at a home range for each active season, roughness = topographic roughness of a home range (see Appendix B for additional details).

Model	-2LL	k	AIC_C	ΔAIC_C	w_i
MCL+Area	221.7	3	227.7	0.0	0.42
MCL+Road	225.0	3	231.1	3.3	0.08
MCL+SoilBD	225.1	3	231.1	3.4	0.08
MCL	227.7	2	231.7	3.9	0.06
MCL+Wash	226.3	3	232.3	4.6	0.04
MCL+Burrow	226.6	3	232.6	4.9	0.04
MCL+Road+Fence	224.6	4	232.7	4.9	0.04
MCL+NDVI.CV	226.9	3	232.9	5.2	0.03
MCL+Tmax	227.0	3	233.1	5.3	0.03
MCL+Fence	227.3	3	233.3	5.6	0.03
MCL+Shrub	227.5	3	233.5	5.7	0.02
MCL+NDVI.Mean	227.5	3	233.5	5.8	0.02
MCL+Precipitation	227.5	3	233.6	5.8	0.02
MCL+Roughness	227.6	3	233.6	5.9	0.02
Area	230.1	2	234.1	6.3	0.02
Group+ MCL	226.9	4	234.9	7.2	0.01
Road	232.3	2	236.3	8.6	0.01
No Predictor Variables	236.6	1	238.6	10.8	0.00

4. Conclusions

Translocation has become a common mitigation technique to reduce negative effects of human activities on protected species. For example, several studies that have evaluated desert tortoises translocated following exurban or military development have found no effect of translocation on stress (Drake et al. 2012), reproductive output (Nussear et al. 2012), or survival (Field et al. 2007, Esque et al. 2010, Nussear et al. 2012), but possible effects on paternal genetic integration (Mulder et al. 2017). For both long-distance (Field et al., 2007, Nussear et

al., 2012) and short-distance (Farnsworth et al. 2015, Hinderle et al. 2015) translocations, increased movement has been most consistently observed effect.

This report presented results associated with the two main objectives of the ISEGS EMP for desert tortoise translocation to: 1) collect and analyze data on potential drivers of tortoise survival, and 2) investigate the processes and scales influencing tortoise survival. Within the nearly six years since translocations began, these objectives have been achieved: we collected and analyzed data on individual-level factors (e.g., size, sex) and environmental variables (e.g., thermal conditions, local- and landscape-level variables, anthropogenic factors) and analyzed their potential effects on tortoise survival within the Ivanpah Valley study area. The key findings of this study were as follows:

- In the first two months of the first active season post-translocation, translocated tortoises increased their movements, showed decreased space use intensity, and experienced higher ambient temperatures than did resident and control tortoises. However, space use and thermal conditions of translocated tortoises were indistinguishable from those of control and resident tortoises thereafter.
- Annual and cumulative survival probabilities of translocated tortoises were not different from those of resident or control tortoises. Furthermore, survival estimates of immature and adult tortoises in the Ivanpah Valley study area were among the highest annual survival probabilities published in the scientific literature (Doak et al. 1994, Zylstra et al. 2013, Nafus et al. 2017). Given the importance of survival probabilities in older age classes to dynamics of turtle populations, generally (Heppell 2008), and desert tortoise populations, in particular (Doak et al. 1994, Reed et al. 2009), it is worth highlighting that survival probability estimates of our study groups all approached 1.0 (i.e., the maximum value possible). In other words, survival estimates indicated that, on average, between 89% and 100% of tortoises survived each year, with larger (i.e., older) tortoises at the high end of that range.

Based on relatively short-term differences in space use and thermal effects related to short-distance translocations, coupled with the lack of negative effects on condition, growth, or mortality that we observed in this study, we conclude the following:

- Short-distance translocation releases in spring had relatively minimal impacts on desert tortoise space use and other behaviors in the Ivanpah study area (Farnsworth et al. 2015, Brand et al. 2016, Sadoti et al. 2017).
- Spring translocations might have given tortoises time to dig burrows and familiarize themselves with their surroundings prior to being exposed to hot summer temperatures.
- Translocation methods that minimize stressful environmental conditions during the period immediately following translocation may have the greatest success.
- This study serves as an important example of how translocations can be combined with intensive monitoring to understand the potential effects of energy and other development on sensitive species.

5. Acknowledgements

We thank the many field biologists for their efforts in data collection, including W. Ball, J. Borgmeyer, A. Chambers, R. Crawford, I. Daly, S. DiRuzzo, K. Edwards, T. Embrey, C. Furman, M. Havelka, A. Hazelton, J. Hillman, C. Himmelwright, J. Holloway, L. Jeane, G. Keyes, S. Lindey, J. Meyer, D. Prival, G. Rink, L. Rose, J. Smith, P. Sundt, and J. Valentine. We also thank B. Cohn, K. Herbinson, T.G. Jackson, Jr., C. Llewellyn, J. Meyers, L. Pavliscak, A. Scheib, M. Vaughn, B. Weise, and P. Woodman, who acted as Designated Biologists and/or helped with project development. Special thanks go to J. Anderson, A. Brand, B. Cohn, D. Davis, M. Farnsworth, A. Fesnock, C. Grouios, K. Herbinson, T.G. Jackson, Jr., J. Meyers, G. Sadoti, A. Scheib, T. Sisk, J. Smith, M. Traphagen, M. Vaughn, B. Weise, P. Woodman, and L. Zachmann for their roles in the design, implementation, management, analyses, or publications associated with this study. We thank the U.S. Bureau of Land Management and U.S. Fish and Wildlife Service for encouraging this work, as well as the California Energy Commission and the California Department of Fish and Wildlife for guidance. Data collection and analyses were funded by NRG Energy Services, Google Inc., and BrightSource Energy through three limited liability companies: Solar Partners I, Solar Partners II, and Solar Partners VIII. The ISEGS is operated by NRG Energy Services. The comments and contributions of A. Scheib, B. Weise, B. Cohn, K. Langin, and B. Noon improved this report.

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7. Appendix A: Protocols for field implementation of the translocation Effectiveness Monitoring Program (EMP)

7.1 Local-scale Measurements of Vegetation and Habitat Features

Drafted by Laura Pavliscak, Myles Traphagen, Nate Jones and Kelly Herbinson, Sundance Biology and Kiva Biological Consulting

To measure and monitor the influence of environmental variables at a local scale, we supplemented a previous inventory for the study site (conducted in 2010) with long-term, repeat-measure vegetation sampling, assessing key attributes of perennial and annual vegetation. Variables such as cover, height, density, frequency, and species diversity were considered, as well as soil characteristics, in order to assess tortoise forage and shelter site potential, and to monitor habitat quality changes over the study period.

On-the-Ground Protocol

Field personnel sampled vegetation once per year in the spring, and again in the fall in order to examine changes over time. The number and spatial distribution of sampling transects and plots were determined in an adaptive framework to accommodate the distribution of study animals and environmental variables of interest. Our vegetation sampling protocol evaluated local-scale habitat characteristics along transects based on topographic and vegetative community features across the study area to capture the naturally occurring heterogeneity in tortoise habitat.

7.2 Climatic Processes Associated with Desert Tortoise Habitat

Drafted by Myles Traphagen and Kelly Herbinson; Sundance Biology and Kiva Biological Consulting

We implemented a systematic, long-term weather monitoring program to provide valuable information on the role of weather in influencing desert tortoise habitat use. We gathered weather data from a network of weather stations throughout the Ivanpah Valley. Detailed weather data provided insight into the relationship between local-scale weather patterns and landscape-scale environmental variables, which we were able to incorporate in survival analyses.

For desert tortoises, one specific impact of drought involves forage plants that have been identified as crucial for the species to survive the hyper-arid conditions of the Mojave Desert, notably, annual plants containing compounds that promote potassium excretion potential (PEP). Such plants appear to be restricted in time and space to very moist conditions, and thus achieve abundance in numbers and biomass only in years of high winter rainfall and relatively cool springs, such as the 1991/92 and 1997/98 El Niño-Southern Oscillation events (Oftedal 2001). Thus, the need for monitoring these specific plant species, in association with prevailing weather conditions, is of utmost importance.

On-the-Ground Protocol

To collect weather data, six automated data-logging weather stations were established within the project boundaries and on the control and recipient sites. The weather stations collected information on precipitation, temperature, relative humidity, evapotranspiration, and solar radiation, all on an hourly basis.

To augment the weather station data and quantify spatial variability in rainfall, a network of 18 low-cost manual rain gauges were deployed within the project boundaries and on the control and recipient sites. To reduce costs and increase efficiency, rainfall data were collected by radio telemetry personnel on their regular routes following rainfall events. By collecting data on localized precipitation, we were able to examine the association between rainfall and habitat predictor variables in the survival analysis.

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7.3 Thermal Assessments of Tortoises and Associated Burrows

Drafted by Jay Meyers and Kelly Herbinson; Sundance Biology and Kiva Biological Consulting

Temperature data loggers were covered and affixed with epoxy to either the costal or marginal scutes of each tortoise. Placement of the iButton was dictated by the size and shell morphology of the tortoise. To determine the best placement of the iButton, a subset of tortoises in the holding pens were affixed with up to three iButtons and then monitored to ensure the feasibility of these locations for placement on wild tortoises. iButtons weigh less than three grams (5 g total with the included epoxy), and the total weight of the transmitter (approximately 20 g with epoxy) and iButton combined was under 5% of an animal's body weight in tortoises over approximately 130 mm MCL. For tortoises smaller than 130 mm, iButtons were modified by removing the outer canister, bringing the total weight down to approximately 1 g (Lovegrove 2009). On small tortoises, we typically placed modified iButtons on one of the costal scutes, but loggers were placed on pen animals first to confirm the appropriateness of the attachment site.

Cover Sites: To monitor tortoise thermoregulatory behavior, it is necessary to adequately describe the thermal profiles of cover sites used by the tortoises. Data loggers were placed in multiple cover sites, including soil and caliche burrows. Burrow temperatures were monitored by attaching an iButton to flexible wire that was threaded down to the burrow terminus. The exposed end of the wire was staked at the burrow entrance to reduce the chance of it being pulled into the burrow. Data loggers also monitored above-ground cover sites and ambient temperatures. These loggers were attached to a holder that sunk into the ground so that the final position of the button was just above the surface of the ground. To reduce the effect of direct sunlight on the iButton, a 3-in semi-translucent cover was placed on top of the stake to reduce direct radiance on the iButton. Data loggers monitoring cover sites were set to record at 30-60 minute intervals, requiring them to be downloaded less frequently than for tortoises. Data were downloaded and managed in the Microsoft Access database developed for the EMP. Data loggers were replaced as needed due to damage or loss.

Literature Cited

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7.4 Health and Pathogen Transmission Monitoring

Drafted by Liz Smith, Peter Woodman and Kelly Herbinson; Sundance Biology and Kiva Biological Consulting

Prior to the current study, the effects of translocation on the health of desert tortoises were unknown. Desert tortoises translocated from the Fort Irwin National Training Center were monitored for health over the last three years; however, no conclusive results have been documented (Berry pers comm). Two health issues have been implicated in high mortality events for the desert tortoise at one or more sites: upper respiratory tract disease (caused by the pathogens *Mycoplasma agassizii* and *M. testudineum*) and shell lesions indicative of cutaneous dyskeratosis (a shell disease of unknown origin with unknown physiological processes leading to compromised health or death.) The latter disease is typified by lesions on the growth annuli, primarily on the scutes and large scales of the forelimbs. Areas affected with cutaneous dyskeratosis appear discolored, dry, rough, and flakey, with peeling and chipping through multiple cornified layers (Homer et al. 2001).

Large die-offs of tortoises have been attributed to epizootics of *M. agassizii* (Sandmeier et al. 2009), but those die-offs also coincided strongly with periods of stress associated with drought and lack of forage. In this study, our goal was to disentangle this relationship by conducting frequent, comprehensive health assessments that allow us to quantify the role played by pathogens in influencing tortoise survival.

In conjunction with a comprehensive monitoring effort, data were collected on the health status of all tortoises in the three study groups: translocated, resident, and control, for both long- and short-distance translocations. Health assessments were conducted during spring and fall of each active season, as stipulated by USFWS (USFWS 2011a), with the additional condition

that we used a modified version of the Berry and Christopher (2001) data form (i.e., a much more detailed data form that allows for greater detail regarding potential health abnormalities from upper respiratory tract disease and cutaneous dyskeratosis). All tortoises were handled as stipulated by all regulatory agencies and great care was taken to minimize stress and disturbance to each animal (Berry et al 2002).

On-the-Ground Protocol

A detailed and specific protocol is already currently in place for monitoring tortoise health (see the June 2011 ISEGS Biological Opinion (USFWS 2011b), the USFWS Health Assessment Handbook (USFWS 2011a) and Berry and Christopher (2001) for more information). USFWS-approved field personnel conducted health assessments on all radio-tagged tortoises twice per year: mid-May and early to mid-September. Blood and oral swabs were collected twice per year in conjunction with the health assessments to assess within-year transmission dynamics.

The visual health assessment included but was not limited to: clinical signs of upper respiratory tract disease (discharge from nares and/or eyes, redness and/or swelling of eyes, lethargic behavior, and poor body condition score), shell disease (lesions typical of cutaneous dyskeratosis, peeling laminae or scutes, other lesions of the bone or scute, mold, and fungus), and trauma (missing or other trauma to the limbs and trauma to the shell). Clinical assessments included ELISA testing for *Mycoplasma agassizii* and *M. testudineum*.

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7.5 Environmental Toxicant and Contaminant Monitoring

Drafted by Brian Cohn and Kelly Herbinson; Sundance Biology and Kiva Biological Consulting

Elemental toxicity related to heavy metals and anthropogenic pollutants is one of many suspected causes of elevated morbidity and mortality of desert tortoises. The need for a

toxicology investigation is increasing, particularly as tortoise habitat becomes increasingly fragmented and tortoises are forced closer to potentially toxic regions like highway buffers (e.g. I-15 corridor), factories, and mines.

We implemented a monitoring effort that evaluated potential toxicants in air, soil, vegetation, and tortoises, with the aim of evaluating the impact of potential environmental toxins on tortoise health and survival in all three study groups: translocation, resident, and control. We evaluated the distribution of metal concentration values across the study area in relation to potential anthropogenic sources. The sites collectively contain highly developed or disturbed areas (proximate to I-15) as well as less impacted ecosystems (e.g. upper bajada of recipient site, eastern portions of control site). By measuring metal concentrations at a variety of sites, we were able to quantify natural and anthropogenic toxicant levels, to be used in analyses to determine whether they influence health and disease. To accomplish this, we sampled potential toxins from the environment and habitat components to determine current levels and we also plan to continue to monitor these levels for changes over the course of the project. Finally, we collected and analyzed blood samples from live tortoises during health assessments to quantify heavy metal concentrations across groups and across the study area. Tissue samples were also collected from recently deceased project tortoises (where scutes and/or body tissue and organs are present).

On-the-Ground Protocol

Field personnel collected dust samples at 12 sampling locations across the study area, including the quarantine pen, recipient sites and control sites. All samples were collected and prepared for laboratory analyses using inductively coupled plasma mass spectrometry (ICP-MS), which was used to quantify 29 trace and non-trace elements. All soil and vegetation samples were packed and shipped to the University of Alaska Anchorage for analysis. Soil and vegetation toxicology monitoring followed the protocols presented in Chaffee and Berry (2006), with samples collected in conjunction with vegetation (see above) to maximize efficiency.

Soil samples were collected at depths of ~2-8 cm using soil cores, a distance meant to target the depth to which the roots of annual and perennial plant species important to desert tortoises generally grow. A subset of soil samples was used to assess soil texture. Harmful metals were tested at the Applied Science, Engineering, and Technology Laboratory (ASET) at the University of Alaska, Anchorage, on homogenized samples collected from within burrows of translocated, resident, and control tortoises. Experienced botanists collected plant samples and soil cores across the translocation, resident, and control burrow sites at the same time.

As in the case of soil sampling, plant samples were collected both parallel and perpendicular to high traffic roadways and other road types to observe the potential influence of roads as point sources for concentrating potential toxins in plant tissue. The goal was to generate a portrait of how potential toxins changed over space and time. We collected plants in spring (April-May), with a focus on annuals and perennials known to be consumed by tortoises as well as forage locations defined by the home ranges of radio-tracked tortoises. We measured the potential

toxin content of PEP plants, tortoise cover, alternative foods, and exotic and invasive plants. Plant samples were sent to ASET lab at the University of Alaska, Anchorage, for analyses.

Sampling locations were chosen to represent the ecological characteristics and processes across the landscape in the Ivanpah Valley. Sampling will take place over the life of the monitoring program to evaluate temporal linkages between potential toxin exposure to tortoises and their survival.

Dried Blood Spot Procedure

We used a relatively novel dried blood spot (DBS) analytical procedure (validated by Lehner et al., 2013) that analyzes toxin concentrations in whole blood using ICP-MS. Whole blood samples were collected on filter paper. This offered the advantage that it enabled both ELISA testing and DBS testing. During health evaluations, we drew up to 0.25-3 ml of blood from each individual, with the amount dependenting on the weight of the animal at the time blood was drawn (USFWS 2013). No additional sampling was required, as the heavy metal analysis required only 50 uL of blood per DBS test. Another advantage of the DBS method is that sample storage (Whatman 903® Filter Card) requirements are minimal, as samples only need to be frozen for long-term storage and the cards are compact.

Element concentrations were determined for each blood sample at the Michigan State University Diagnostic Center for Population and Animal Health. The spot was removed from the card using acetone-rinsed stainless steel scissors. Blood and blank paper spots were placed in separate 5 mL Teflon digestion vessels (Savillex, Minneapolis, MN), to which 250 mL of concentrated nitric acid (Suprapur, Merck) was added; the vessels were then heated in an oven at 95^{o}C overnight. After cooling the vessels, increments of water were added until a 500 mg (±5 mg) mass was obtained, and the solution was centrifuged for 10 min at 3000 rpm. For quality control, Lyphochek-2 and -3 standards (Bio-Rad, Hercules, CA) were also run simultaneously. As, Cd, Pb, Hg, and Se were determined by using ICP-MS (7500ce ICP-mass spectrometer; Agilent, Santa Clara, CA). The limits of quantification (LOQs) were 10 ppb for As, Cd, and Se and 20 ppb for Hg and Pb.

The laboratory measured standard curves based on five points plus a blank, which gave good refit values down to 10 ppb (Fe, As, Cd, Pb, Hg, Se, Tl, Th) or 20 ppb Hg. The limits of detection and limits of quantitation were calculated analyzing repeated blanks for any background signal present in the untreated paper, determining the standard deviation of the values (n = 10), and multiplying by 3.3 times or 10 times, respectively, according to established methods (Lehner et. al 2013). Concentrations estimated based on blank spots on the papers were lower than the limits of quantification.

Although acute poisoning concentrations remain unknown for desert tortoises, this test panel method was shown to be suitable for the diagnosis of heavy metals in domesticated and other wildlife species. Blood concentrations of As, Cd, Hg, Pb and Tl are generally <50 mg/L (Lehner et. al 2013).

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7.6 Road Noise and Vibration and Tower Noise

Drafted by Bill Boarman, Kelly Herbinson, and Laura Pavliscak; Sundance Biology and Kiva Biological Consulting

The proliferation of roads and highways throughout the range of the desert tortoise has significantly impacted tortoise mortality rates (FWS 1995, Boarman 2002). One cause of tortoise mortality due to roads is moving vehicles. Tortoises that move more than average are at an even greater risk of being run over, which means adult and sub-adult males are the most at risk (Sazaki et al. 1995 and Boarman and Sazaki 2006). Additionally, translocated animals are also known to move more than average (Nussear 2004), which puts them at an increased risk of road mortality as well. Previous research has found that most roads have a tortoise depletion zone within a distance of approximately 400 meters, and perhaps farther for older and more heavily traveled roads (Boarman and Sazaki 2006). This depletion zone may be attributed to road kills, but it may also be caused by indirect effects such as airborne contaminants (Homer et al. 1998), noise, vibration, or vegetation changes associated with habitat degradation (Frenkel 1970, Johnson et al. 1995).

To determine the effect of roads on tortoise survival, we monitored noise, vibration, and environmental toxicants as well as the movement of associated tortoises (see above) along the

edge of Interstate I-15. We tracked tortoises that moved to the edge of I-15 weekly (an established requirement in the Biological Opinion) to determine movement patterns associated with the highway.

Noise monitoring was also conducted at each of six locations proximate to the ISEGS towers. Our goal was to quantify noise emitted from the towers during operational and non-operational conditions, as well as background noise levels within the project area. Monitoring locations were representative of noise-sensitive locations in the project area.

On-the-Ground Protocol

We set up acoustic noise and vibration measuring instruments in the release and control sites. The Caltrans traffic noise measurement protocol was implemented to ensure consistency with other studies completed in California. Noise monitoring was conducted using the Larson Davis Model 820 sound level meter with a Model PRM828 5.5 inch precision preamplifier and a 0.5 inch precision air condenser microphone with a 3.5 inch windscreen. This meter meets the requirements of the American National Standards Institute (ANSI) S1.4, International Electro-technical Commission (IEC) 651, and 804-1985 standards for type 1 accuracy. The microphone was placed ~8-10 cm from the ground to mimic the height at which sounds would be heard by a tortoise. A single microphone was used at each sample point. Sampling periods were adjusted depending on the extent of temporal variability in sound levels as per ANSI S1.13-1971 and ANSI S12.9-1988. The noise fluctuation at each sample point was within 10 dB and relatively steady depending on traffic pattern. Thus, a measurement of no less than two minutes was taken at each sample point with a minimum of three repetitions.

Sample locations were chosen to represent vibration and noise distribution across the Ivanpah Valley study area. The primary focus of this monitoring effort was the noise produced by traffic traveling along the I-15 corridor. Therefore, several transects were selected to measure vibration and noise starting at the edge of I-15, moving perpendicular at 50-100 m intervals until ambient noise and vibration levels were attained. BLM dirt roads and other secondary and tertiary roadways were characterized by similar transects. We measured pass-by scenarios (e.g., a single pick-up truck driving down the road) to characterize the extent and magnitude of vibration and noise on these smaller, less traveled road systems. Additionally, 32 locations coinciding with the vegetation monitoring plots were also sampled to ensure characterization of valley-wide noise and vibration distribution, specifically that of the release and control sites of the ISEGS EMP. Each point was sampled at least once during average traffic conditions and if possible during high and low traffic conditions.

Vibration monitoring at ISEGS was conducted using an Instantel Blastmate III Vibration Seismograph, equipped with a triaxial velocity geophone. The instrument measures a time history of vibration in each of three mutually perpendicular directions (vertical, longitudinal, and transverse). From these three directions a peak acceleration, velocity, and displacement is measured for each vibration event. Adjacent to I-15, air vibration was measured using a fourth channel on the Blastmate III, which allows a microphone whose output units are pressure (Pascals).

Noise monitoring proximate to the ISEGS towers was conducted using the Extech Instruments Model 407732 Digital Sound Level Meter with a windscreen. This instrumentation complies with ANSI and IEC for Type 2 SLM standards. An Extech Instruments Model 407722 Sound Level Calibrator was used to calibrate the sound level meter before and during the monitoring effort.

Three short-term noise level measurements (six minutes in duration) were conducted at each of six sites proximate to the towers, twice a day (morning and afternoon) and approximately weekly from February 21, 2013, through October 22, 2013. The microphone was placed at 1.5 m from the ground surface, the preferred position in terms of microphone height for most construction and traffic related monitoring. A single microphone was used at each sample point. For receiver distances greater than 100 m from the source, meteorological conditions can have a large influence on sound travel (e.g., distance, level, frequency). Therefore, meteorological conditions (wind speed and direction, temperature, humidity, and cloud cover) were documented prior to data collection and whenever substantial changes in conditions were noted.

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8. Appendix B. Individual-level and landscape-scale variables measured or derived for use in analyses

Table 8.1. Landscape-scale variables measured or derived in this study.

Variables	***Description***
Movement(s) and space use	Distance moved per day and within activity centers, area under the utilization distribution and burrow density
Thermal condition	Average daily maximum temperature for tortoises and average daily duration a tortoise experiences temperatures > 35C
Wash density	Estimate of wash density within each individual's UTILIZATION DISTRIBUTION, based on CIR DOQQ data and estimates of NDVI
Shrub cover	Estimate of shrub cover within each individual's UTILIZATION DISTRIBUTION, based on CIR DOQQ data and estimates of NDVI
Greenness	Landsat-derived NDVI or EVI as proxy for, e.g., forage availability and precipitation
Terrain	Aspect and estimate of topographic roughness integrating over elevation and slope
Soil properties	Bulk density, coarse fragments % by volume, % silt, % sand, % clay, and pH*10 in water
Weather	Total precipitation and mean daily maximum temperature over each active season
Anthropogenic: roads and fences	Estimates of road and fence density within UTILIZATION DISTRIBUTION and presence of/proximity to infrastructure
Anthropogenic: noise and vibration	Loudness and frequency of sound and magnitude of vibrations related to traffic on I-15
Anthropogenic: toxicity	Heavy metal concentrations in tortoise blood

Table 8.2. Individual- and landscape-scale predictor variables used in the survival analysis.

Analysis	*Predictor variable*	*Description*
Analysis 1	Treatment group	Translocated, resident, and control
	Size (Midline Carapace Length [MCL] in mm)	MCL during spring health assessment preceding survival interval
	Sex	Adult male, adult female, and immature (i.e., unknown sex)
Analysis 2*	Body condition	Body condition scores, numeric score (scale of 1-7) of relative degree of emaciation (lowest = 1)
Analysis 3*	Iron concentration	Concentration of iron in blood of tortoises based on dried blood spot samples
	Selenium concentration	Concentration of selenium in blood of tortoises based on dried blood spot samples
	Lead concentration	Concentration of lead in blood of tortoises based on dried blood spot samples
Analysis 4*	Maximum temperature	Average daily maximum temperature a tortoise experiences during an active season
	Duration ≥ 35°C	Average daily duration a tortoise experiences temperatures > 35°C during an active season
Analysis 5*	Home range size	Area (ha) under the utilization distribution
	Burrow density	Estimate of burrow density within each individual's UTILIZATION DISTRIBUTION based on a map of burrows derived from tortoise encounters within burrows
	Shrub density	Estimate of shrub cover within each individual's UTILIZATION DISTRIBUTION based on CIR DOQQ data and estimates of NDVI
	Wash density	Estimate of wash density within each individual's UTILIZATION DISTRIBUTION based on CIR DOQQ data and estimates of NDVI
	Topographic roughness	The standard deviation of elevation within a home range
	Soil bulk density	The weight of soil in a given volume
	Mean NDVI	Landsat-derived estimate of forage availability and precipitation for a home range
	Coefficient of variation of NDVI	Landsat-derived estimate of the variability in forage availability and precipitation across a home range
	Road density	Estimate of the density of roads within a home range
	Fence density	Estimate of the density of fences within a home range
	Precipitation	Total precipitation at a home range over each active season
	Maximum temperature	Mean daily maximum temperature at a home range over each active season

*Effects of midline carapace length (MCL) and group were included in all analyses and are defined under Analysis 1.

Appendix F
Map of ISEGS Final Locations of EMP Tortoises

630000 632000 634000 636000 638000 640000 642000 644000 646000 648000 650000

3940000 3938000 3936000 3934000 3932000 3930000 3928000

BS95
BS56
BS156
BS316
BS176
BS77
BS159
BS137
BS248

Ivanpah 3
Ivanpah 2
Ivanpah 1

N

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User

Map Symbol

Site Boundary ***Cleared Areas*** ***Ring Roads***

Female

Male

0 1 2 Kilometers

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure F1
Final Positions - Terminated Monitoring
EMP - Recipient Sites
Ivanpah Solor Electric Generating System

Appendix G
Map of ISEGS 2018 LOP Tortoise Fatalities

632000 634000 636000 638000 640000 642000 644000 646000 648000 650000

3938000 3936000 3934000 3932000 3930000 3928000

BS33
Ivanpah 3
BS70
BS183
Ivanpah 2
Ivanpah 1
I-15
Pen
BS562
BS621
BS629

N

Map Symbol

- *Recent Tortoise Location (Female)*
- *Recent Tortoise Location (<160 mm)*
- *Recent Tortoise Location (Male)*
- *Recent Tortoise Location (Unknown Sex)*
- *Site Boundary*
- *Cleared Areas*

0 1 2 *Kilometers*

This map should not be used for site specific purposes. Proprietary and confidential. For use by Solar Partners I, II, and VIII only.

Figure G1
LOP Tortoise Fatalities
June 1 - December 31, 2018
Ivanpah Solar Electric Generating System

Appendix H

ISEGS Juvenile Desert Tortoise Translocaion 2018 Annual Report

JUVENILE DESERT TORTOISE TRANSLOCATION
IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

2018 Annual Report
January 1, 2018 – December 31, 2018

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Section 1.0 – Introduction

1.1 Background

The translocation of juvenile desert tortoises at the Ivanpah Solar Electric Generating System (ISEGS) is a mitigation requirement indicated in the *Revised Biological Opinion for ISEGS* (USFWS, 2011). The *ISEGS Juvenile Desert Tortoise Translocation Plan* has been incorporated into the *ISEGS Biological Resources Mitigation Implementation and Monitoring Plan* (BRMIMP) and follows procedures outlined in the *Guidelines for Clearance and Translocation of Desert Tortoises from the Ivanpah Solar Electric Generating System Project* (USFWS, 2008) as well as the translocation guidelines specified in the *Desert Tortoise Recovery Plan* (USFWS, 1994).

1.2 Initial Juvenile Tortoise Encounters

The ISEGS Quarantine Pens are located at the Ivanpah Solar Electric Generating Facility off Colosseum Road in Construction Logistics Areas West (Commons West) and south of the Unit 2 access gate. Juvenile desert tortoises are defined as those measuring <120mm MCL (midline carapace length). All juveniles originally held at the quarantine pens were either encountered during clearance surveys, while monitoring construction activities, or were hatched in captivity from adult female tortoises held at the quarantine pens prior to their translocation. Table 1 shows the initial encounter locations and totals.

Table 1. Translocated Tortoises – Initial Encounter Sites

Site	Number of Tortoises
Commons East	2
Commons West	1
Unit 1	11
Unit 2	15
Unit 3	33
Hatched in Quarantine Facility	35

1.3 Recipient Site

The juvenile tortoise recipient site, as identified by the USFWS Biological Opinion, extends south from Unit 1 to Interstate-15 (I-15) and along the western edge of I-15 from Yates Well Road to Nipton Road. The fenced portion of the recipient site, the I-15 pen, begins approximately two kilometers south of the Yates Well Road exit and extends south for 2.5 kilometers along the I-15 tortoise exclusion fence and to

the west one kilometer (Figure 1). For future reference "Recipient Site" will refer to the area outside the I-15 pen while "I-15 Pen" will refer to the area inside the I-15 pen.

1.4 Release

As specified in the 2011 revised biological opinion, juvenile desert tortoises were to be translocated in cohorts of 30 once they reached a size of 120mm MCL or until they had been held for five years. Since a group of 30 tortoises did not reach the 120mm MCL requirement before the five-year holding period was reached, all tortoises were released during one translocation event October 1- 4, 2016.

Section 2.0 – Translocation

2.1 Overview

The juvenile desert tortoise release points were systematically determined using the following methodology. First, the tortoises were divided into groups based on whether they were hatched in captivity or were brought to the quarantine facility from encounter locations on the project site. Second, those groups were then divided into nine size classes in 10mm increments from 80mm to 189mm (Table 2). From each 10mm size class bracket, tortoises were then randomly assigned an "Inside I-15 Pen" or "Outside I-15 Pen" disposition for a total of 48 tortoises inside the I-15 pen and 49 tortoises outside the I-15 pen (Table 3). Lastly, release points were selected under the criteria that no point would be within 150 meters from a fence and points would be separated on the roughly east-west axis by 150 meters and by 175 meters on the roughly north-south axis. Appendix A provides the disposition details for each of the 97 juvenile tortoises released. The October 2016 translocation release points are shown in Figure 1.

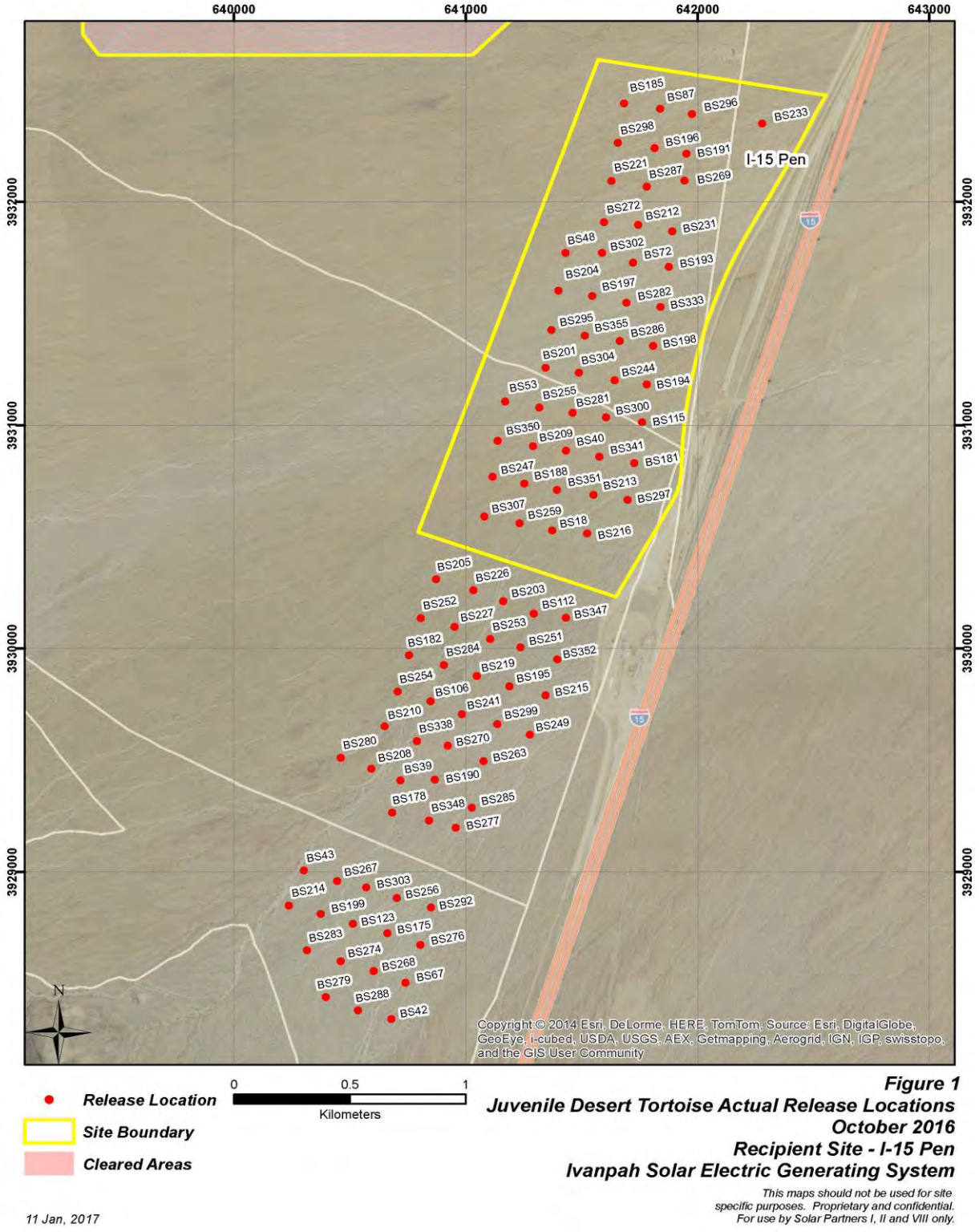
Table 2. Translocated Tortoises – Size Class Summary

MCL (mm)	Number of Tortoises
80-89	6
90-99	13
100-109	36
110-119	11
120-129	15
130-139	10
140-149	4
170-179	1
180-189	1
Total	**97**

Table 3. Translocated Tortoises – Disposition Summary

Tortoise Size and Sex	Inside I-15 Pen	Outside I-15 Pen
Male >159 mm MCL	0	1
Female >159 mm MCL	1	0
Sex Unknown >159 mm MCL	1	0
120-159 mm MCL	19	19
0-119 mm MCL	27	29
Totals	**48**	**49**

Figure 1. ISEGS Juvenile Desert Tortoise Translocation: 2016 Actual Release Points

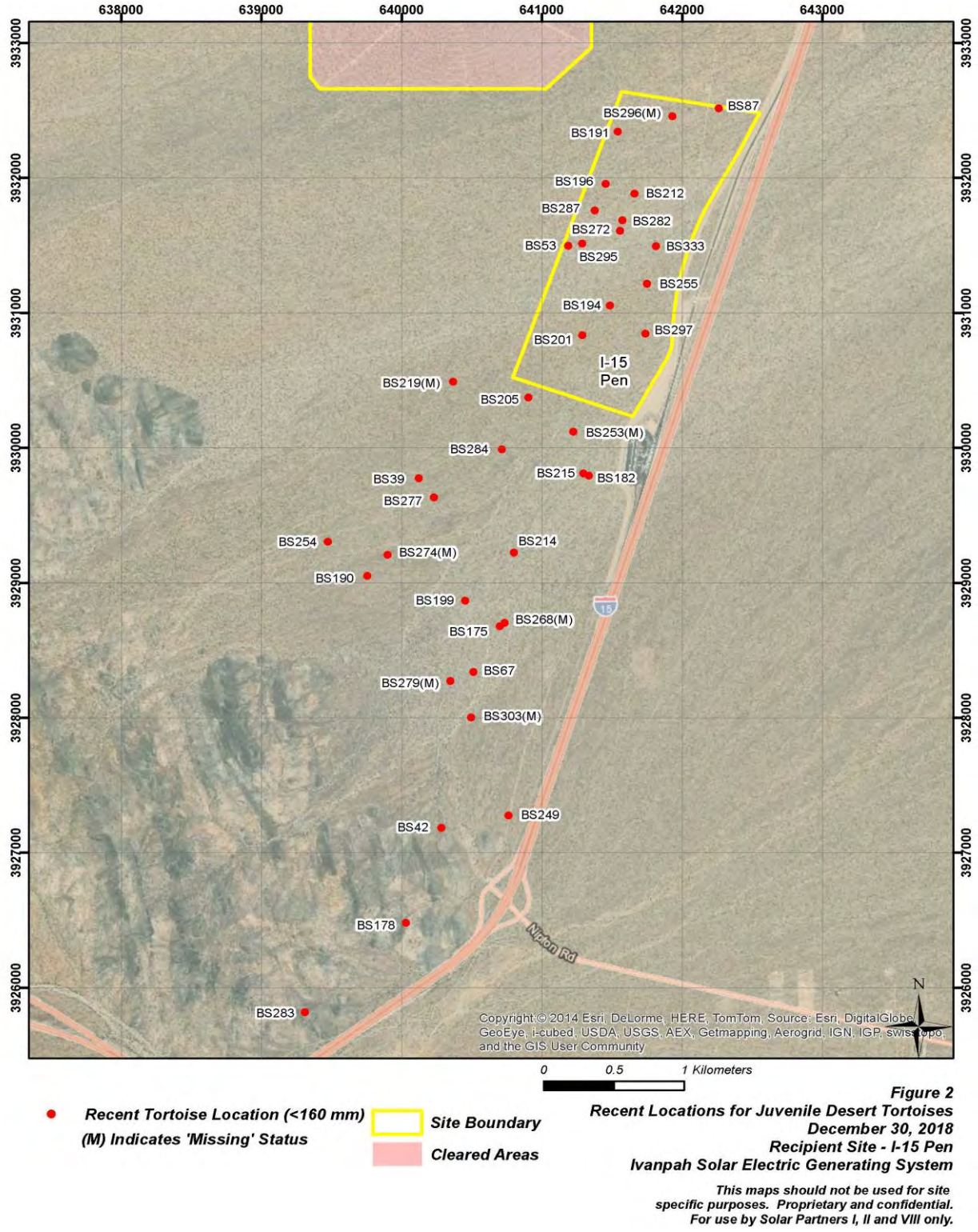


Section 3.0 – Juvenile Tortoise Monitoring

3.1 Juvenile Tortoise Encounters

In 2018, biologists conducted radio tracking of the juvenile desert tortoises once a week during the active season from mid-February to mid-November and every other week during the inactive season from January 1 to mid-February and mid-November to December 31. Data collected includes the date, time, geographic coordinates, location in the landscape, and activity. Fifty-two tortoises were monitored as of January 1, 2018, including one missing tortoise. Throughout 2018, there were 14 juvenile fatalities bringing the total number of juveniles monitored to 38 by the end of the year. This number includes seven missing tortoises and one tortoise being held for trauma treatment at Pet Hospital of Peñasquitos in San Diego. Recent encounter locations are shown in Figure 2.

Figure 2. ISEGS Juvenile Desert Tortoise Translocation: Recent Encounter Locations



3.2 Missing Tortoises

In 2018 there were a total of 13 juvenile tortoises that went missing (Table 4). Six were eventually recovered by telemetry or visual searches bringing the year-end missing total to seven. Two of the six recovered tortoises were found deceased and four were encountered during visual searches as their transmitters were previously found detached from the tortoises. The majority of the missing tortoise events were due to known or suspected canid activity. Only two tortoises were known to be missing because of large displacement and one of those showed signs of a canid attack and had been carried out of the I-15 pen.

Detached transmitters belonging to two of the seven currently missing tortoises were recovered on the ground in the recipient area. Out of the remaining five missing tortoises with transmitters, only one is likely to have an active transmitter in 2019 based on estimated battery life. Biologists will continue to listen for the remaining active transmitter and conduct visual searches for the tortoises without active transmitters.

Given the small size of the missing animals and their transmitters, and the amount of predator activity throughout the translocation area, it is reasonable to suspect these animals have been predated and their transmitter has possibly been damaged and rendered non-functional. It is possible some of the animals survived an attack and have a damaged but partially functional transmitter. Tortoises with damaged transmitters have been recovered but often the signal of a damaged transmitter can be reduced to 20 meters or less, compared to the 200+ meter range of a fully functional transmitter, making these animals difficult to encounter. It is also possible some of the missing animals have moved far enough from their home range to elude telemetry detection. Typically, animals with functional transmitters that have moved larger distances are recovered during a widespread telemetry search.

Biologists spend ten hours actively searching for each missing tortoise. This includes a local and widespread telemetry search, a visual search near the last known location or the location of a found transmitter, and a visual inspection of previously known burrows. In the cases of a found transmitter, only visual searches and burrow inspections are conducted. Generally, the search is conducted over multiple days to increase the likelihood of encountering an animal.

Table 4. Translocated Tortoises – Missing Tortoise Summary

Tortoise ID	Status	Release Site	MCL	Last Encounter	Weeks Missing	Transmitter Status	Suspected Cause
BS42	Found, Currently Tracked	Outside I-15 Pen	148	28-Dec-2018	5	Found Detached	Canid
BS53	Found, Currently Tracked	Inside I-15 Pen	127	28-Dec-2018	5	Found Attached	Canid Attack, Carried out of I-15 Pen, Large Displacement
BS67	Found, Currently Tracked	Outside I-15 Pen	174	28-Dec-2018	2	Found Detached	Canid
BS182	Found, Currently Tracked	Outside I-15 Pen	142	28-Dec-2018	3	Found Attached	Large Displacement, Fence Breach, Found in JPOE
BS219	Missing	Outside I-15 Pen	128	26-Jul-2018	23	Expired	Canid
BS253	Missing	Outside I-15 Pen	113	22-Sep-2017	66	Found Detached	Canid
BS259	Found Deceased	Inside I-15 Pen	181	16-Aug-2018	2	Found Detached	Canid
BS268	Missing	Outside I-15 Pen	134	3-Aug-2018	21	Expired	Canid
BS274	Missing	Outside I-15 Pen	110	10-Aug-2018	20	Expired	Canid
BS276	Found Deceased	Outside I-15 Pen	121	20-Aug-2018	1	Found Detached	Canid
BS279	Missing	Outside I-15 Pen	107	18-Aug-2018	19	Active	Canid
BS296	Missing	Inside I-15 Pen	135	1-Jun-2018	30	Expired	Canid
BS303	Missing	Outside I-15 Pen	137	20-Apr-2018	36	Found Detached	Canid

3.3 Juvenile Tortoise Radio Transmitters

There was a total of 100 juvenile tortoise transmitter events in 2018 which consisted of 85 transmitter exchanges, 14 transmitter removals due to fatalities, and one removal for a tortoise transported to the off-site veterinary clinic. No transmitters in 2018 were replaced due to damage or improper function.

3.4 Juvenile Tortoise Interventions

The *Revised Biological Opinion for ISEGS* (USFWS, 2011) stipulates that biologists will intervene if a tortoise is injured or in harm's way. Injuries are most likely to result from predators or other animal attacks, or from vehicle strikes. Scenarios where a tortoise may be harmed include pacing a fence or other barrier, moving too close to an unfenced road, being flipped on its carapace, or being entombed in a burrow. Depending on the extent of the injury or possible harm, actions taken to resolve an issue may include veterinary care, rehydration, righting, or relocating a tortoise to its last known location. The Designated Biologist will be notified when an intervention is necessary. The appropriate agencies will be contacted in cases where a tortoise requires veterinary care or relocation. In 2018, eight tortoises required an intervention for various reasons.

- Two tortoises, BS182 and BS215, were encountered inside the California Joint Point of Entry (JPOE) having walked through breaches in the I-15 tortoise fence caused by rain damage. The tortoises were relocated out of harm's way to a burrow near their respective last known encounter locations.
- Two tortoises, BS282 and BS199, were entombed in their winter burrows. BS282 was unable to egress due to rocks and backfill in the tunnel. Upon removal it was hydrated via the nares and released at the encounter location. BS199 had severe trauma from what appeared to be fire ants. The tortoise was transported to the Pet Hospital of Peñasquitos in San Diego for treatment over several months. Originally thought to be blind and unlikely to survive, this tortoise made a miraculous recovery and was released back into the field in October 2018.
- Three tortoises – BS67, BS209, and BS254 – were found with suspected predator trauma and were transported to Pet Hospital of Peñasquitos for treatment. BS67 and BS254 were released into the field in October 2018 after several weeks of treatment. BS209 remain at the veterinary clinic and will be released in spring of 2019.
- BS53 was encountered outside the I-15 pen, 1.74km from its previous location which was *inside* the I-15 pen. Its transmitter was damaged, but the tortoise was unharmed. It is suspected that a predator moved the tortoise outside of the pen as there were no breaches in the I-15 pen fence at that time. The tortoise was relocated to its last known location after receiving authorization from the Bureau of Land Mangement (BLM).

3.5 Ongoing Evaluation

Translocated juvenile tortoises will continue to be monitored weekly during the active season and every other week throughout the inactive season until October 2021.

Section 4.0 – Health Analysis and ELISA Testing

4.1 2018 Health Assessments

Health is a vital component to the survival of a species. There are many factors that pose a potential threat to the desert tortoise and its prolonged survival in the Mojave Desert. One of the threats to desert tortoise survival is the prevalence of upper respiratory tract disease (URTD) caused by the bacteria *Mycoplasma agassizii* and *Mycoplasma testudineum.* Habitat loss, herpesvirus, as well as trauma from animal predation and human interactions are other factors that can have a negative impact on tortoise survival. To determine the health of the ISEGS tortoise population, biologists conduct health examinations of each animal being monitored. The 2011 *Revised Biological Opinion for ISEGS* specifies that health examinations will be conducted on all translocated juvenile desert tortoises in the spring and fall each year. Health data will be collected using the *USFWS Health Assessment Data Collection Form for Translocated Desert Tortoises* and examinations will follow the guidelines in the *USFWS Desert Tortoise Health Evaluation Handbook*.

To measure the health of the ISEGS desert tortoise population, several factors are evaluated during the bi-annual health examinations. First, the tortoise is evaluated for clinical signs of disease such as abnormal respiration; nasal erosion or discharge; and eye discharge, redness, swelling, or other abnormalities. Second, the shell and limbs are examined for any abnormalities or trauma. The tortoise is weighed and measured and the body condition score (BCS), a metric of general health, is determined. Next, the tortoise's mouth is inspected for ulcers, plaques, or discoloration that could indicate a herpesvirus infection. While examining the mouth, swabs of the oral cavity are collected which are later sent to the USFWS laboratory at UCLA, Los Angeles, California for banking. Lastly, blood is collected via sub-carapacial venipuncture for enzyme-linked immunosorbent assay (ELISA) testing. This test is used to determine if an animal has antibodies for *M. agassizii or M. testudineum* indicating past exposure or current infection depending on the titer values. These data are then evaluated for each animal to determine the overall health of the animal and the population.

In 2018, blood samples for ELISA testing were taken from all remaining juvenile tortoises in May and September. The Department of Infectious Disease and Pathology at the University of Florida, Gainesville, Florida perform the ELISA testing on all ISEGS desert tortoise blood samples. The ELISA test detects antibodies for *M. agassizii* and *M. testudineum,* the bacteria responsible for URTD in desert tortoises. To determine if an animal is sick or has had past exposure, antibody titers are evaluated. An antibody titer is the measurement of the greatest dilution of serum that will still elicit a positive result. The presence of

antibodies does not necessarily mean an animal is sick, only that it has had exposure to a pathogen at some point. For this reason, the clinical evaluation along with the diagnostic test results are used to determine the health of an animal. Previously established antibody titer cutoff values were used for the ELISA test. For *M. agassizii*, values less than 32 are considered negative, values equal to 32 are considered suspect and values greater than 32 are positive. For *M. testudineum*, values less than 32 are considered negative, values equal to 32 or 64 are considered suspect, and values greater than 128 are considered positive.

In May 2018, 47 health examinations were performed with 47 blood samples collected. In September 2018, there were 31 assessments, each with a blood sample, for a total of 78 blood samples in 2018. The Juvenile Tortoise Status Table, Appendix A, shows the most recent morphometrics, BCS, and ELISA results for all juvenile tortoises, including deceased animals. A summary of 2018 ELISA results for *M. agassizii* is shown in Table 5 while the results for *M. testudineum* can be found in Table 6. Of the 78 blood samples tested in 2018, there were 73 negative results for *M. agassizii* and 52 negative results for *M. testudineum*. *M. agassizii* returned three suspect and three positive results while *M. testudineum* had 22 suspect and five positive results.

Table 5. Translocated Tortoises – Cumulative *Mycoplasma agassizii* ELISA Results Summary

ELISA Titers	2017 May	2017 September	2018 May	2018 September
Negative (<32)	47	44	42	31
Suspect (32)	2	7	3	0
Positive (>32)	0	1	3	0
Total Blood Samples	49	52	47	31
Total Health Assessments	69	52	47	31

Table 6. Translocated Tortoises – Cumulative *Mycoplasma testudineum* ELISA Results Summary

ELISA Titers	2017 May	2017 September	2018 May	2018 September
Negative (<32)	46	25	21	31
Suspect (32)	3	26	22	0
Positive (>32)	0	1	5	0
Total Blood Samples	49	52	47	31
Total Health Assessments	69	52	47	31

Section 5.0 – Tortoise Fatalities

5.1 Summary of Tortoise Fatalities

There were 14 total translocated desert tortoise fatalities in 2018: five size class <120mm MCL, seven size class 121mm-159mm MCL, and two size class >159mm MCL (Table 7). Comparatively, 2016 had 19 total fatalities from October through December and 2017 had 26 fatalities for the year. Of the 14 fatalities in 2018, 13 were suspected to be caused by canids and one was the result of suspected hyperthermia. (Table 8). Thirty-eight tortoises remain of the 97 tortoises originally translocated – 16 inside the I-15 pen and 22 outside the I-15 pen in the recipient site (Table 9). However, of the 16 remaining inside the I-15 pen, one is missing, and one is being held at the off-site veterinary clinic while six tortoises are missing from the group of 22 outside the pen.

Table 10 shows fatality details for each tortoise. Fatality locations can be seen in Figure 3.

Table 7. Translocated Tortoise Fatalities 2016-2018 – Size Class Summary.

Release Site	<121mm MCL	121mm-159mm MCL	>159mm MCL	Totals
2016 Inside I-15 Pen	6	8	0	**14**
2016 Outside I-15 Pen	2	3	0	**5**
2016 Totals	**8**	**11**	**0**	**19**
2017 Inside I-15 Pen	4	5	0	**9**
2017 Outside I-15 Pen	8	7	2	**17**
2017 Totals	**12**	**12**	**2**	**26**
2018 Inside I-15 Pen	3	4	2	**9**
2018 Outside I-15 Pen	2	3	0	**5**
2018 Totals	**5**	**7**	**2**	**14**
Grand Total	***25***	***15***	***19***	***59***

Table 8. Translocated Tortoise Fatalities 2016-2018 – Suspected Cause of Death Summary.

Release Site	Canid	Hyperthermia	Natural Causes	Rodents	Totals
2016 Inside I-15 Pen	14	0	*0*	*0*	***14***
2016 Outside I-15 Pen	4	1	*0*	*0*	***5***
2016 Totals	**18**	**1**	**0**	**0**	**19**
2017 Inside I-15 Pen	8	1	0	0	***9***
2017 Outside I-15 Pen	15	0	1	1	***17***
2017 Totals	**23**	**1**	**1**	**1**	**26**
2018 Inside I-15 Pen	8	1	0	0	***9***
2018 Outside I-15 Pen	5	0	0	0	***5***
2018 Totals	**13**	**1**	**0**	**0**	**14**
Grand Total	***54***	***3***	***1***	***1***	***59***

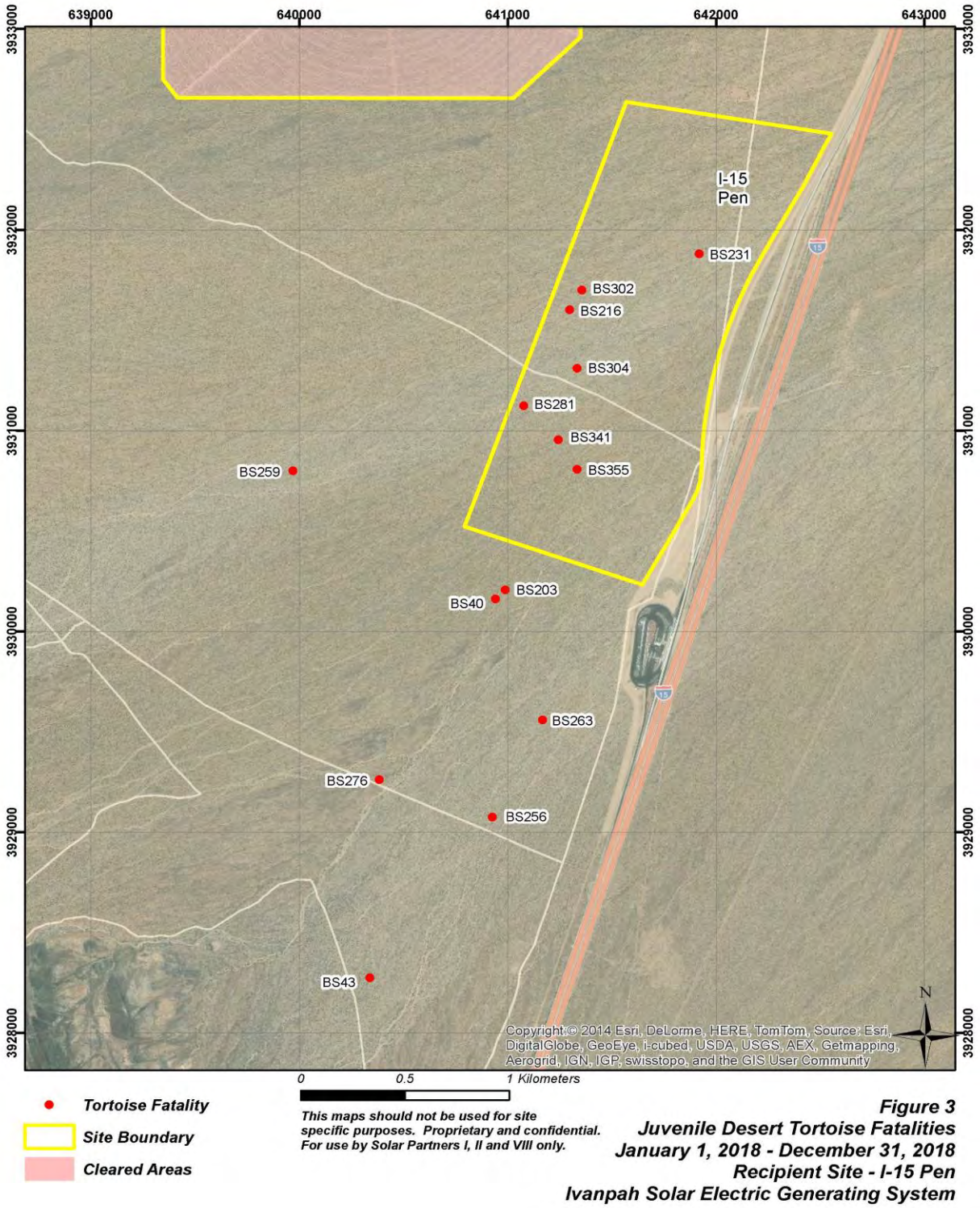
Table 9. Translocated Tortoise Fatalities 2016-2018 – Cumulative Fatality Summary.

Release Site	Released	2016 Fatalities	2017 Fatalities	2018 Fatalities	Total	Remaining
Inside I-15 Pen	48	14	*9*	*9*	***32***	***16***
Outside I-15 Pen	49	5	*17*	*5*	***27***	***22***
Totals	***97***	***19***	***26***	**14**	**59**	**38**

Table 10. Translocated Tortoise Fatalities 2018 – Details

Tort ID	Release Site	Sex	MCL	Date Carcass Encountered	Weeks Alive Post Release	Suspected Cause of Death
BS304	I-15 Pen	Unknown	122	4/20/2018	80	Canid
BS43	Recipient Site	Unknown	120	5/2/2018	82	Canid
BS231	I-15 Pen	Unknown	115	5/31/2018	86	Hyperthermia
BS302	I-15 Pen	Unknown	116	5/31/2018	86	Canid
BS216	I-15 Pen	Unknown	114	7/17/2018	93	Canid
BS203	Recipient Site	Unknown	106	7/20/2018	93	Canid
BS355	I-15 Pen	Unknown	122	8/2/2018	95	Canid
BS263	Recipient Site	Unknown	133	8/3/2018	95	Canid
BS281	I-15 Pen	Unknown	122	8/9/2018	96	Canid
BS40	I-15 Pen	Unknown	167	8/10/2018	96	Canid
BS256	Recipient Site	Unknown	137	8/10/2018	96	Canid
BS259	I-15 Pen	Female	181	8/16/2018	97	Canid
BS276	Recipient Site	Unknown	121	8/20/2018	98	Canid
BS341	I-15 Pen	Unknown	135	9/13/2018	101	Canid

Figure 3. ISEGS Juvenile Desert Tortoise Translocation: 2018 Fatality Locations



Appendix A – Juvenile Tortoise Status Table

Tort ID	Tort Status	Initial Disposition	Initial Encounter Site	Initial Encounter Date	Release Site	Release Date	Sex	Initial MCL	Recent MCL	Recent Mass	Recent BCS	Recent Health Exam Date	Recent ELISA Results M. agassizii	Recent ELISA Results M. testud.	Annual Encounters
BS18	Dead	Wild Capture	Ivanpah 1	20-Oct-2010	Inside I-15 Pen	1-Oct-2016	Unknown	72	147	645		30-Sep-2016	Negative	Negative	0
BS39	Tracked	Wild Capture	Ivanpah 1	1-Nov-2010	Outside I-15 Pen	2-Oct-2016	Unknown	61	138	485	5	22-Sep-2018	Negative	Negative	52
BS40	Dead	Wild Capture	Ivanpah 1	1-Nov-2010	Inside I-15 Pen	3-Oct-2016	Unknown	69	167	845		18-May-2018	Negative	Negative	30
BS42	Tracked	Wild Capture	Ivanpah 1	17-Dec-2010	Outside I-15 Pen	1-Oct-2016	Unknown	53	148	640	5	14-Sep-2018	Negative	Negative	46
BS43	Dead	Wild Capture	Ivanpah 1	20-Dec-2010	Outside I-15 Pen	1-Oct-2016	Unknown	46	120	375		16-Sep-2017	Positive	Positive	17
BS48	Dead	Wild Capture	Ivanpah 2	9-Mar-2011	Inside I-15 Pen	3-Oct-2016	Unknown	86	130	535		5-May-2017	Negative	Negative	0
BS53	Tracked	Wild Capture	Common East	10-Mar-2011	Inside I-15 Pen	4-Oct-2016	Unknown	46	127	425	5	13-Sep-2018	Negative	Negative	55
BS67	Tracked	Wild Capture	Ivanpah 2	16-Mar-2011	Outside I-15 Pen	1-Oct-2016	Unknown	71	174	1000	5	17-Oct-2018	Negative	Suspect	45
BS72	Dead	Wild Capture	Ivanpah 2	21-Mar-2011	Inside I-15 Pen	3-Oct-2016	Unknown	57	120	305		2-Oct-2016	Negative	Negative	0
BS87	Tracked	Wild Capture	Ivanpah 3	30-Mar-2011	Inside I-15 Pen	4-Oct-2016	Unknown	72	163	810	5	16-Sep-2018	Negative	Negative	49
BS106	Dead	Wild Capture	Ivanpah 3	2-Apr-2011	Outside I-15 Pen	2-Oct-2016	Unknown	68	121	350		19-May-2017	Negative	Negative	0
BS112	Dead	Wild Capture	Common West	4-Apr-2011	Outside I-15 Pen	3-Oct-2016	Unknown	44	126	390		19-May-2017	Negative	Negative	0
BS115	Dead	Wild Capture	Ivanpah 3	5-Apr-2011	Inside I-15 Pen	3-Oct-2016	Unknown	64	123	490		2-Oct-2016	Negative	Negative	0
BS123	Dead	Wild Capture	Ivanpah 1	13-Apr-2011	Outside I-15 Pen	1-Oct-2016	Unknown	57	116	302		30-Sep-2016	Negative	Negative	0
BS175	Tracked	Wild Capture	Ivanpah 1	12-May-2011	Outside I-15 Pen	1-Oct-2016	Unknown	62	145	555	5	15-Sep-2018	Negative	Negative	49
BS178	Tracked	Wild Capture	Ivanpah 1	9-Jun-2011	Outside I-15 Pen	2-Oct-2016	Unknown	46	130	390	5	22-Sep-2018	Negative	Negative	49
BS181	Dead	Wild Capture	Ivanpah 3	20-Jul-2011	Inside I-15 Pen	2-Oct-2016	Unknown	62	130	415		1-Oct-2016	Negative	Negative	0

Tort ID	Tort Status	Initial Disposition	Initial Encounter Site	Initial Encounter Date	Release Site	Release Date	Sex	Initial MCL	Recent MCL	Recent Mass	Recent BCS	Recent Health Exam Date	Recent ELISA Results M. agassizii	Recent ELISA Results M. testud.	Annual Encounters
BS182	Tracked	Wild Capture	Ivanpah 2	27-Jul-2011	Outside I-15 Pen	4-Oct-2016	Unknown	59	142	410	5	15-Sep-2018	Negative	Negative	51
BS185	Dead	Wild Capture	Ivanpah 3	6-Aug-2011	Inside I-15 Pen	4-Oct-2016	Unknown	53	125	345		3-Oct-2016	Negative	Negative	0
BS188	Dead	Wild Capture	Ivanpah 3	12-Aug-2011	Inside I-15 Pen	2-Oct-2016	Unknown	75	136	450		1-Oct-2016	Negative	Negative	0
BS190	Tracked	Wild Capture	Ivanpah 3	15-Aug-2011	Outside I-15 Pen	2-Oct-2016	Unknown	102	119	590	5	14-Sep-2018	Negative	Negative	50
BS191	Tracked	Wild Capture	Ivanpah 2	15-Apr-2011	Inside I-15 Pen	4-Oct-2016	Unknown	82	158	780	5	22-Sep-2018	Negative	Negative	50
BS193	Dead	Wild Capture	Ivanpah 3	15-Apr-2011	Inside I-15 Pen	3-Oct-2016	Unknown	70	124	350		2-Oct-2016	Negative	Negative	0
BS194	Tracked	Hatchling	Quarantine Pens	25-Aug-2011	Inside I-15 Pen	4-Oct-2016	Unknown	45	112	265	5	13-Sep-2018	Negative	Negative	50
BS195	Dead	Hatchling	Quarantine Pens	26-Aug-2011	Outside I-15 Pen	3-Oct-2016	Unknown	43	118	345		16-May-2017	Negative	Negative	0
BS196	Tracked	Hatchling	Quarantine Pens	26-Aug-2011	Inside I-15 Pen	4-Oct-2016	Unknown	43	99	190	5	22-Sep-2018	Negative	Negative	52
BS197	Dead	Hatchling	Quarantine Pens	26-Aug-2011	Inside I-15 Pen	2-Oct-2016	Unknown	45	102	205		1-Oct-2016	Negative	Negative	0
BS198	Dead	Hatchling	Quarantine Pens	26-Aug-2011	Inside I-15 Pen	1-Oct-2016	Unknown	44	84	113		30-Sep-2016	Negative	Negative	0
BS199	Tracked	Hatchling	Quarantine Pens	26-Aug-2011	Outside I-15 Pen	1-Oct-2016	Unknown	43	112	280	6	17-Oct-2018	Negative	Suspect	31
BS201	Tracked	Hatchling	Quarantine Pens	29-Aug-2011	Inside I-15 Pen	1-Oct-2016	Unknown	43	143	520	5	13-Sep-2018	Negative	Negative	52
BS203	Dead	Hatchling	Quarantine Pens	29-Aug-2011	Outside I-15 Pen	3-Oct-2016	Unknown	44	106	250		20-May-2018	Suspect	Positive	29
BS204	Dead	Hatchling	Quarantine Pens	29-Aug-2011	Inside I-15 Pen	3-Oct-2016	Unknown	43	110	240		2-Oct-2016	Negative	Negative	0
BS205	Tracked	Hatchling	Quarantine Pens	29-Aug-2011	Outside I-15 Pen	4-Oct-2016	Unknown	41	127	360	5	13-Sep-2018	Negative	Negative	50
BS208	Dead	Hatchling	Quarantine Pens	30-Aug-2011	Outside I-15 Pen	2-Oct-2016	Unknown	46	98	195		16-May-2017	Negative	Negative	0
BS209	At Offsite Vet	Hatchling	Quarantine Pens	30-Aug-2011	Inside I-15 Pen	3-Oct-2016	Unknown	40	127	275	5	13-Sep-2018	Negative	Suspect	38

Tort ID	Tort Status	Initial Disposition	Initial Encounter Site	Initial Encounter Date	Release Site	Release Date	Sex	Initial MCL	Recent MCL	Recent Mass	Recent BCS	Recent Health Exam Date	Recent ELISA Results M. agassizii	Recent ELISA Results M. testud.	Annual Encounters
BS210	Dead	Hatchling	Quarantine Pens	30-Aug-2011	Outside I-15 Pen	2-Oct-2016	Unknown	40	120	335		8-May-2017	Negative	Negative	0
BS212	Tracked	Hatchling	Quarantine Pens	1-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	48	107	245	5	12-Sep-2018	Negative	Negative	50
BS213	Dead	Hatchling	Quarantine Pens	1-Sep-2011	Inside I-15 Pen	2-Oct-2016	Unknown	46	114	280		21-May-2017	Negative	Negative	0
BS214	Tracked	Hatchling	Quarantine Pens	1-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	45	126	360	5	15-Sep-2018	Negative	Negative	50
BS215	Tracked	Hatchling	Quarantine Pens	1-Sep-2011	Outside I-15 Pen	3-Oct-2016	Unknown	44	139	510	5	15-Sep-2018	Negative	Negative	51
BS216	Dead	Hatchling	Quarantine Pens	1-Sep-2011	Inside I-15 Pen	1-Oct-2016	Unknown	42	114	285		27-May-2018	Negative	Suspect	30
BS219	Tracked (Missing)	Hatchling	Quarantine Pens	3-Sep-2011	Outside I-15 Pen	3-Oct-2016	Unknown	43	128	360	5	20-May-2018	Negative	Negative	31
BS221	Dead	Hatchling	Quarantine Pens	5-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	48	92	145		3-Oct-2016	Negative	Negative	0
BS226	Dead	Hatchling	Quarantine Pens	6-Sep-2011	Outside I-15 Pen	4-Oct-2016	Unknown	46	114	270		3-Oct-2016	Negative	Negative	0
BS227	Dead	Hatchling	Quarantine Pens	7-Sep-2011	Outside I-15 Pen	4-Oct-2016	Unknown	44	132	415		3-Oct-2016	Negative	Negative	0
BS231	Dead	Hatchling	Quarantine Pens	7-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	43	115	305		19-May-2018	Negative	Suspect	22
BS233	Dead	Hatchling	Quarantine Pens	7-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	44	120	320		3-May-2017	Negative	Negative	0
BS241	Dead	Hatchling	Quarantine Pens	11-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	41	103	225		1-Oct-2016	Negative	Negative	0
BS244	Dead	Wild Capture	Ivanpah 2	10-Sep-2011	Inside I-15 Pen	1-Oct-2016	Unknown	55	93	168		30-Sep-2016	Negative	Negative	0
BS247	Dead	Wild Capture	Ivanpah 2	10-Sep-2011	Inside I-15 Pen	2-Oct-2016	Unknown	61	137	510		1-Oct-2016	Negative	Negative	0
BS249	Tracked	Hatchling	Quarantine Pens	11-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	45	126	370	5	14-Sep-2018	Negative	Negative	49
BS251	Dead	Hatchling	Quarantine Pens	12-Sep-2011	Outside I-15 Pen	3-Oct-2016	Unknown	46	92	130		21-May-2017	Negative	Negative	0
BS252	Dead	Wild Capture	Ivanpah 3	12-Sep-2011	Outside I-15 Pen	4-Oct-2016	Unknown	79	145	550		20-May-2017	Negative	Negative	0

Tort ID	Tort Status	Initial Disposition	Initial Encounter Site	Initial Encounter Date	Release Site	Release Date	Sex	Initial MCL	Recent MCL	Recent Mass	Recent BCS	Recent Health Exam Date	Recent ELISA Results M. agassizii	Recent ELISA Results M. testud.	Annual Encounters
BS253	Tracked (Missing)	Hatchling	Quarantine Pens	13-Sep-2011	Outside I-15 Pen	3-Oct-2016	Unknown	44	113	280	4	21-May-2017	Negative	Negative	0
BS254	Tracked	Hatchling	Quarantine Pens	13-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	43	124	400	5	17-Oct-2018	Negative	Negative	52
BS255	Tracked	Hatchling	Quarantine Pens	13-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	43	134	425	5	16-Sep-2018	Negative	Negative	50
BS256	Dead	Wild Capture	Ivanpah 3	13-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	68	137	480		18-May-2018	Suspect	Suspect	31
BS259	Dead	Wild Capture	Ivanpah 3	14-Sep-2011	Inside I-15 Pen	1-Oct-2016	Female	114	181	1110		27-May-2018	Negative	Suspect	31
BS263	Dead	Wild Capture	Ivanpah 2	16-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	74	133	490		18-May-2018	Negative	Negative	32
BS267	Dead	Wild Capture	Ivanpah 3	18-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	82	165	880		17-Sep-2017	Negative	Negative	0
BS268	Tracked (Missing)	Wild Capture	Ivanpah 3	18-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	66	134	465	4	18-May-2018	Negative	Suspect	29
BS269	Dead	Wild Capture	Ivanpah 3	18-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	93	132	500		3-Oct-2016	Negative	Negative	0
BS270	Dead	Wild Capture	Ivanpah 3	18-Sep-2011	Outside I-15 Pen	2-Oct-2016	Male	120	184	1200		1-Oct-2016	Negative	Negative	0
BS272	Tracked	Wild Capture	Ivanpah 3	20-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	89	160	780	5	12-Sep-2018	Negative	Negative	49
BS274	Tracked (Missing)	Wild Capture	Ivanpah 3	20-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	45	110	225	5	19-May-2018	Negative	Suspect	32
BS276	Dead	Wild Capture	Ivanpah 3	20-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	69	121	345		27-May-2018	Negative	Suspect	35
BS277	Tracked	Wild Capture	Common East	20-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	46	117	310	5	22-Sep-2018	Negative	Negative	52
BS279	Tracked (Missing)	Hatchling	Quarantine Pens	21-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	48	107	235	5	17-May-2018	Negative	Suspect	33
BS280	Dead	Wild Capture	Ivanpah 3	21-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	85	145	580		1-Oct-2016	Negative	Negative	0
BS281	Dead	Hatchling	Quarantine Pens	21-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	48	122	315		20-May-2018	Negative	Suspect	32
BS282	Tracked	Wild Capture	Ivanpah 3	21-Sep-2011	Inside I-15 Pen	2-Oct-2016	Unknown	90	163	840	5	12-Sep-2018	Negative	Negative	49

Tort ID	Tort Status	Initial Disposition	Initial Encounter Site	Initial Encounter Date	Release Site	Release Date	Sex	Initial MCL	Recent MCL	Recent Mass	Recent BCS	Recent Health Exam Date	Recent ELISA Results M. agassizii	Recent ELISA Results M. testud.	Annual Encounters
BS283	Tracked	Wild Capture	Ivanpah 2	21-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	100	169	860	5	14-Sep-2018	Negative	Negative	48
BS284	Tracked	Hatchling	Quarantine Pens	22-Sep-2011	Outside I-15 Pen	3-Oct-2016	Unknown	43	126	345	5	13-Sep-2018	Negative	Negative	52
BS285	Dead	Wild Capture	Ivanpah 3	22-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	54	138	465		16-May-2017	Negative	Negative	0
BS286	Dead	Wild Capture	Ivanpah 3	22-Sep-2011	Inside I-15 Pen	1-Oct-2016	Unknown	63	120	315		30-Sep-2016	Negative	Negative	0
BS287	Tracked	Wild Capture	Ivanpah 2	22-Sep-2011	Inside I-15 Pen	4-Oct-2016	Female	111	212	1660	5	16-Sep-2018	Negative	Negative	49
BS288	Dead	Wild Capture	Ivanpah 2	23-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	58	101	215		30-Sep-2016	Negative	Negative	0
BS292	Dead	Wild Capture	Ivanpah 2	24-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	103	150	670		30-Sep-2016	Negative	Negative	0
BS295	Tracked	Wild Capture	Ivanpah 2	26-Sep-2011	Inside I-15 Pen	2-Oct-2016	Unknown	60	127	405	5	22-Sep-2018	Negative	Negative	51
BS296	Tracked (Missing)	Wild Capture	Ivanpah 3	26-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	70	135	475	4	19-May-2018	Negative	Negative	21
BS297	Tracked	Hatchling	Quarantine Pens	27-Sep-2011	Inside I-15 Pen	1-Oct-2016	Unknown	43	130	430	5	13-Sep-2018	Negative	Negative	50
BS298	Dead	Wild Capture	Ivanpah 3	27-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	62	112	295		3-Oct-2016	Negative	Negative	0
BS299	Dead	Hatchling	Quarantine Pens	29-Sep-2011	Outside I-15 Pen	2-Oct-2016	Unknown	47	115	275		19-May-2017	Negative	Negative	0
BS300	Dead	Wild Capture	Ivanpah 3	29-Sep-2011	Inside I-15 Pen	4-Oct-2016	Unknown	47	121	315		13-May-2017	Negative	Negative	0
BS302	Dead	Wild Capture	Ivanpah 3	30-Sep-2011	Inside I-15 Pen	3-Oct-2016	Unknown	62	116	320		20-May-2018	Negative	Negative	22
BS303	Tracked (Missing)	Wild Capture	Ivanpah 3	30-Sep-2011	Outside I-15 Pen	1-Oct-2016	Unknown	76	137	535	5	6-Oct-2017	Negative	Suspect	13
BS304	Dead	Wild Capture	Ivanpah 3	2-Oct-2011	Inside I-15 Pen	1-Oct-2016	Unknown	72	122	395		28-Sep-2017	Suspect	Suspect	15
BS307	Dead	Wild Capture	Ivanpah 3	3-Oct-2011	Inside I-15 Pen	1-Oct-2016	Unknown	64	126	365		23-May-2017	Negative	Negative	0
BS333	Tracked	Wild Capture	Ivanpah 1	17-Oct-2011	Inside I-15 Pen	2-Oct-2016	Unknown	43	143	510	5	12-Sep-2018	Negative	Negative	50

Tort ID	Tort Status	Initial Disposition	Initial Encounter Site	Initial Encounter Date	Release Site	Release Date	Sex	Initial MCL	Recent MCL	Recent Mass	Recent BCS	Recent Health Exam Date	Recent ELISA Results M. agassizii	Recent ELISA Results M. testud.	Annual Encounters
BS338	Dead	Wild Capture	Ivanpah 2	5-Mar-2012	Outside I-15 Pen	2-Oct-2016	Unknown	62	128	445		8-May-2017	Negative	Negative	0
BS341	Dead	Wild Capture	Ivanpah 1	3-Apr-2012	Inside I-15 Pen	3-Oct-2016	Unknown	70	135	540		20-May-2018	Negative	Suspect	37
BS347	Dead	Wild Capture	Ivanpah 3	7-Sep-2012	Outside I-15 Pen	3-Oct-2016	Unknown	72	108	240		2-Oct-2016	Negative	Negative	0
BS348	Dead	Wild Capture	Ivanpah 2	10-Sep-2012	Outside I-15 Pen	2-Oct-2016	Unknown	74	122	350		19-May-2017	Negative	Negative	0
BS350	Dead	Wild Capture	Ivanpah 3	25-Sep-2012	Inside I-15 Pen	3-Oct-2016	Unknown	45	100	210		2-Oct-2016	Negative	Suspect	0
BS351	Dead	Wild Capture	Ivanpah 3	8-Oct-2012	Inside I-15 Pen	2-Oct-2016	Unknown	93	157	660		1-Oct-2016	Negative	Negative	0
BS352	Dead	Wild Capture	Ivanpah 3	17-Oct-2012	Outside I-15 Pen	3-Oct-2016	Unknown	101	140	580		2-Oct-2016	Negative	Negative	0
BS355	Dead	Wild Capture	Ivanpah 1	27-Mar-2013	Inside I-15 Pen	2-Oct-2016	Unknown	43	122	335		20-May-2018	Negative	Negative	31

Appendix G

Condition of Certification BIO-13

Weed Management Plan Annual Report

Ivanpah Solar Electric Generating System
California Energy Commission (07-AFC-5C)
Bureau of Land Management
(CACA-48668, 49502, 49503, and 49504)
Conditions of Certification BIO-13

Annual Biological Report
January 1, 2018 – December 31, 2018
Reporting Period
Submitted
January 31, 2019

Prepared by: Designated Biologist on behalf of Solar Partners I, II, VIII LLC

100302 Yates Well Road
Nipton, CA 92364

Table of Contents

Introduction

This annual compliance report pertains to weed management activities at Ivanpah Solar Electric Generating System (ISEGS). Compliance with this plan is required by the Bureaus of Land Management Right-of-Way Grant, California Energy Commissions (CEC) Conditions of Certification (COC's) BIO-13, and Revised 2011 United States Fish and Wildlife Service (USFWS) Biological Opinion.

Weed Management Activities

The Weed Management Plan's protocols implemented in 2018 continue to be an effective method at identifying and controlling weed establishment within the ISEGS facility. Weed establishment early in the project was an anticipated result of the disturbance areas created during the construction of the ISEGS facility. Weed management is required for the ten years of operation to mitigate the increased potential of weed establishment. In 2018, weeds identified at the facility were manually removed, and disposed of off site by the Designated Biologist.

Biological monitors and/or the Designated Biologist conducted semi-monthly weed surveys throughout the site during the active growing season (February through November), in accordance with the CECs BIO-13 requirements. Data was collected and reported to the Designated Biologist, including the location and type of noxious weeds. In addition, non-native plants were located. All non-native plants and noxious weeds were collected, and transferred to the Designated Biologist for disposal. All weed surveys were successfully implemented and completed according to the Weed Management Plan (Revision 2) and 2011 USFWS Biological Opinion (8-8-10-F-24R).

Eight noxious weed species and 1,256 individuals were found throughout the project site in 2018. In addition 1 weed species comprising 1 individual that is not classified as noxious were also found at the project site. Not all of these species meet the criteria of the Weed Management Plan's target weed species; however, all were treated as noxious weeds and removed from the facility. See table 1 for number of each species found in 2018. The 8 noxious weed species were: Field Bindweed (*Convolvulus arvensis),* Halogeton (*Halogeton glomeratus*), Kochia (*Kochia scoparia*), London rocket (*Sisymbrium irio*), Puncture Vine (*Tribulus terrestris*), Russian thistle (*Salsola tragus*), Sahara mustard (*Brassica tournefortii*), and Silverleaf nightshade (*Solanum elaeagnifolium).* The one weed species not classified as a noxious weed is: Rocketsalad (*Eruca vesicaraia*).

Table 1. Summary of Noxious Weed Species Observed During 2018 at ISEGS

Weed Species	Colosseum Road	CLA-E	CLA-W	Ivanpah 1	Ivanpah 2	Ivanpah 3	Total per Species
Field bindweed	0	14	0	0	0	0	14
Halogeton	2	0	0	4	1	0	7
Kochia	1	0	0	0	0	0	1
London rocket	24	1	48	0	8	52	133
Puncture vine	0	51	0	0	25	859	935
Rocketsalad	0	1	0	0	0	0	1
Russian thistle	19	14	7	14	52	59	165
Saharan mustard	0	0	0	0	0	1	1
Silverleaf nightshade	0	0	0	0	0	0	0
Total per Location	46	81	55	18	86	971	---
Total Plants Observed and Removed Onsite During 2018							**1,257**

In 2018, a total of 1,257 individual weeds were removed from the project site, as compared to 3,436 individuals removed from the project site in 2017. See Figure 1 showing the number of individual weeds removed by year since commercial operations commenced. Nine species of weeds were removed from the project site in 2018, whereas eleven species of weeds were removed in 2017. See Figure 2 showing the number of weed species removed by year since commercial operations commenced. The reduction in number of weeds could be attributed to removal of weeds prior to going to seed in 2017. The goal is to reduce the number of weed species, and total weeds observed each year. The total number of individual weeds decreased in 2018. The goal was met for reducing the total number of weeds in 2018. There was a decrease in the number of weed species removed in 2018. The goal was met for reducing the total number of weed species in 2018. The most significant contribution to the reduction in weeds in 2018 is likely the result of surveying areas where weeds went to seed in previous years. During 2018, the locations of weed species were recorded to inform survey locations for 2019. In order to reduce future potential increases in individual numbers of weeds and number of weed species biologists will survey areas where weeds were observed going to seed on a more frequent basis in 2019.

Figure 1. Number of Noxious Weeds Observed During Operations at ISEGS

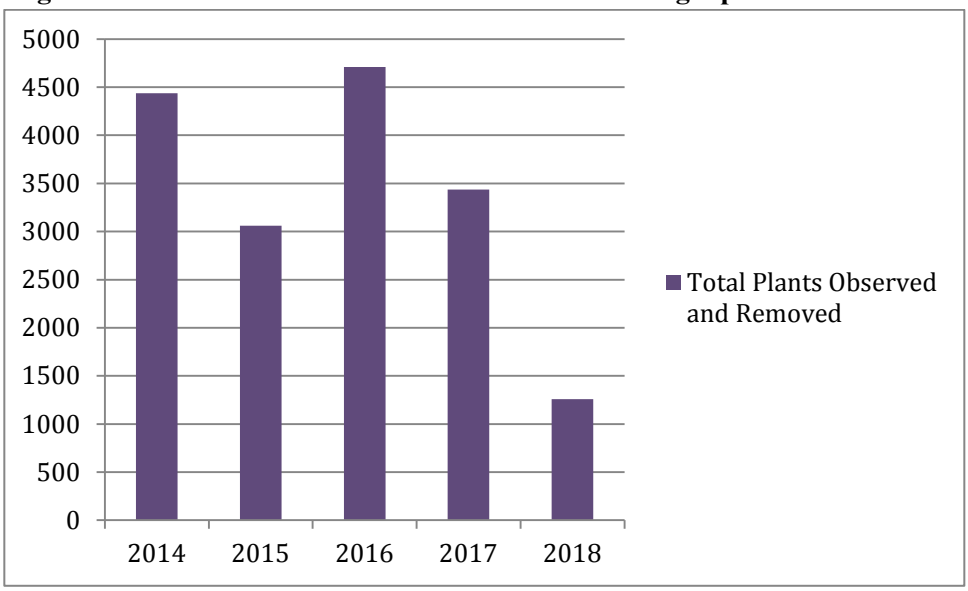
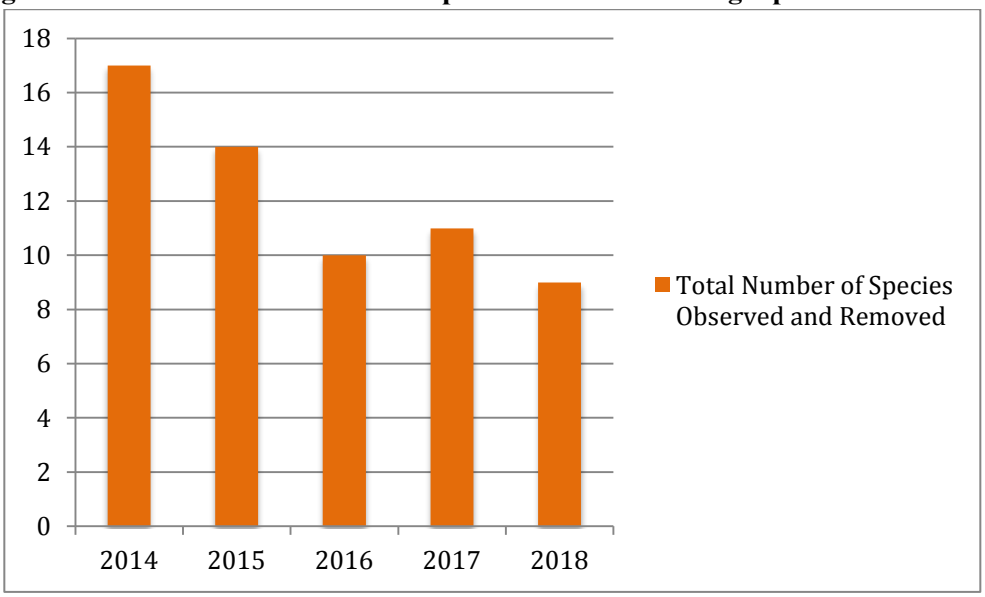


Figure 2. Number of Noxious Weed Species Observed During Operations at ISEGS



Appendix H

Condition of Certification BIO-14

Revegetation Annual Monitoring Report for Short-Term Disturbance

Ivanpah Solar Electric Generating System

Revegetation Monitoring Report for Short-Term Disturbance

Final

January 2019

Solar Partners II, LLC; Solar Partners I, LLC;
and Solar Partners VIII, LLC

Ivanpah Solar Electric Generating System

Project No:	701975CH
Document Title:	Revegetation Monitoring Report for Short-Term Disturbance
Document No.:	AX1219180847LAS
Revision:	Final
Date:	January 2019
Client Name:	NRG Energy Services, LLC
Project Manager:	Jerry Salamy, Jacobs Engineering Group Inc. (Jacobs)
Author:	Morgan King, Jacobs

Jacobs Engineering Group Inc.

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Tables

Figures

Acronyms and Abbreviations

%	percent
115 kV	115-kV gen-tie line
33 kV	33-kV gen-tie line
BIO-13	Condition of Certification Biology -13 Weed Management Plan
BIO-14	Condition of Certification Biology -14 Closure, Revegetation and Rehabilitation Plan
Biological Opinion	*Biological Opinion on BrightSource Energy's Ivanpah Solar Electric Generating System Project*
BLM	Bureau of Land Management
CE	Commons East
CEC	California Energy Commission
CH2M	CH2M HILL Engineers, Inc.
CLA	Construction Logistics Area
COC	Condition of Certification
ft	foot (feet)
ft^2	square foot (feet)
gen-tie	generation tie-line
GIS	geographic information system
GPS	global positioning system
ha	hectare(s)
ISEGS	Ivanpah Solar Electric Generating System
Jacobs	Jacobs Engineering Group Inc.
km	kilometer(s)
kV	kilovolt(s)
m	meter(s)
m^2	square meter(s)
MW	megawatt(s)
NGL	Natural Gas Pipeline
No.	number
NRG	NRG Energy Services, LLC
O&M	operations and maintenance
POD	Plan of Development
Revegetation Plan	*Closure, Revegetation and Rehabilitation Plan for Ivanpah Solar Electric Generating System*
ROW	right-of-way
Solar Partners	Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC
U.S.	United States
USFWS	U.S. Fish and Wildlife Service

Weed Plan	*Weed Management Plan for the Ivanpah Solar Electric Generating System*
WR	Well Road

1. Introduction

1.1 Project Description

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners) are the owners of the Ivanpah Solar Electric Generating System (ISEGS), a nominal 370-megawatt (MW) solar energy project in southern California's Mojave Desert, near the Nevada border. The project was developed by BrightSource Energy, Inc. and is operated for Solar Partners by NRG Energy Services, LLC (NRG). The project is located on a 3,471-acre (1,405-hectare [ha]) site west of the Ivanpah Dry Lake, on land managed by the Bureau of Land Management (BLM). CH2M HILL Engineers, Inc. (CH2M), now Jacobs Engineering Group Inc. (Jacobs), provides environmental compliance support during operations of the solar facility.

Ivanpah 1 (the southern unit) covers approximately 913.5 acres (370 ha); Ivanpah 2 (the middle unit) covers approximately 1,077 acres (436 ha); and Ivanpah 3 (the northern unit) is larger and covers approximately 1,235 acres (500 ha). The remaining disturbance areas include common access roads, gas lines, generation tie-lines (gen-ties), and operations facilities. All three units share an administration building, operations and maintenance (O&M) building, a substation located between Ivanpah 1 and 2, and paved roads to access each unit. The project ties into the existing Kern River natural gas transmission line about 0.5 mile (0.8 kilometer [km]) north of the Northern Rare Plant Mitigation Area and into the Southern California Edison 230/115-kilovolt (kV) line that crosses between the Ivanpah 1 and 2 sites (Figure 1-1, presented at the end of this section) (CEC, 2010).

1.2 Report Objective

This report presents the results of the annual revegetation monitoring of 48.94 acres (19.8 ha) of short-term and temporary disturbance within the Construction Logistics Area (CLA) and shared ancillary facilities for the ISEGS. The CLA consists of two separate locations, which are referred to as CLA East and CLA West (Figure 1-1). All monitoring (or disturbed) sites were treated according to the restoration measures prescribed in the project-specific *Closure, Revegetation and Rehabilitation Plan for Ivanpah Solar Electric Generating System* (Revegetation Plan) (CH2M, 2010b), as required by the BLM Right-of-Way (ROW) Grant (BLM, 2010) and the California Energy Commission's (CEC's) Commission Decision Condition of Certification (COC) Biology -14 Closure, Revegetation and Rehabilitation Plan (BIO-14) (CEC, 2010). The ROW Grant provides independent reclamation bond numbers for each independent part of the facility. The CLA and common ancillary facilities reclamation bond number for the short-term and temporary disturbance discussed in this report is BLM ROW CACA-49502 (BLM, 2010).

This report provides the results of the application of two separate monitoring protocols: revegetation and noxious weed monitoring and management. Revegetation monitoring refers to quantitative vegetation assessments using belt transects and relevé plots, where success criteria are based on perennial plant cover and species richness. The Revegetation Plan specifies the use of standard analyses of plant data recovered from belt transects and relevé plots, such as density, diversity, and survivorship (CH2M, 2010b). These values are not used to determine success per se, but they provide useful additional information on the condition of the vegetation and the progress of recovery. The Revegetation Plan requires 10 years of revegetation monitoring, or until the success criteria are met; in which case, revegetation monitoring may be completed in less than 10 years.

Noxious weed monitoring and management within revegetation sites is required by the *Weed Management Plan for the Ivanpah Solar Electric Generating System* (Weed Plan) (CH2M, 2010c), a standalone document included as Appendix A of the Revegetation Plan, as required by Commission Decision COC Biology -13 Weed Management Plan (BIO-13) (CEC, 2010). Weed monitoring and management requirements are concurrently guided by the U.S. Fish and Wildlife Service's (USFWS') *Biological Opinion on BrightSource Energy's Ivanpah Solar Electric Generating System Project* (Biological Opinion) (USFWS, 2011). Weed monitoring results from the revegetation locations are provided in this document but are independent of the revegetation success criteria (CH2M, 2010b). Weed monitoring is scheduled for 10 years after revegetation treatment, and is staggered, based on when disturbance is

completed. In 2018, the frequency of weed monitoring occurred in accordance with Year 3, Year 5, and Year 6 requirements. Weed monitoring occurred on all short-term disturbance sites in 2018.

Annual revegetation monitoring was staggered, depending on when disturbance was complete (Section 1.3.1 describes the detailed monitoring schedule). This report provides Year 3 and Year 5 revegetation monitoring results for different sites that were completed in 2015 and 2013, respectively. Year 3 monitoring occurred on an area of short-term disturbance 40.1 acres (16 ha) in size, on the western side of CLA East, completed in 2015 (Figure 1-1). Year 5 monitoring was conducted on a temporary disturbance area of 6.03 acres (2.44 ha) of the linear Natural Gas Pipeline (NGL) north of Ivanpah 3, which was completed in November 2013 (Figure 1-1). Year 6 monitoring was not conducted on the 0.38 acre (0.15 ha) associated with the 33-kV gen-tie line (33 kV) in 2018 because this area is measured on a biannual basis; monitoring will resume in Year 7 (2019) (CH2M, 2010b).

In 2018, one monitoring site (belt transect; Commons East [CE]-10) within the CLA East revegetation area met Revegetation Plan success goals after 3 years of post-revegetation treatment. The monitoring locations are shown on Figure 1-1. Figure 1-1 also includes five sites where Revegetation Plan success criteria were met prior to 2018, and revegetation monitoring for these sites is now complete:

- Two NGL linear monitoring sites (including the NGL tap station; NGL-1, NGL-2)
- The Well Road (WR; WR-4)
- The 115-kV gen-tie line (115 kV-5)
- One CLA East site (CE-18)

Weed monitoring occurred at these locations in 2018 and, as noted, weed monitoring is independent of the revegetation success criteria, so will continue for 10 years post-revegetation treatment.

1.3 Long-Term Monitoring Schedule

This section provides the long-term revegetation and weed monitoring schedules.

1.3.1 Revegetation

Table 1-1 provides a recommended long-term schedule for revegetation monitoring on the remaining sites.

Table 1-1. Revegetation Monitoring Schedule [a]

Site	End of Construction	Annual Monitoring Years 1 through 3			Biennial Monitoring Years 4 through 10[b]			
NGL-3	2013	2014	2015	2016	2018	2020	2022	2024
33 kV-6	2012	2013	2014	2015	2017	2019	2021	2023
CE-07, CE-08, CE-09, CE-11, CE-12, CE-13, CE-14, CE-15, CE-16, CE-17[c]	2015	2016	2017	2018	2020	2022	2024	2026

[a] This schedule does not account for dry years or remedial actions after 10 years if success criteria (CH2M, 2010b) are not met.

[b] Or until success criteria (CH2M, 2010b) are met.

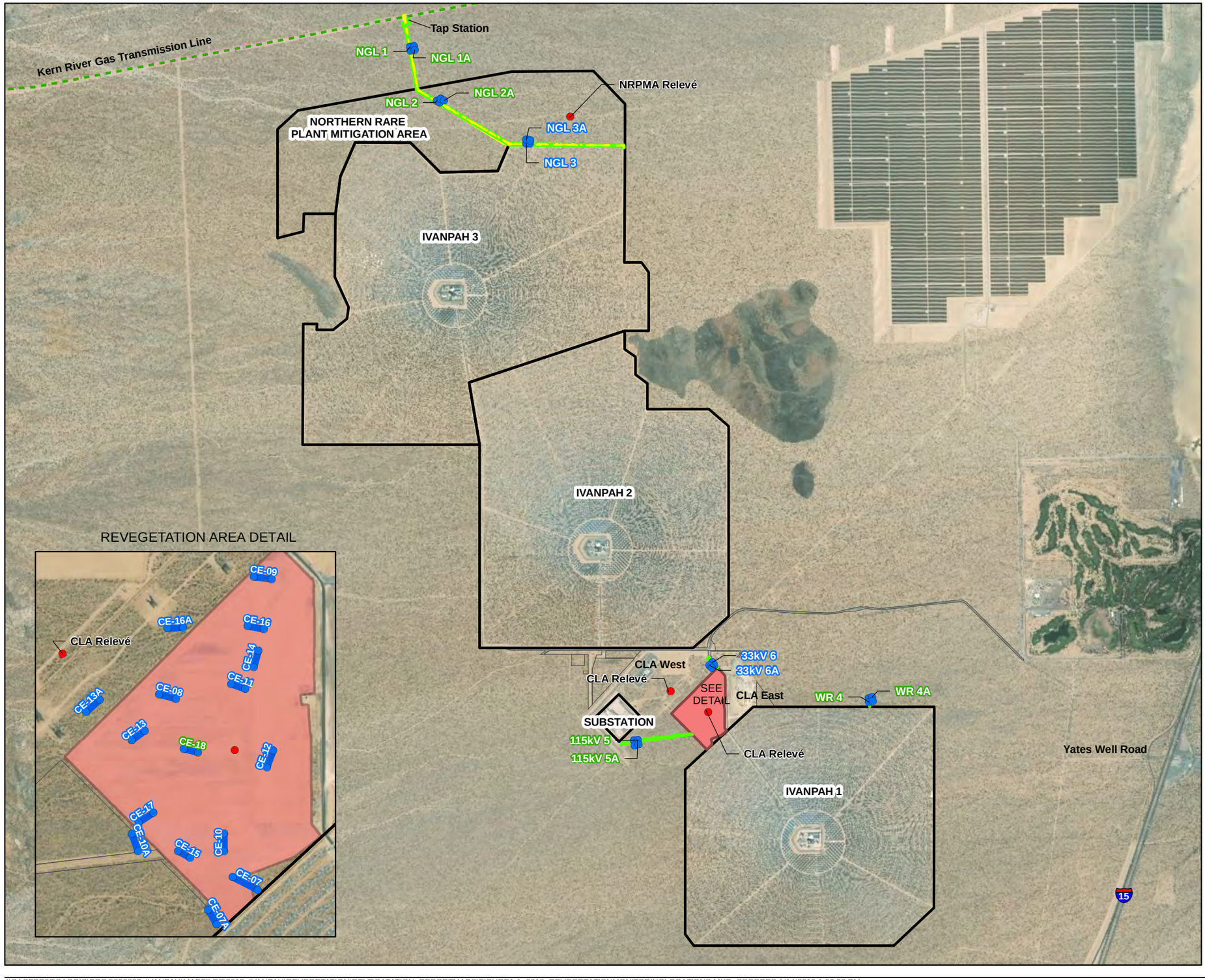
[c] Revegetation success criteria were met for CE-10 (Year 3 [2018]) and CE-18 (Year 2 [2017]), so they were removed from the long-term monitoring schedule.

1.3.2 Weeds

Biological staff will continue monitoring the revegetation areas for weeds through 2025 (Table 1-2).

Table 1-2. Weed Monitoring Schedule

Site	End of Construction	Monthly Monitoring Years 1 and 2		Quarterly Monitoring Years 3 and 4		Semiannual Monitoring Years 5 through 10					
NGL linear	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
NGL tap station	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020	2022
WR	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020	2022
115 kV	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
33 kV	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Western side of CLA East	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025



LEGEND

- Permanent Photographic Plot at End of Belt Transect
- Relevé
- Belt Transect
- Project Site
- 2012 Revegetation Area
- 2013 Revegetation Area
- 2015 Revegetation Area

NGL 1A Success criteria met
NGL 3A Success criteria monitoring in progress

Notes:
2012 Revegetation Area Acreage:
33-kV Line - 0.38 acre
115-kV Line - 2.18 acres
Well Road - 0.10 acre
Gas Line Tap Station - 0.15 acre
Natural Gas Line - 6.03 acres

2013 Revegetation Area Acreage:
Natural Gas Line - 1.9 acres

2015 Revegetation Area Acreage:
Commons East - 40.1 acres

CLA = Construction Logistics Area
kV = kilovolt(s)
NGL = natural gas pipeline
NRPMA = Northern Rare Plant Mitigation Area

N

0 0.25 0.5
Miles

Figure 1-1
2018 Annual
Revegetation Monitoring Locations
Ivanpah Solar Electric Generating System
San Bernardino County, California

JACOBS

2. Methods

This section includes a discussion of all monitoring sites, regardless of whether success criteria were met in previous years.

2.1 Revegetation Monitoring and Progress Assessment

Revegetation monitoring and success criteria for ISEGS are guided by the *Technical Basis Document*, which is included as Appendix C of the Revegetation Plan (CH2M, 2010b). Success criteria are based on perennial plant species, including perennial grasses and succulents, and do not include annual species because their populations fluctuate drastically from year to year.

2.1.1 Vegetation Sampling

The Revegetation Plan states that each 10 acres (4 ha) of disturbance requires a minimum sample of three belt transects (CH2M, 2010b). The location and timing of construction-related disturbances varied, and vegetation sample locations were, therefore, adjusted to the size and location of each disturbance. Table 2-1 provides the acreage and vegetation sampling sites at each sampled disturbed location and, for comparison, the estimated disturbance in the project's Plan of Development (POD) (CH2M, 2010a).

Success criteria are different for revegetation monitoring sites based on elevation and location within the facility (CH2M, 2010b). These monitoring sites had the following success criteria standards:

1. The NGL and NGL tap station were associated with Ivanpah 3 success criteria.
2. The WR, 115 kV, 33 kV, and the western side of CLA East were associated with the CLA success criteria.

Within the western side of CLA East (40.1 acres [16.2 ha]), 12 monitoring locations were established on the disturbed area (three sampling sites for each 10-acre [4-ha] portion). In addition, four control sample sites were established in undisturbed areas for comparison with the western side of CLA East. Three monitoring locations were established along the 1.5-mile (2.4-km) NGL disturbed area, with one control sample site in an undisturbed area. The other revegetation disturbance locations were not surveyed in 2018, and details of the vegetation sampling locations are not described in this report. Figure 1-1 shows the location of all vegetation sampling locations.

Table 2-1. Revegetation Monitoring Sampling Locations and Acreages

Location (Year Revegetation Complete)	Disturbed Belt Transect	Undisturbed Belt Transect	Actual Revegetation Acres[a]	POD - Estimated Area in Acres[a]
Ivanpah 3 Area (2012 and 2013)				
NGL from Ivanpah 3 to the tap point at Kern River Gas Transmission [b, c, e]	NGL-1, NGL-2, NGL-3	NGL-1A, NGL-2A, NGL-3A	6.03	5.1
Kern River Gas Transmission Tap Station [d]	None	None	0.15 [d]	0.9
CLA (2012 and 2015) [f]				
WR north of Ivanpah 1 [c]	WR-4	WR-4A	0.1	NI
Underground 115 kV between Ivanpah 1 and substation [c]	115 kV-5	115 kV-5A	2.18	3.4
33 kV	33 kV-6	33 kV-6A	0.38	NI

Table 2-1. Revegetation Monitoring Sampling Locations and Acreages

Location (Year Revegetation Complete)	Disturbed Belt Transect	Undisturbed Belt Transect	Actual Revegetation Acres[a]	POD - Estimated Area in Acres[a]
Western side of CLA East [c]	CE-07, CE-08, CE-09, CE-10, CE-11, CE-12, CE-13, CE-14, CE-15, CE-16, CE-17, CE-18	CE-07A, CE-10A, CE-13A, CE-16A	40.1	49.3
Total Acreage			**48.94**	**58.7**

[a] Areas may differ because the POD area was a pre-construction estimate.

[b] 1.9 acres were treated in 2013.

[c] Revegetation success criteria were met in 2015 for NGL-1, NGL-2, WR-4, and 115 kV-5 (CH2M, 2016). Revegetation success criteria were met in 2018 for CE-18 (CH2M, 2018). Weed monitoring will continue at these locations for 10 years post-revegetation treatment (Table 1-2 presents the weed monitoring schedule).

[d] Revegetation area differs from the POD because the area inside the tap station fencing was not revegetated.

[e] Monitoring was not conducted on NGL-3 in 2018 because this area is measured every other year; monitoring will resume in 2019.

[f] Revegetation was completed on the WR, 115 kV, and 33 kV in 2012. Revegetation was completed on the western side of CLA East in 2015.

Notes:

NI = not included in POD calculations

To be consistent with international scientific standards, the quantitative data generated in plant-ecological sampling, such as that required here by the Revegetation Plan, are gathered using tools graduated in the metric system. Conversions to the English system are provided herein, and the results are reported as English units (for example, acres), as needed for direct comparison to the success criteria. English system units are rounded to nearest whole number.

Within the disturbed areas, eighteen 30-meter (m) (98-foot [ft]) by 4-m (13-ft) belt transects, also referred to as quadrats (120 square meters [m^2] or 1,292 square feet [ft^2] each) were marked with a capped t-post at each end of the transect axis. In 2018, vegetation sampling was required at 12 of the 18 disturbed locations. Revegetation monitoring was not conducted on the remaining six locations because success criteria were met at five locations, the sixth is only monitored every other year, and monitoring will resume in 2019. As a control comparison, five 120-m^2 (1,292-ft^2) belt transect locations were chosen within the undisturbed vegetation adjacent to the disturbed sample plots. The undisturbed transects were chosen along the same orientation as the disturbed transects and approximately 30 m (98 ft) from the edge of disturbance.

On linear features, sampling locations were named from north to south. On nonlinear features (western side of CLA East), sampling locations were randomly assigned as a representative sample of the entire area. Random samples were chosen by overlaying a numbered grid over the revegetation area and running a random number generator. A random number generator was also used to determine orientation: north-south, east-west, northeast-southwest, and northwest-southeast. Sampling locations within disturbed locations are numbered 1 through 18, and associated undisturbed locations include the number and letter A. Vegetation sampling locations were recorded using a Garmin global positioning system (GPS) and are provided on a map with an aerial photograph base layer (Figure 1-1).

2.1.1.1 Belt Transects

Perennial plant cover was recorded along the centerline of each transect as a percent of total transect length. Botanists assessed cover by stretching a tape measure along the transect axis between the capped t-posts and measuring the distance that foliar canopies of perennial plants intercepted the tape measure. Field data were collected on mobile devices using the Environmental Systems Research Institute's proprietary geographic information system (GIS) ArcGIS Online platform. Hard copy data sheets were used as a backup. Transect locations were marked by capped t-posts placed at the start and end of the 30-m (98-ft) axis and recorded using a GPS, for later relocation.

Belt transects were formed by placing two 4-m-long (13-ft-long) sticks at the ends of and perpendicular to the 30-m-long (98-ft-long) transect axis, thus, describing a rectilinear area (the 'belt') of 120 m^2 (1,292 ft^2). Individual species were counted if they had vegetative cover that intersected the belt transect. Field data were collected on mobile devices using the ArcGIS Online platform. Hard copy data sheets were used as a backup. Perennial species were counted as separate individuals when clumps of stems protruded from different locations on the ground. This is most common for creosote bush (*Larrea tridentata*), white bursage (also known as burrobrush; *Ambrosia dumosa*), and Mojave yucca (*Yucca schidigera*). Individual Mojave yucca trunks were counted separately.

Perennial species richness was recorded within the belt transect as the number of unique perennial species. The Revegetation Plan states that richness should be averaged over three belt transects and one circular relevé plot (CH2M, 2010b). Section 2.1.1.2 provides a description of a relevé plot. Because of the small acreage and linear nature of the NGL, WR, 115 kV, and 33 kV revegetation locations, a relevé plot was not included in the richness analysis of disturbed locations. A relevé plot was used in the richness calculations on the CLA East revegetation monitoring sites.

2.1.1.2 Relevé Plots

Relevé plots were used to calculate perennial species' richness by counting the number of species in the plot (CNPS, 2000). The number of plants from the relevé plot will be used as a value in the average perennial species richness calculations.

Three 12-m-radius (39-ft-radius) relevé plots were established to sample the disturbed and undisturbed vegetation (Figure 1-1). The total area of each relevé plot was 452 m^2 (4,778 ft^2). The northern undisturbed relevé plot is located north of Ivanpah 3 and is representative of the NGL vegetation, and the southern undisturbed relevé plot is representative of the CLA vegetation. The only disturbed relevé plot was established on the CLA East revegetation location and will be used as a value in the average perennial species richness calculations. Richness calculations will be used in determining the success of the monitoring sites. Due to the small acreage and linear nature of the NGL, WR, 115 kV, and 33 kV disturbance areas, relevé plots were not established in these disturbed areas. For these locations, this analysis is required by field monitoring protocol and will not be used in determining success (CH2M, 2010b).

2.1.1.3 Survivorship

Perennial species density measurements (that is, number of live individuals present per unit area) were used to estimate survivorship. For this measurement, the unit area is defined as each 120-m^2 (1,292-ft^2) belt transect. The population present at the time of the first monitoring session (t_1) is defined as the original cohort. Survivorship at Year 1 is set to 1.0 for the original cohort of perennials and will be equal to the proportion of the population surviving at subsequent monitoring dates. Values can be either greater or less than 1, depending on whether there is reduction of or recruitment to the population within the sampled area. This analysis is required by field monitoring protocol and will not be used in determining success (CH2M, 2010b).

2.1.1.4 Photographic Documentation

At each belt transect monitoring site, permanent photographic locations were established at the start and end of the line. Each location was permanently marked in the field with a capped t-post, which also represents the start and end of the belt transect. These locations were recorded with a Garmin GPS and are shown on maps of the monitoring sites. A meter stick or range pole was used as a scale to illustrate the relative size of plants in photographs. Photographs were taken within the ArcGIS Online platform and are provided in Appendix A.

2.2 Data Analysis

2.2.1 Species Richness Calculations

Perennial species richness is defined as the total number of unique species per unit area at each sampling site within a revegetation location. The Revegetation Plan states that richness should be averaged over three belt transects and one circular relevé plot for each 10-acre (4-ha) disturbance area (CH2M, 2010b). Richness averages were conducted for the 11 disturbed CLA East belt transects (CE-07 through 17) and the disturbed CLA East relevé plot. The richness average for CE-16 and CE-17 used three plots (CE-16, CE-17, and relevé plot) instead of four because monitoring success criteria were met on CE-18 in Year 2 (2017). Because of the small acreage and linear nature of the NGL, WR, 115 kV, and 33 kV revegetation locations, a relevé plot was not included in the richness analysis of disturbed locations. Species richness was calculated independently for the two NGL Ivanpah 3 belt transects, NGL-3 and NGL-3A.

2.2.2 Species Diversity Calculations

Perennial species diversity was calculated using Simpson's Index of Diversity (Simpson, 1949) using the following formula:

$$1 - D = 1 - \frac{\sum n(n-1)}{N(N-1)} \quad \text{(Eq. 1)}$$

Where:

1 – D = Simpson's Index of diversity
N = Total number of individual perennials
n = Number of individuals of a particular species

2.2.3 Progress Criteria

The Revegetation Plan (CH2M, 2010b) provides the following revegetation success criteria:

- ***Monitoring Duration***: 10 years or until success criteria are met (the period would be extended on a yearly basis if the criteria are not met after 10 years)
- ***Vegetation Cover Success Criterion***: 60 percent of pre-disturbance cover of perennials
- ***Species Richness Success Criterion***: 60 percent of pre-disturbance perennial species richness

To avoid ambiguities, the Revegetation Plan specified baseline values of pre-disturbance vegetation cover and species richness (Table 7-4, page 7-36, CH2M, 2010b). For the purpose of this document, the success criteria values reflect 60 percent of the baseline cover and richness values of 120 m^2 (1,292 ft^2) (as compared to 100 m^2 [1,076 ft^2] presented in the Revegetation Plan) for ease of analysis (Table 2-2). These baseline data are used to compare the perennial cover and species richness values measured during this reporting period.

Table 2-2. Success Criteria for Perennial Cover and Richness Values

Unit or Area	60% Perennial Plant Cover (%)	60% Perennial Species Richness[a]
Ivanpah 1	8	3
Ivanpah 2 and CLA	11	6
Ivanpah 3 and NGL	13	8
Channels and Washes	4	2

[a] Richness values are presented as the number of perennial species.

Notes:

% = percent

The Revegetation Plan also provided cover and richness criteria at Years 2, 5, and 8 as interim goals (Appendix D, Table D-8, page 12, CH2M, 2010b). Richness is defined as the number of perennial species per unit area. Analysis includes comparing the actual monitoring results to these interim goals presented in Table 2-3.

Table 2-3. Revegetation Success Criteria at Years 2, 5, and 8

Parameter	Year 2	Year 5	Year 8
Perennial Plant Cover (%)	No cover criteria; however, a minimum of 1,500 plants per acre	8	12
Species Richness (100 m^2)	3	5	10

Notes:

These goals are general success guidelines excerpted from the Revegetation Plan (Appendix D, Table D-8, page 12, CH2M, 2010b) and are not specific success criteria for units or areas, as outlined in Table 2-2.

2.2.4 Schedule and Reporting

Monitoring of revegetation progress will be conducted for a period of 10 years from the date of revegetation, or until the success criteria provided in Table 2-2 are met (CH2M, 2010b). If success criteria are not met within 10 years, monitoring extensions will be assessed by the BLM and CEC on a year-by-year basis until success criteria are met. Monitoring will be performed annually during the first 3 years following revegetation and every other year thereafter. Weed monitoring will occur for 10 years after revegetation treatment, independent of the progress of revegetation. The weed monitoring frequency is described in Section 2.3, Weed Management.

According to the Revegetation Plan, revegetation monitoring reports will be submitted to an adaptive management stakeholders' board within 30 days of each board meeting and annually submitted to the BLM and CEC (CH2M, 2010b). In the absence of a stakeholders' board, reports summarizing the previous year's monitoring results are being submitted to BLM and CEC yearly, or every other year according to the monitoring schedule described previously.

2.3 Weed Management

The Weed Plan (CH2M, 2010c) and Biological Opinion (USFWS, 2011) established the post-construction revegetation weed monitoring schedule. Monitoring was to occur monthly for the first 2 years after revegetation construction and then quarterly for the third and fourth years, followed by semiannual monitoring, for a total of 7 years (according to the Weed Plan), or for 10 years (according to the Biological Opinion). To resolve the conflict in duration, Solar Partners chose to follow the more conservative 10-year monitoring duration required by the Biological Opinion.

On linear disturbed sites, biological staff walked two transects within the approximately 50-ft-wide (approximately 15-m-wide) corridors: one transect outbound and one transect returning. In the western half of CLA East, biological staff walked 30-ft (9-m) spaced transects, alternating between north-south and east-west oriented transects. Each weed or grouping of weeds was recorded using a GPS. In addition, information was collected on the following:

- Species
- Number of individuals
- Whether they went to seed
- General location

The results were cataloged in a spreadsheet. Weeds were then manually removed, bagged, and disposed of offsite at an approved municipal waste disposal container.

3. Results

3.1 Revegetation Assessment

3.1.1 Background

In 2015, Revegetation Plan success criteria were met on four revegetation monitoring sites, two NGL linear monitoring sites (including the NGL tap station), the WR, and the 115 kV (Figure 1-1) (CH2M, 2016).

In 2017, Revegetation Plan success criteria were met on one revegetation monitoring site in CLA East (CE-18) (Figure 1-1) (CH2M, 2018). The results of these revegetation monitoring sites are not discussed further in this report.

3.1.2 Dates and Staff

Annual assessment of revegetation progress was conducted on April 25 through 29 and May 21, 2018, by Jacobs botanists Morgan King and Josh Holloway.

3.2 Survey Findings

Data from the 12 disturbed sites (identified as NGL-3, CE-07, CE-08, CE-09, CE-10, CE-11, CE-12, CE-13, CE-14, CE-15, CE-16, and CE-17) and 5 nearby undisturbed sites (NGL-3A, CE-07A, CE-10A, CE-13A, and CE-16A) were evaluated for comparison.

Between 2017 and 2018, treatment (disturbed) and control (undisturbed) sites generally showed declines for perennial density, richness, and survivorship consistent with a challenging season for vegetation in the region (refer to the tables provided in this section for details). However, perennial percent cover and diversity increased at treatment and control sites. Despite challenging regional conditions, some progress was made in the treatment areas, and the project is on track to meet the success criteria goals established in the Revegetation Plan.

3.2.1 Initial Establishment: Species Composition

Table 3-1 provides the three most abundant perennial species at sampled sites based on individual counts of percent cover along 30-m (98-ft) belt transects. The most abundant perennials in the disturbed sites are:

- Brittlebush (*Encelia farinosa*)
- Cheesebush (*Ambrosia salsola*)
- Creosote bush
- Desert marigold (*Baileya multiradiata*)
- Virgin River brittlebush (*Encelia virginensis*)
- White bursage

The most common perennial species in the undisturbed sites include:

- Buckhorn cholla (*Cylindropuntia acanthocarpa* var. *coloradensis*)
- Creosote bush
- Cheesebush
- Littleleaf ratany (*Krameria erecta*)
- Nevada jointfir (*Ephedra nevadensis*)
- Pencil cholla (*Cylindropuntia ramosissima*)
- White bursage

Table 3-1. Most Abundant Perennial Plant Taxa in Disturbed and Undisturbed Sites, Ordered by Percent Cover

Sample Site (Year[a])	Disturbed (% cover)	Undisturbed (% cover)
Ivanpah 3 Sites (Year 5)		
NGL-3 and NGL-3A (Year 5)		
1	White bursage (7.7)	White bursage (7.7)
2	Creosote bush (4.5)	Creosote bush (7.4)
3	Cheesebush (3.5)	Pencil cholla (3.8)
CLA East Sites (Year 3)		
CE-07 and CE-07A (Year 3)		
1	White bursage (2.1)	Nevada jointfir (8.2)
2	--	Creosote bush (5.1)
3	--	White bursage (4.8)
CE-08 (Year 3)		
1	White bursage (5.6)	
2	Cheesebush (0.6)	See undisturbed control site results for CE-7A
3	Desert marigold (0.6)	
CE-09 (Year 3)		
1	White bursage (3.9)	
2	Virgin River brittlebush (0.4)	See undisturbed control site results for CE-7A
3	--	
CE-10 and CE-10A (Year 3)		
1	White bursage (9.4)	White bursage (5.1)
2	Cheesebush (1.6)	Littleleaf ratany (4.8)
3	Creosote bush (0.2)	Creosote bush (4.7)
CE-11 (Year 3)		
1	White bursage (2.5)	
2	Creosote bush (0.1)	See undisturbed control site results for CE-10A
3	--	
CE-12 (Year 3)		
1	White bursage (2.9)	
2	Creosote bush (0.1)	See undisturbed control site results for CE-10A
3	--	
CE-13 and CE-13A (Year 3)		
1	White bursage (3.6)	White bursage (13.7)
2	--	Creosote bush (3.2)
3	--	Buckhorn cholla (1.2)
CE-14 (Year 3)		
1	White bursage (6.9)	
2	Cheesebush (0.9)	See undisturbed control site results for CE-13A
3	Creosote bush (0.4)	
CE-15 (Year 3)		
1	White bursage (3.8)	
2	Brittlebush (0.9)	See undisturbed control site results for CE-13A
3	--	
CE-16 and CE-16A (Year 3)		
1	White bursage (0.7)	Creosote bush (12.9)
2	Creosote bush (0.4)	White bursage (5.5)
3	--	Cheesebush (4.1)

Table 3-1. Most Abundant Perennial Plant Taxa in Disturbed and Undisturbed Sites, Ordered by Percent Cover

Sample Site (Year[a])	Disturbed (% cover)	Undisturbed (% cover)
CE-17 (Year 3)		
1	White bursage (7.0)	
2	Desert marigold (1.0)	See undisturbed control site results for CE-16A
3	Creosote bush (0.4)	

[a] Year number indicates number of years since revegetation treatment
Notes:
-- = not applicable

Although annual species' use of the revegetation areas does not pertain to the success criteria (CH2M, 2010b), it is important to note that these species are also establishing in the disturbance areas. Native plant species establishment decreases erosion and slows disturbance for adapted species establishment. The following annual and parasitic species were observed in the revegetation areas:

- Woolly amsonia (*Amsonia tomentosa*)
- Devil's spineflower (*Chorizanthe rigida*)
- Narrow-leaved cryptantha (*Cryptantha angustifolia*)
- Cryptantha species (*Cryptantha* sp.)
- Modest pepperweed (*Lepidium lasiocarpum*)
- Cooper's broom-rape (*Orobanche cooperi*)

Annual growth on the disturbed areas also includes the following weed species:

- Halogeton (*Halogeton glomeratus*)
- Russian thistle (*Salsola tragus*)
- Arabian schismus (*Schismus arabicus*)
- Silverleaf nightshade (*Solanum elaeagnifolium*)

Arabian schismus is allowed to colonize as pioneer species on revegetation areas (CH2M, 2010c). Weed species are discussed further in Section 3.2.8, Weed Management.

3.2.2 Perennial Density

Perennial density was determined as the number of perennial plants, irrespective of species, per 120-m^2 (1,292-ft^2) belt transect and is provided in Table 3-2. Perennial density in both the undisturbed and disturbed sites decreased between 2017 and 2018, as shown in Table 3-2 and on Figure 3-1. As shown in Table 3-2, perennial densities in the disturbed sites ranged from 62 (CE-15) to 881 (CE-14). The perennial densities in the undisturbed sites ranged from 56 (NGL-3A) to 427 (CE-10A).

Table 3-2. Perennial Density in Disturbed and Undisturbed Sample Sites

Sample Site	Disturbed					Undisturbed				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Ivanpah 3 Site (Year 5) [a]										
NGL-3 and NGL-3A	25	111	114	--	90	51	176	122	--	56
CLA East Sites (Year 3) [b]										
CE-07 and CE-07A	--	--	39	70	66	--	--	574	370	272
CE-08	--	--	2	468	315	--	--	--	--	--
CE-09	--	--	37	591	440	--	--	--	--	--
CE-10 and CE-10A	--	--	529	530	402	--	--	842	604	427
CE-11	--	--	3	1,038	703	--	--	--	--	--
CE-12	--	--	47	378	273	--	--	--	--	--
CE-13 and CE-13A	--	--	0	214	161	--	--	184	146	130

Table 3-2. Perennial Density in Disturbed and Undisturbed Sample Sites

Sample Site	Disturbed					Undisturbed				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
CE-14	--	--	27	1,270	881	--	--	--	--	--
CE-15	--	--	69	45	62	--	--	--	--	--
CE-16 and CE-16A	--	--	2	670	563	--	--	135	123	111
CE-17	--	--	108	210	205	--	--	--	--	--

[a] No monitoring occurred on the NGL-3 site in 2017 because this site is monitored every other year.

[b] No monitoring occurred on the CLA 33 kV-6 site in 2018 because this site is monitored every other year.

Notes:

Perennial density is calculated as the number of plants per 120 m^2 (1,292 ft^2)

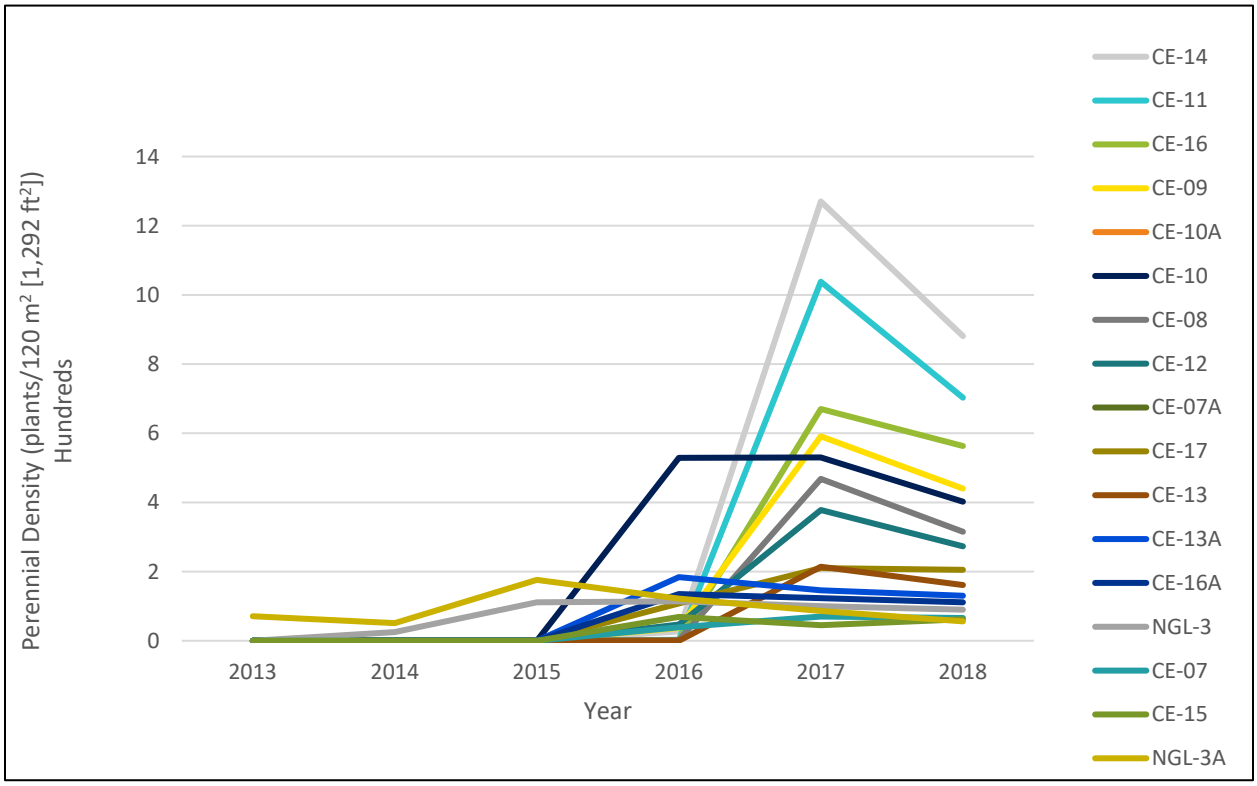


Figure 3-1. Perennial Density Over Time

3.2.3 Perennial Cover

The perennial cover in the disturbed and undisturbed sites is presented in Table 3-3. The Year 3 (2018) results for the CLA East locations show perennial cover ranging from 1.1 to 11.3 percent. The perennial cover in the undisturbed sites for Year 3 (2018) ranges from 15.8 to 22.5 percent. The Year 5 (2018) results for the NGL-3 site show a 16.1 percent cover, which is comparable to the undisturbed 14.2 percent cover.

Table 3-3. Percent Perennial Cover in Disturbed and Undisturbed Sample Sites during 2018

Sample Site (Year)	Disturbed					Undisturbed				
	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)	2014 (%)	2015 (%)	2016 (%)	2017 (%)	2018 (%)
Ivanpah 3 Site (Year 5)[a]										
NGL-3 and NGL-3A	4	10	11.3	--	16.1	10	13	14.1	--	14.2
CLA East Sites (Year 3)[b]										
CE-07 and CE-07A	--	--	0	1.1	2.1	--	--	22.3	14.5	21.1
CE-08	--	--	0	2.4	6.8	--	--	--	--	--
CE-09	--	--	0	2.5	4.3	--	--	--	--	--
CE-10 and CE-10A	--	--	1	9.7	11.3	--	--	24.2	20.3	15.8
CE-11	--	--	0	1.3	2.6	--	--	--	--	--
CE-12	--	--	0	2.5	3.8	--	--	--	--	--
CE-13 and CE-13A	--	--	0	1.5	3.6	--	--	22.8	19	19.6
CE-14	--	--	0	4.5	8.2	--	--	--	--	--
CE-15	--	--	0	1.8	4.6	--	--	--	--	--
CE-16 and CE-16A	--	--	0	0.7	1.1	--	--	25.6	15.7	22.5
CE-17	--	--	0	4.5	8.4	--	--	--	--	--

[a] No monitoring occurred on the NGL-3 site in 2017 because this site is monitored every other year.

[b] No monitoring occurred on the CLA 33 kV-6 site in 2018 because this site is monitored every other year.

3.2.4 Perennial Species Richness and Diversity

The richness and diversity parameters are interrelated expressions, or different ways of enumerating the abundance of plant species in a community. This section provides 2018 monitoring results for these parameters.

3.2.4.1 Species Richness

Perennial species richness is presented in Table 3-4 for each sample site (richness is the total number of species present within a 120-m^2 [1,292-ft^2] area for small areas; or for large enough areas, the average number of species present within three 120-m^2 [1,292-ft^2] area belt transects and one relevé plot). During Year 3 (2018) monitoring of the western side of CLA East, richness at the disturbed sites was approaching, or equal to, the number at the undisturbed sites. On the disturbed sites, the 2018 species richness results ranged from five to eight species. At the undisturbed sites, species richness ranged from 8 to 14 species.

Table 3-4. Perennial Species Richness in Disturbed and Undisturbed Sample Sites during 2018

Site (Year)	Perennial Species Richness									
	Disturbed [a]					Undisturbed				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Ivanpah 3 (Year 5)										
NGL-3 and NGL-3A	4	6	5	--	5	**6**	**8**	**8**	--	8
CLA East Sites (Year 3) [b]										
CE-07, CE-08, CE-09, and CE-07A	--	--	4	9	7	--	--	14	15	14
CE-10, CE-11, CE-12, and CE-10A	--	--	4	10	8	--	--	13	12	11
CE-13, CE-14, CE-15, and CE-13A	--	--	4	9	8	--	--	11	10	10
CE-16, CE-17, and CE-16A [c]	--	--	4	10	8	--	--	9	7	8

[a] Because of the size and distribution of the NGL-3 location, perennial species richness was calculated based on the total number of perennial species in one belt transect. On large enough revegetation areas (western side of CLA East), perennial species richness is calculated as an average between three belt transects and one relevé plot. See results for CLA East disturbed relevé plot in Table 3-7. Averages are rounded to the nearest whole number.

[b] No monitoring occurred on the 33 kV-6 site in 2018 because this site is monitored every other year.

[c] Monitoring success criteria was met at CE-18 in Year 2 (2017). The richness average for CE-16 and CE-17 was calculated using three plots (CE-16, CE-17, and relevé plot) instead of four plots.

3.2.4.2 Diversity

Perennial diversity, as expressed by Simpson's Index (Simpson, 1949) (Section 2.2.2), is presented in Table 3-5 for each sample site. Perennial diversity was overall lower in the disturbed sites than in the undisturbed sites, except for NGL-3. Diversity results for 2018 in the disturbed sites ranged from 0.15 to 0.69, and in the undisturbed sites from 0.42 to 0.68. During the third year of monitoring at the CLA East revegetation monitoring sites, all sites either were equal to or showed increased diversity values as compared to second year results.

Table 3-5. Perennial Diversity in Disturbed and Undisturbed Sample Sites during 2018

Site (Year)	Simpson's Index of Diversity (1-D)									
	Disturbed					Undisturbed				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Ivanpah 3 (Year 5)										
NGL-3 and NGL-3A	0.73	0.72	0.71	--	0.69	0.6	0.55	0.61	--	0.66
CLA East Sites (Year 2)[a]										
CE-07 and CE-7A	--	--	0.36	0.06	0.15	--	--	0.45	0.53	0.68
CE-08	--	--	0	0.21	0.29	--	--	--	--	--
CE-09	--	--	0.25	0.21	0.21	--	--	--	--	--
CE-10 and CE-10A	--	--	0.2	0.28	0.30	--	--	0.33	0.39	0.42
CE-11	--	--	0	0.10	0.18	--	--	--	--	--
CE-12	--	--	0.39	0.20	0.22	--	--	--	--	--
CE-13 and CE-13A	--	--	0	0.24	0.36	--	--	0.68	0.64	0.60
CE-14	--	--	0.37	0.23	0.28	--	--	--	--	--
CE-15	--	--	0.22	0.21	0.48	--	--	--	--	--
CE-16 and CE-16A	--	--	0	0.22	0.26	--	--	0.73	0.71	0.63

Source: Simpson, 1949.

[a] No monitoring occurred on the 33 kV-6 site in 2018 because this site is monitored every other year.

Notes:

The higher the index of diversity, the greater the diversity at a site.

3.2.4.3 Survivorship

Table 3-6 presents the survivorship or growth rates for the revegetation and control sites. As noted in Section 2.1.1.3, the Year 1 (2016) live perennial individuals represent the original cohort, and survivorship was set to 1.0 for future survivorship calculations. Survivorship or growth rate values greater than 1.0 indicate that more individuals are present in the belt transect than during Year 1 (2016), and values less than 1.0 indicate that fewer individuals are present. Between Year 2 (2017) and Year 3 (2018) in the CLA East revegetation monitoring sites, all sites showed decreased survivorship, except CE-15, which increased in survivorship. Consistent with the disturbed sites, the undisturbed sites for CLA East also showed decreased survivorship. Even though trends show a slight decrease in disturbed sites, the disturbed sites show greater survivorship than undisturbed sites, which is consistent with increased plant establishment and successful revegetation efforts.

Table 3-6. Perennial Survivorship in Disturbed and Undisturbed Sample Sites

Sample Site	Disturbed					Undisturbed				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Ivanpah 3 (Year 5)										
NGL-3 and NGL-3A	1	4.44	4.56	--	3.60	1	3.45	2.39	--	1.10
CLA East Sites (Year 3) [a]										
CE-07 and CE-07A	--	--	1	1.79	1.69	-	--	1	0.64	0.47
CE-08	--	--	1	234	158	-	--	-	-	--
CE-09	--	--	1	15.97	11.89	-	--	-	-	--
CE-10 and CE-10A	--	--	1	1.00	0.76	-	--	1	0.72	0.51
CE-11	--	--	1	346	234	-	--	-	-	--
CE-12	--	--	1	8.04	5.81	-	--	-	-	--
CE-13 and CE-13A	--	--	1	214	161	-	--	1	0.79	0.71
CE-14	--	--	1	47.04	32.63	-	--	-	-	--
CE-15	--	--	1	0.65	0.90	-	--	-	-	--
CE-16 and CE-16A	--	--	1	335	282	-	--	1	0.91	0.82
CE-17	--	--	1	1.94	1.90	-	--	--	--	--

[a] No monitoring occurred on the 33 kV-6 site in 2018 because this site is monitored every other year.

3.2.4.4 Relevé Plots

Table 3-7 provides the observed perennial species at three relevé plots, one south on an undisturbed CLA, one north on the undisturbed NGL, and one on the disturbed western side of CLA East. The undisturbed relevé plots had 14 and 15 species observed. The western side of CLA East disturbed relevé plot during Year 3 (2018) monitoring had 6 species, which is a decrease from 15 species observed during Year 2 (2017).

Table 3-7. Relevé Plots Observed Perennial Species List on Disturbed and Undisturbed Areas during 2018

Scientific Name	Common Name	Undisturbed Relevé Plot (North, NGL)	Undisturbed Relevé Plot (South, CLA East)	Disturbed Relevé Plot (CLA East)
Cooper's dogweed	*Adenophyllum cooperi*	X	X	--
White bursage	*Ambrosia dumosa*	X	X	X
Cheesebush	*Ambrosia salsola*	X	X	X
Desert marigold	*Baileya multiradiata*	--	--	X
Buckhorn cholla	*Cylindropuntia acanthocarpa*	X	X	--
Silver cholla	*Cylindropuntia echinocarpa*	--	X	--
Pencil cholla	*Cylindropuntia ramomissima*	X	X	--
Fluff grass	*Dasyochloa pulchellum*	--	X	--
Brittlebush	*Encelia farinosa*	--	--	X
Virgin River brittlebush	*Encelia virginensis*	--	--	X
Nevada jointfir	*Ephedra nevadensis*	X	X	--
California buckwheat	*Eriogonum fasciculatum*	X	X	--
Desert trumpet	*Eriogonum inflatum*	X	X	--
Whitemargin sandmat	*Euphorbia albomarginatus*	X	--	--
Pima ratany	*Krameria erecta*	X	X	--
Creosote bush	*Larrea tridentata*	X	X	X
Slender poreleaf	*Porophyllum gracile*	X	--	--
Mexican bladdersage	*Scutellaria mexicana*	X	--	--
Catclaw acacia	*Senegalia greggii*	X	--	--
Desert globe mallow	*Sphaeralcea ambigua*	--	X	--
Mojave yucca	*Yucca schidigera*	X	X	--
Total Perennial Plant Species Observed in Plot		**15**	**14**	**6**

Notes:

X = observed

-- = not observed

3.2.5 Photographic Documentation

Photographs of the disturbed and undisturbed locations are provided in Appendix A.

3.2.6 Weed Management

In 2018, weed monitoring requirements (USFWS, 2011) were staggered based on when the revegetation treatment was completed (Table 1-2 presents the weed monitoring schedule). The western side of CLA East was monitored quarterly at minimum according to Year 3 criteria. Because of the number of weeds observed in 2016 and 2017 at CLA East, weed monitoring occurred monthly during the growing season (March through October). The remaining areas were monitored semiannually (NGL linear, NGL tap station, WR, 115 kV, and 33 kV) according to Year 5 and Year 6 criteria.

Weed monitoring occurred on the six revegetation sites between January 1 and December 31, 2018. During this time, a total of 38 individual plants of the 3 noxious weed species shown in Table 3-8 were observed (see also Figure 3-2). The three noxious weed species observed were:

- Halogeton
- Russian thistle
- Silverleaf nightshade

Table 3-8. Summary of Weed Species Observed at Revegetation Locations 2018

Noxious Weed Species	Revegetation Location[a]					
	NGL	NGL Tap Station	WR	115 kV	33 kV	Western Side of CLA East
Halogeton	0	0	0	0	0	5
Russian thistle	0	0	0	0	0	31
Silverleaf nightshade	0	0	0	0	0	2
Total per Location	**0**	**0**	**0**	**0**	**0**	**38**
Total Observed						**38**

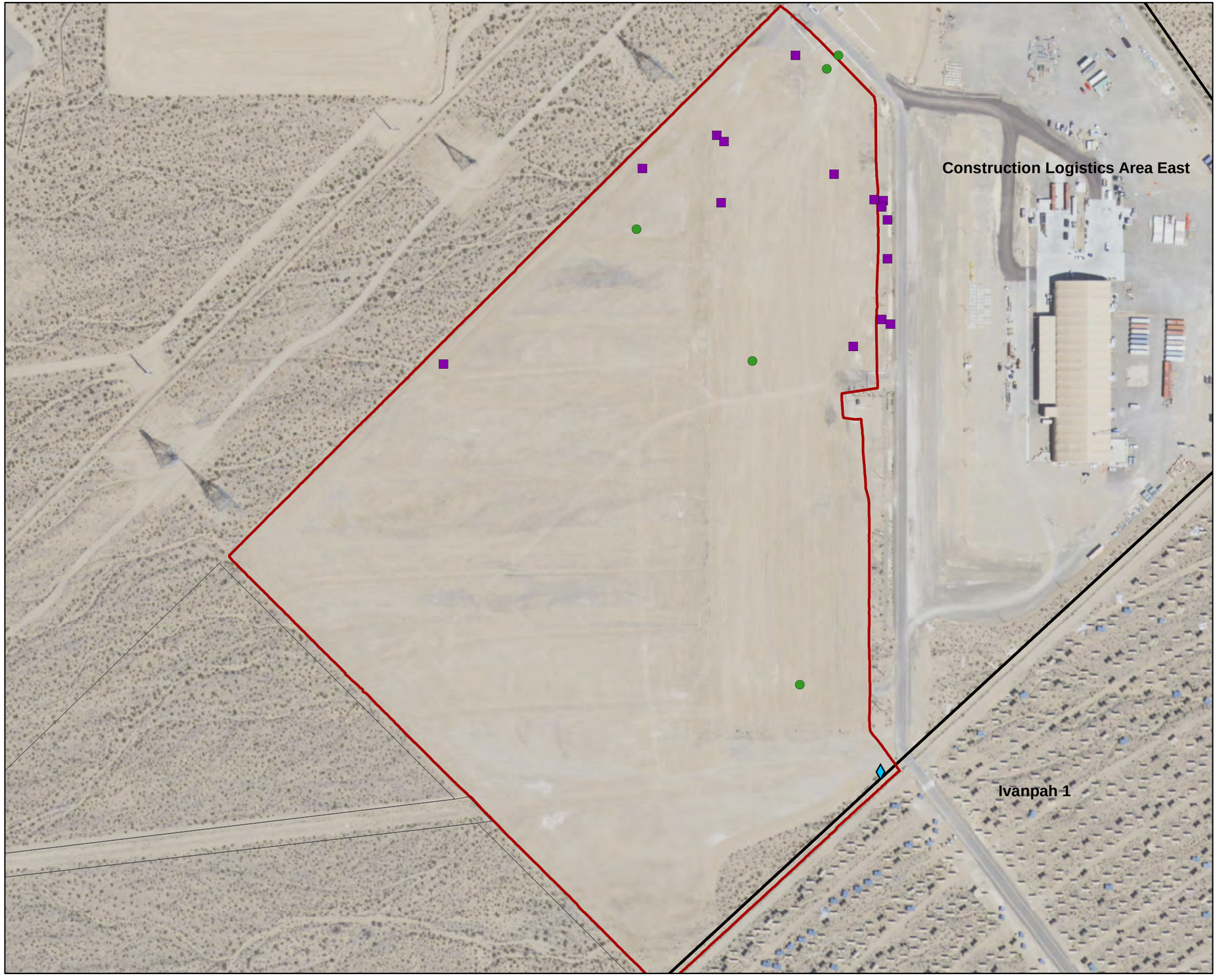
[a] Weed monitoring included the entire disturbed revegetation area, including the sampling sites.

In 2018, all weed individuals were found at the western side of CLA East revegetation during Year 3 (2018) monitoring (Table 3-8). The most common weed species observed was Russian thistle, which was observed only in the northern half of the area (Figure 3-2). The only other observed species were halogeton and silverleaf nightshade. All individuals were removed by hand and disposed of according to the Weed Plan (CH2M, 2010c).

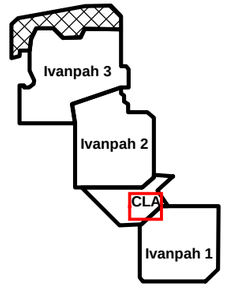
The data show that the implementation of the Weed Plan (CH2M, 2010c) is successfully attaining the goals of removing noxious weeds before they can set seed and of minimizing the transport of additional weed propagules to the site. Between 2016 and 2018, the total number of weeds decreased at the western side of CLA East. In 2016, a total of 1,407 individuals of 9 species were observed; in 2017, a total of 312 individuals of 6 species were observed; and in 2018, a total of 38 individuals of 3 species were observed. Between 2017 and 2018, all species decreased total individual numbers. Biological staff documented that approximately 60 percent of the individuals had dispersed seeds.

No weed species were observed in the revegetation locations (NGL, NGL tap station, WR, 115 kV, or 33 kV) during Year 5 (2018) and Year 6 (2018) monitoring; annual weed monitoring was staggered based on when revegetation was complete. These sites are meeting the Revegetation Plan (CH2M, 2010b) goal that revegetation sites have less than 15 percent weed cover.

In the western side of CLA East, biological staff also observed one BIO-13 noxious weed species that is not feasible to manually control. Arabian schismus is a BIO-13 noxious weed species that is allowed to colonize revegetation areas as pioneer species (CH2M, 2010c). This species is widespread in the Mojave Desert, and control is considered impractical.



WEED LOCATIONS



LEGEND

- Project Site
- Current Short-term Impact Area

Weed Data 2018

- Halogeton
- Russian thistle
- Silverleaf nightshade

Points represent a weed location where there may be more than one individual present.

CLA = Construction Logistics Area

Service Layer Credits: Esri, USDA Farm Service Agency

N

0 100 200
Feet

Figure 3-2
2018 Annual Revegetation Monitoring Weed Results
Ivanpah Solar Electric Generating System
San Bernardino County, California

4. Discussion

4.1 Interim Success Criteria Goals

Table 4-1 (same as Table 2-3 but presented again for convenience) provides interim success criteria percent cover and species richness goals for Years 2, 5, and 8. These goals are general success guidelines excerpted from the Revegetation Plan (Appendix D, Table D-8, page 12, CH2M, 2010b) and are not specific success criteria for units or areas, as outlined in Table 2-2. There are no projection goals for Year 3 for the CLA East sites.

Table 4-1. Revegetation Success Criteria at Years 2, 5, and 8

Parameter	Year 2	Year 5	Year 8
Perennial Plant Cover (%)	No cover criteria; however, a minimum of 1,500 plants per acre	8	12
Species Richness (100 m^2)	3	5	10

Perennial percent cover data are one of the two success criteria. CLA-East revegetation monitoring sites have met or are approaching the Year 5 projections of 8 percent perennial cover. The Year 2 projections for the western side of CLA East anticipated a minimum of 1,500 plants per acre with zero percent cover (Table 4-1). Each 120-m^2 (1,292-ft^2) belt transect is a fraction of an acre (0.03 acre [0.01 ha]), and the plants per acre can be extrapolated from the density data (individual number of perennial plants recorded in belt transect; Table 3-2). Even the lowest density of plants recorded within a belt transect (CE-15, 62 plants) would extrapolate to exceed the Year 2 1,500 plants target, with 2,067 individual plants. The highest density belt transect (CE-14, 881 plants) has estimated over 29,000 individual plants in 1 acre (0.4 ha). Similar to Year 2 results, the Year 3 results for the CLA East monitoring sites are far exceeding the interim percent cover goals to meet revegetation success in 10 years (CH2M, 2010b). The NGL-3 site has met percent cover since Year 2 (2014).

As compared to Table 4-1, the CLA East revegetation monitoring sites are meeting richness success criteria, even though these sites are in Year 3 (2018). NGL-3 is short of meeting richness success criteria (five perennial species were observed, and the success criterion is eight). As compared to interim goals, the NGL-3 site is exceeding cover goals and meeting Year 5 projected richness criteria (five species).

4.2 Final Progress Criteria Analysis

To meet the revegetation success criteria, a sampling site must meet both the percent perennial cover and species richness goals defined in the Revegetation Plan (CH2M, 2010b), which are independent of control plot results. Once both success criteria are met, then annual revegetation monitoring is complete for that location, and no further revegetation monitoring is required. In accordance with weed management requirements, monitoring for presence of weed species will continue for a total of 10 years past the date of revegetation treatment (CH2M, 2010c; USFWS, 2011).

4.2.1 Revegetation Monitoring

The results of the perennial percent cover and species richness for the 12 disturbed locations as compared to the Revegetation Plan (CH2M, 2010b) success criteria are provided in Table 4-2. In 2018, 1 of the 12 locations, CE-10, met both success criteria after 3 years of post-revegetation treatment. Revegetation monitoring for this monitoring site in the western side of CLA East is now complete. The 11 remaining sites that did not meet both success criteria, CE-07, CE-08, CE-09, CE-11, CE-12, CE-13, CE-14, CE-15, CE-16, CE-17, and NGL-3, appear to be on track to meet the revegetation success criteria within 10 years as compared to Table 4-1.

Table 4-2. 2018 Monitoring Results Compared to Success Criteria

	Target Cover (%)	2018 Observed Cover (%)	Met Cover Success Criteria?	Target Species Richness	2018 Observed Species Richness[a]	Met Richness Success Criteria?	Met Both Success Criteria?
Ivanpah 3 and NGL							
NGL-3	13	16.1	Yes	8	5	No	No
Ivanpah 2 and CLA							
CE-07	11	2.1	No	6	7	Yes	No
CE-08	11	6.8	No	6	7	Yes	No
CE-09	11	4.3	No	6	7	Yes	No
CE-10	**11**	**11.3**	**Yes**	**6**	**8**	**Yes**	**Yes**
CE-11	11	2.6	No	6	8	Yes	No
CE-12	11	3.8	No	6	8	Yes	No
CE-13	11	3.6	No	6	8	Yes	No
CE-14	11	8.2	No	6	8	Yes	No
CE-15	11	4.6	No	6	8	Yes	No
CE-16	11	1.1	No	6	8	Yes	No
CE-17	11	8.4	No	6	8	Yes	No

[a] Perennial species richness at the CLA East revegetation monitoring sites was calculated at an average of three belt transects and one relevé plot. Because monitoring success criteria were met at CE-18 in Year 2 (2017), the richness average for CE-16 and CE-17 was calculated using three plots (CE-16, CE-17, and relevé plot) instead of four plots.

Notes:

Success criteria are defined in the Revegetation Plan (CH2M, 2010b).

Between 2017 and 2018, treatment and control sites generally showed monitoring parameter declines consistent with a challenging season for vegetation in the region. Perennial density, richness, and survivorship decreased at both treatment and control sites (respectively, Tables 3-2, 3-4, and 3-6). Perennial percent cover and diversity both increased at both treatment and control sites (respectively, Tables 3-3 and 3-5). Thus, overall progress was made in the treatment areas, and the project is on track to meet the success criteria goal established in the Revegetation Plan.

The Revegetation Plan indicates that annual revegetation monitoring data analysis should include observations of biological activity and erosion (CH2M, 2010b). In 2018, botanists observed fewer signs of herbivory on CLA East sites than during Years 1 (2016) and 2 (2017). There were signs of herbivory on NGL-3 outside of the facility perimeter fence. Erosion continued to be observed on the western side of CLA East on eastern edges near the access road to Ivanpah 1.

4.2.2 Weed Management

The data show that the implementation of the Weed Plan (CH2M, 2010c) is successfully attaining the goals of removing noxious weeds before they can set seed and of minimizing the transport of additional weed propagules to the site. The only weeds observed in 2018 on revegetation locations were at the western side of CLA East during Year 3 monitoring. Between 2016 and 2018, the total number of weeds dropped from 1,407 to 38, which shows that manual control is effective. Weed species grow and mature rapidly. Even with once-monthly monitoring during the Year 3 (2018) growing season, biological monitors reported that approximately 60 percent of the individuals had already dispersed seed when they were observed. These locations were mapped and will be targeted during Year 4 (2019) weed monitoring. Year 4 (2019) weed monitoring on the western side of CLA East is required quarterly.

During weed monitoring of the western side of CLA East (Year 3 [2018]), a qualified botanist observed establishment of one BIO-13 noxious weed species allowed to colonize as pioneer species, Arabian

schismus. This species is ubiquitous in the Mojave Desert, and they are acceptable because they decrease erosion and slow disturbance for native species establishment.

Since 2015, no noxious weeds were observed on the five other revegetation locations (NGL, NGL tap station, WR, 115 kV, and 33 kV). As semiannual monitoring continues for 10 years post-revegetation, we expect that weeds will have little chance of establishing on these areas, since native plants are increasing percent cover each year. Semiannual monitoring of these locations will target spring and late summer plant establishment, and surveys will be conducted in April and September 2019.

Facility-wide weed monitoring, beyond the revegetation locations, is conducted in accordance with COC BIO-13 – Weed Plan (CH2M, 2010c) and is reported in the *Conditions of Certification BIO-13, Annual Biological Report January 1, 2018 – December 31, 2018* (Solar Partners, 2019).

4.3 Remaining Revegetation

The only remaining short-term disturbance awaiting revegetation is the Interstate-15 Desert Tortoise Pen Area. This area was constructed in 2011 and is expected to be used until fall 2021. The ISEGS short-term disturbance area is 10.9 acres (4.4 ha), which is three sides of the pen at a 35-ft (11-m) disturbance corridor width. The fourth side of the pen area is part of the Joint Point of Entry, which is maintained by the California Department of Transportation.

5. References

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Appendix A
Baseline Site Photographs

Site Photographs:

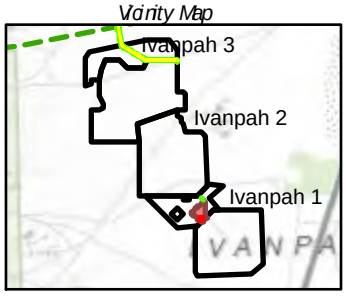
Date: 04/26/2018
Transect Line ID: CE-07
Point Type: Start Point

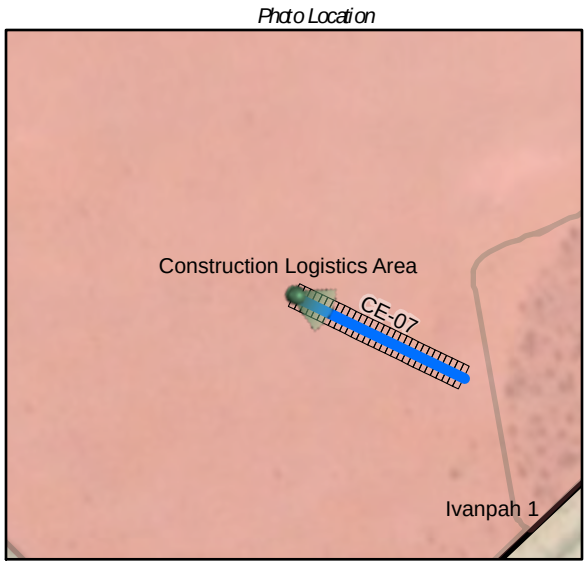
Easting: 639524
Northing: 3934320

Compass Bearing (degrees): 116.57

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

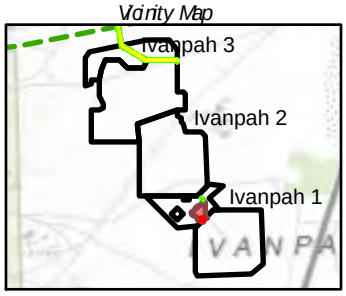
Date: 04/26/2018
Transect Line ID: CE-07
Point Type: End Point

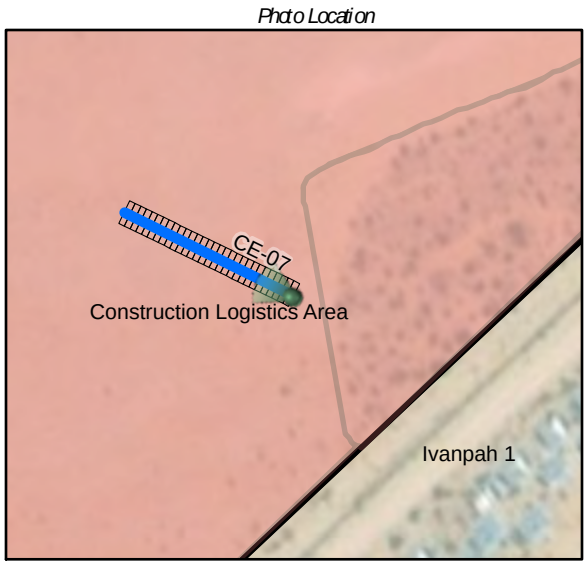
Easting: 639568
Northing: 3934298

Compass Bearing (degrees): 296.57

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





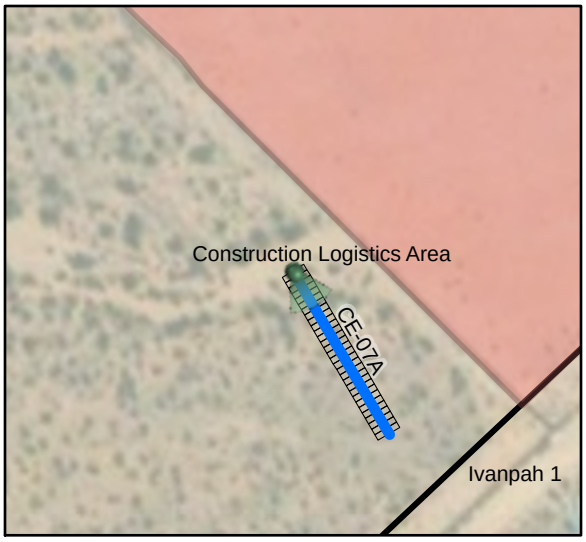
Site Photographs:

Date: 04/28/2018
Transect Line ID: CE-07A
Point Type: Start Point

Easting: 639481
Northing: 3934263

Compass Bearing (degrees): 150.02

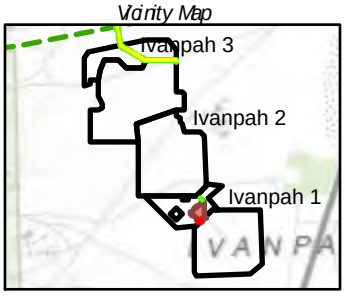
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

Date: 04/28/2018
Transect Line ID: CE-07A
Point Type: End Point

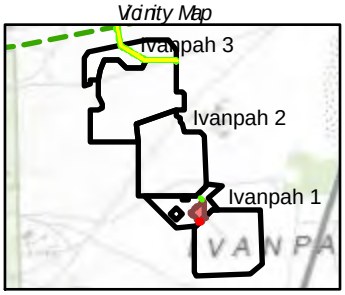
Easting: 639496
Northing: 3934237

Compass Bearing (degrees): 330.02

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



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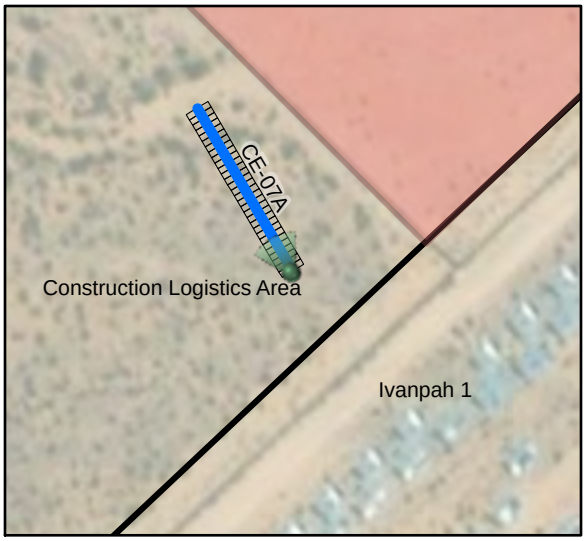


Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-08
Point Type: Start Point

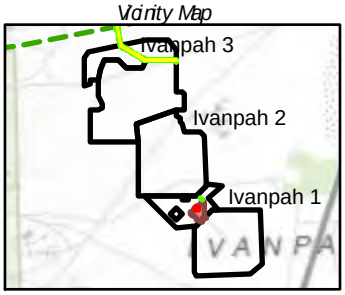
Easting: 639424
Northing: 3934633

Compass Bearing (degrees): 285.42

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



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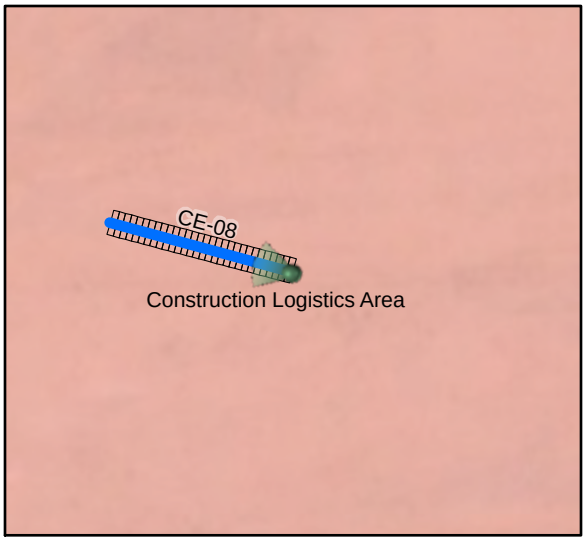


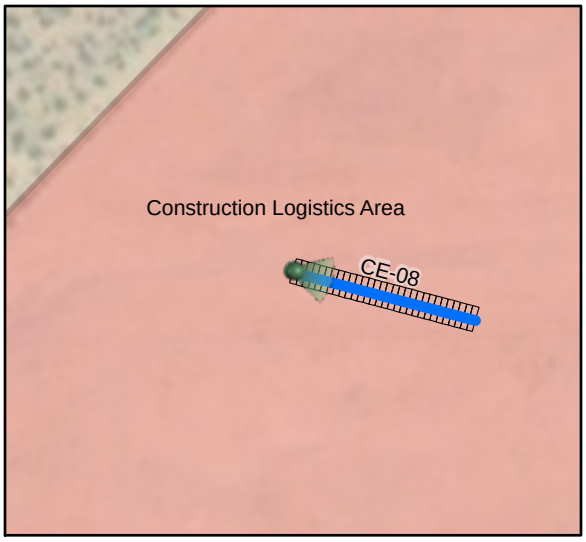
Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-08
Point Type: End Point

Easting: 639395
Northing: 3934641

Compass Bearing (degrees): 105.42

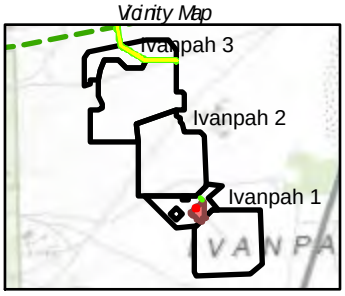
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-09
Point Type: Start Point

Easting: 639592
Northing: 3934843

Compass Bearing (degrees): 277.35

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map

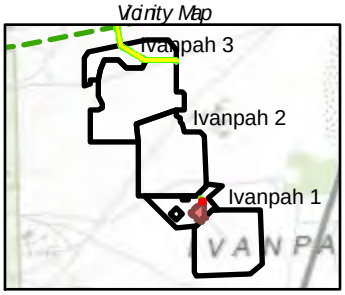
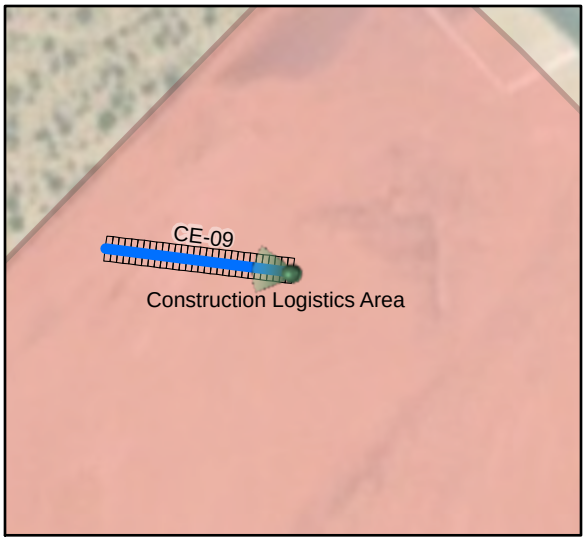


Photo Location



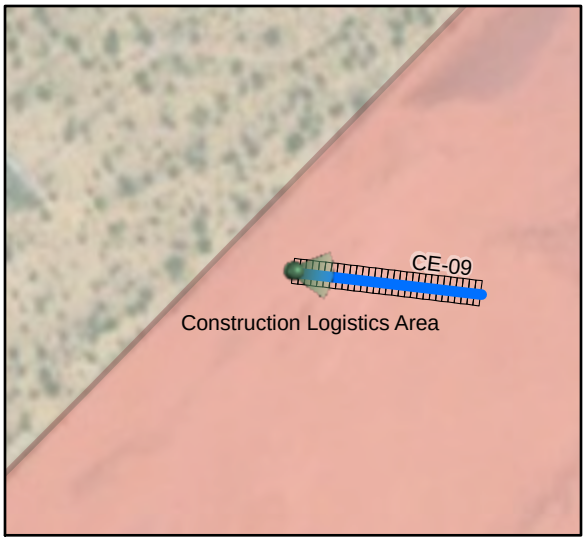
Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-09
Point Type: End Point

Easting: 639561
Northing: 3934847

Compass Bearing (degrees): 97.35

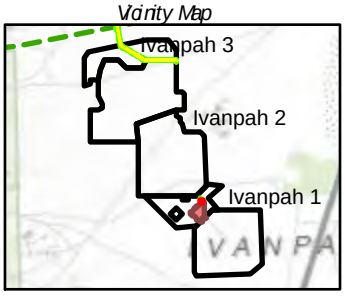
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

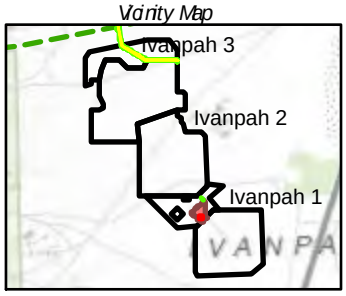
Date: 04/26/2018
Transect Line ID: CE-10
Point Type: Start Point

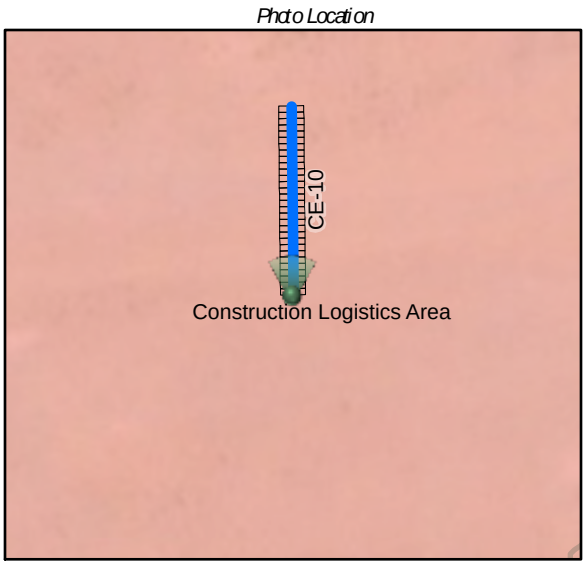
Easting: 639509
Northing: 3934366

Compass Bearing (degrees): 0.0

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

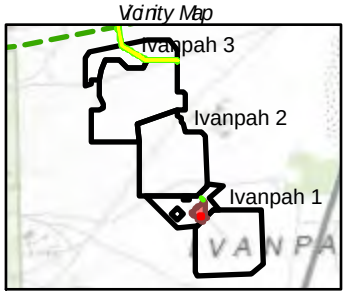
Date: 04/26/2018
Transect Line ID: CE-10
Point Type: End Point

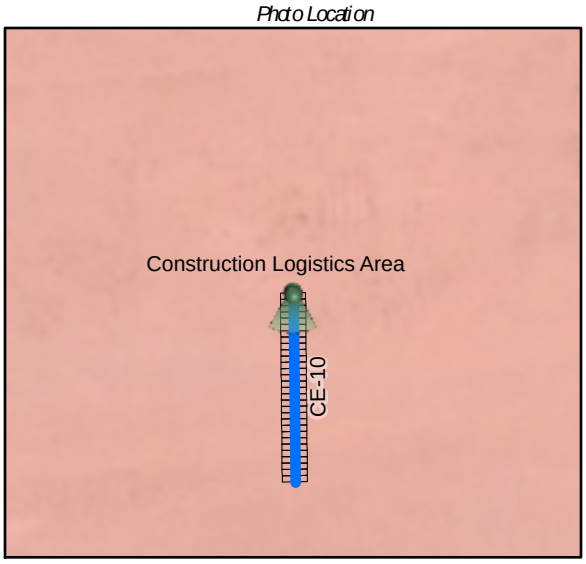
Easting: 639509
Northing: 3934397

Compass Bearing (degrees): 180.0

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

Date: 04/28/2018
Transect Line ID: CE-10A
Point Type: Start Point

Easting: 639358
Northing: 3934366

Compass Bearing (degrees): 339.86

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map

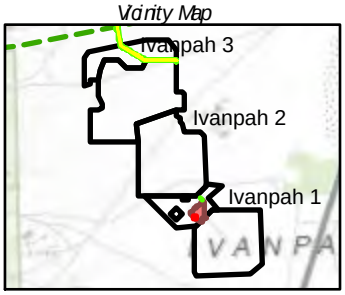
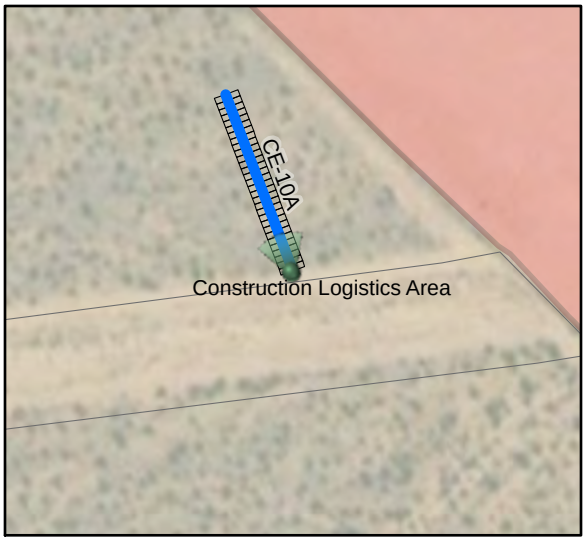


Photo Location



Site Photographs:

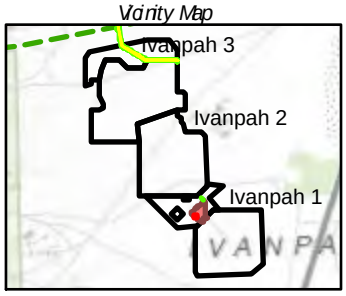
Date: 04/28/2018
Transect Line ID: CE-10A
Point Type: Start Point

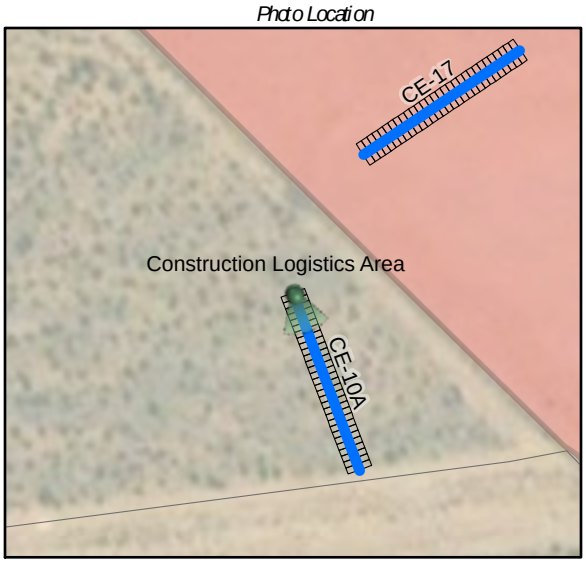
Easting: 639347
Northing: 3934396

Compass Bearing (degrees): 159.86

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

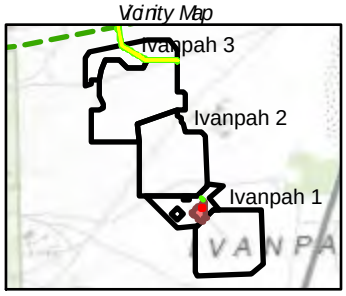
Date: 04/25/2018
Transect Line ID: CE-11
Point Type: Start Point

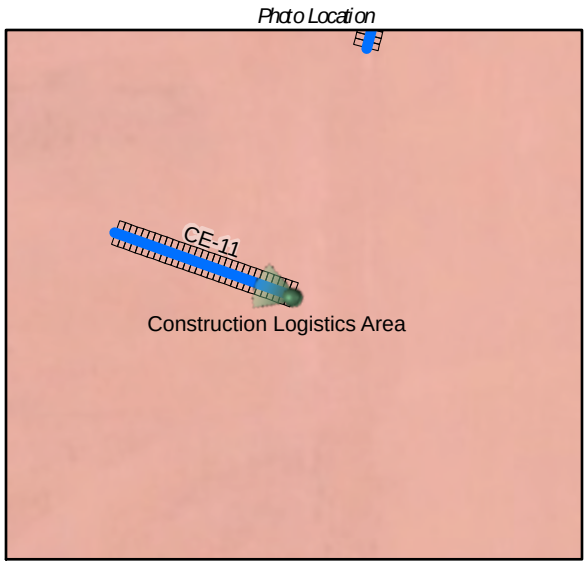
Easting: 639546
Northing: 3934650

Compass Bearing (degrees): 289.81

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats



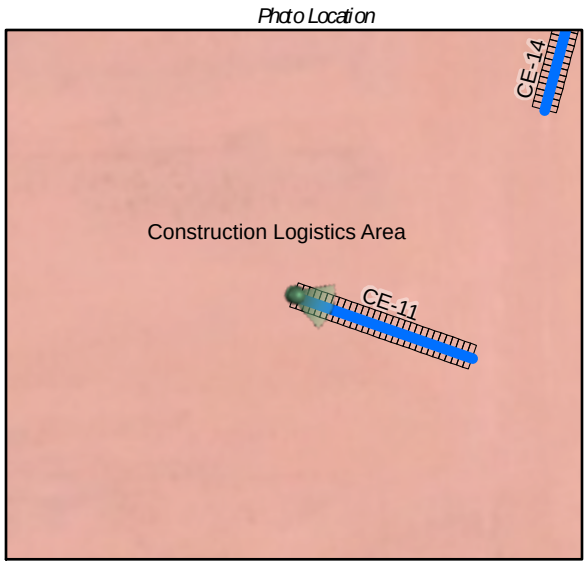


Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-11
Point Type: End Point

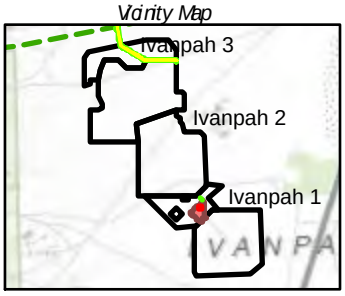
Easting: 639521
Northing: 3934659

Compass Bearing (degrees): 109.81



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats



Site Photographs:

Date: 04/26/2018
Transect Line ID: CE-12
Point Type: Start Point

Easting: 639584
Northing: 3934513

Compass Bearing (degrees): 20.77

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map

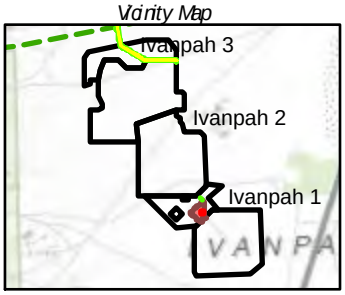
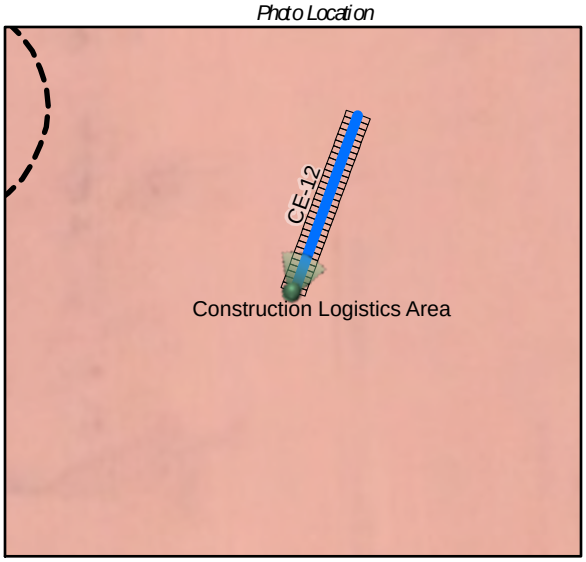


Photo Location



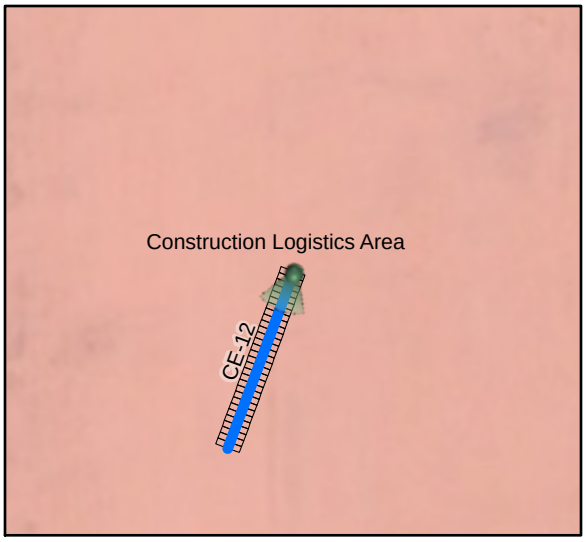
Site Photographs:

Date: 04/26/2018
Transect Line ID: CE-12
Point Type: End Point

Easting: 639595
Northing: 3934542

Compass Bearing (degrees): 200.77

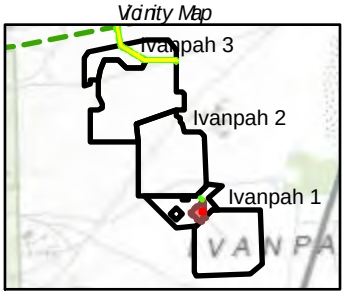
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



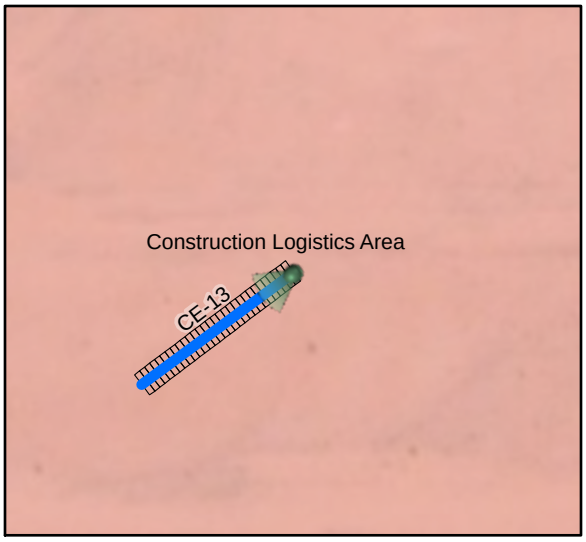
Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-13
Point Type: Start Point

Easting: 639370
Northing: 3934577

Compass Bearing (degrees): 233.51

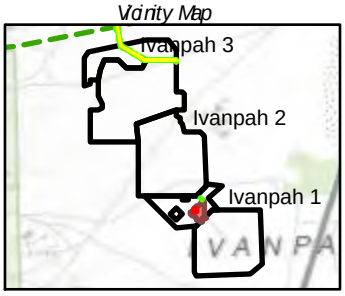
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



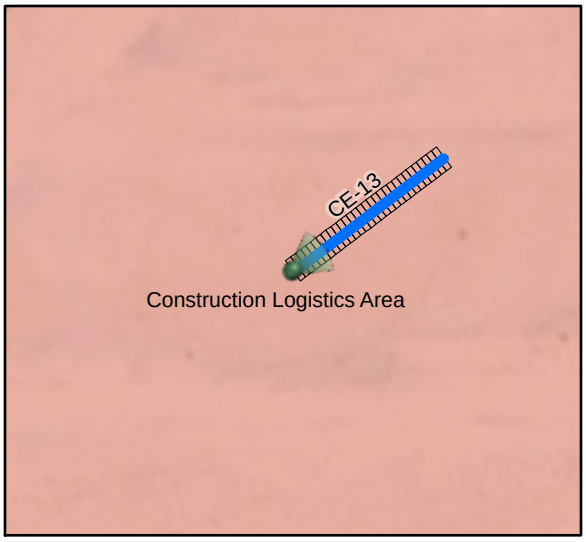
Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-13
Point Type: End Point

Easting: 639347
Northing: 3934560

Compass Bearing (degrees): 53.51

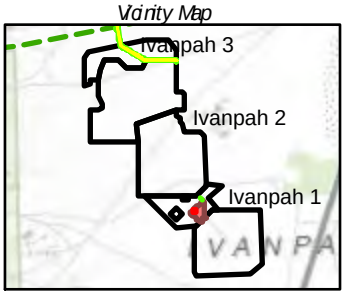
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



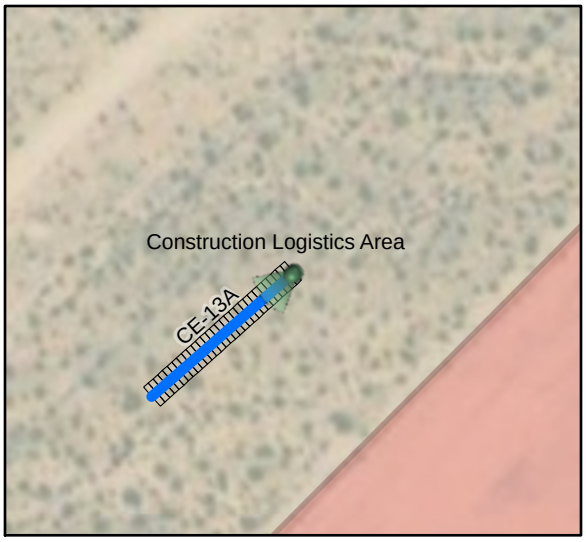
Site Photographs:

Date: 04/29/2018
Transect Line ID: CE-13A
Point Type: Start Point

Easting: 639291
Northing: 3934631

Compass Bearing (degrees): 228.81

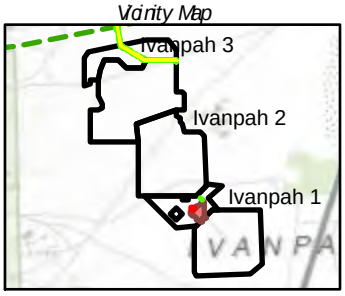
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



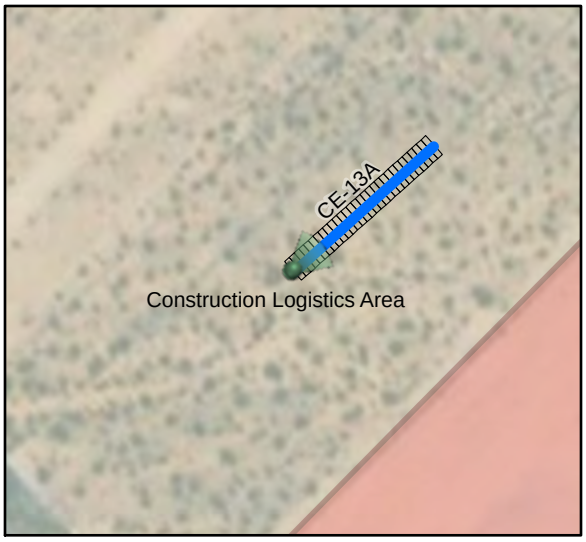
Site Photographs:

Date: 04/29/2018
Transect Line ID: CE-13A
Point Type: End Point

Easting: 639267
Northing: 3934610

Compass Bearing (degrees): 48.81

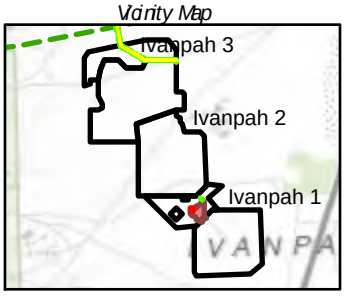
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

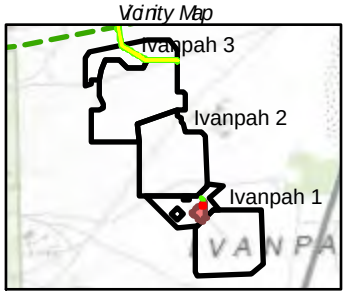
Date: 04/25/2018
Transect Line ID: CE-14
Point Type: Start Point

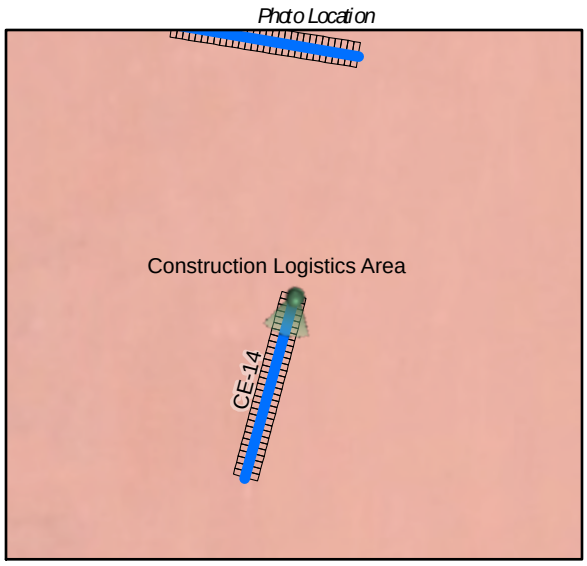
Easting: 639569
Northing: 3934717

Compass Bearing (degrees): 195.42

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

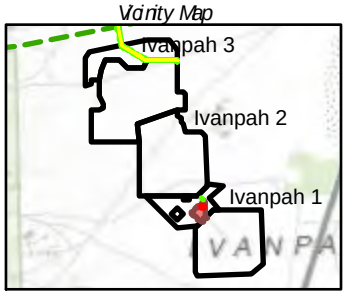
Date: 04/25/2018
Transect Line ID: CE-14
Point Type: End Point

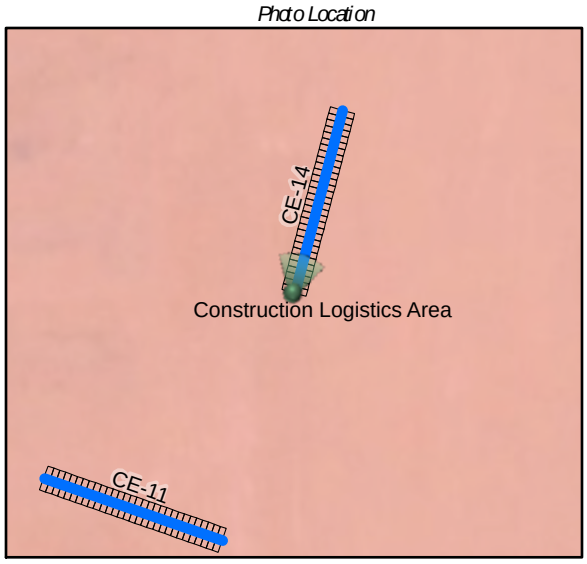
Easting: 639561
Northing: 3934688

Compass Bearing (degrees): 15.42

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

Date: 04/26/2018
Transect Line ID: CE-15
Point Type: Start Point

Easting: 639428
Northing: 3934366

Compass Bearing (degrees): 119.74

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map

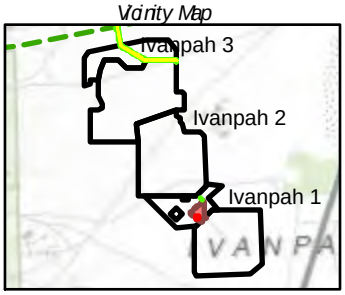
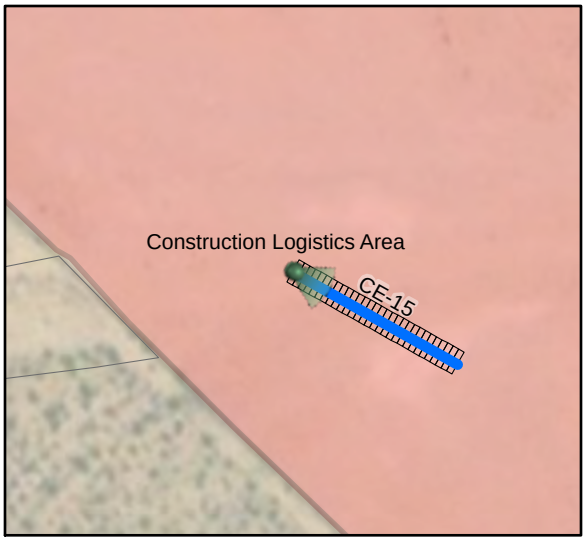


Photo Location



Site Photographs:

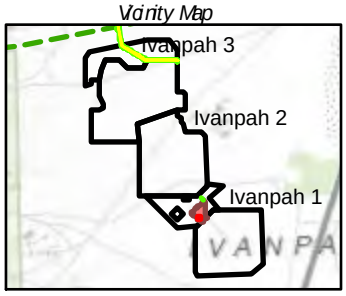
Date: 04/26/2018
Transect Line ID: CE-15
Point Type: End Point

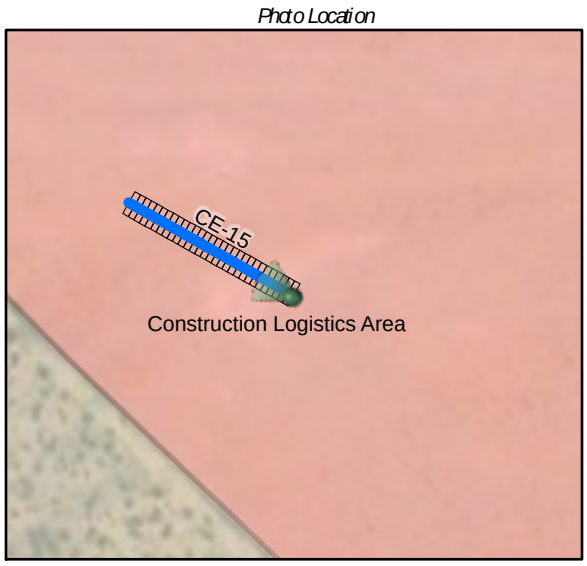
Easting: 639449
Northing: 3934354

Compass Bearing (degrees): 299.74

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-16
Point Type: Start Point

Easting: 639579
Northing: 3934755

Compass Bearing (degrees): 279.78

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map

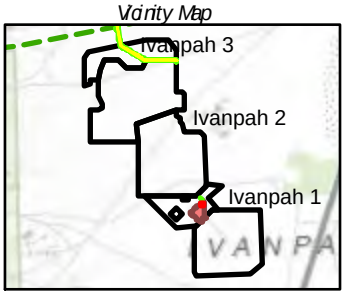
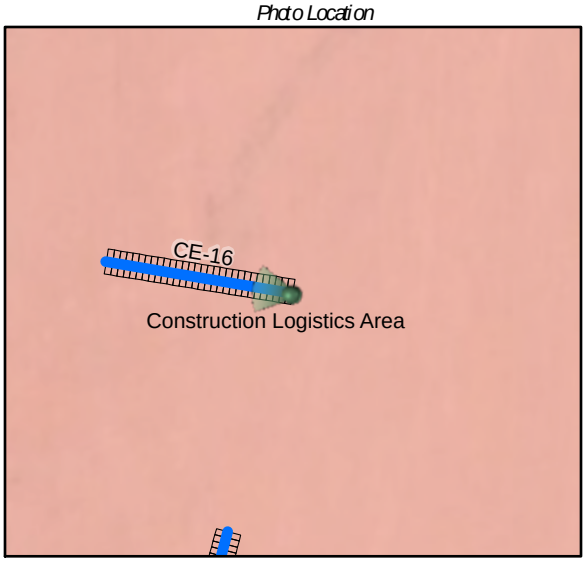


Photo Location



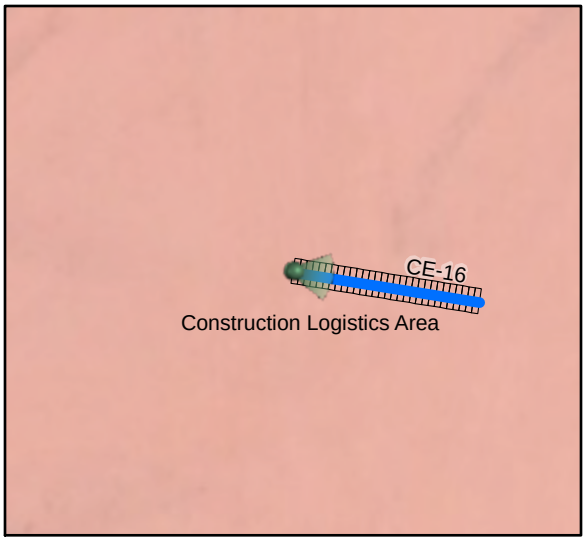
Site Photographs:

Date: 04/25/2018
Transect Line ID: CE-16
Point Type: End Point

Easting: 639550
Northing: 3934760

Compass Bearing (degrees): 99.78

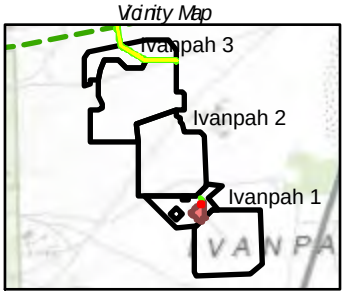
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



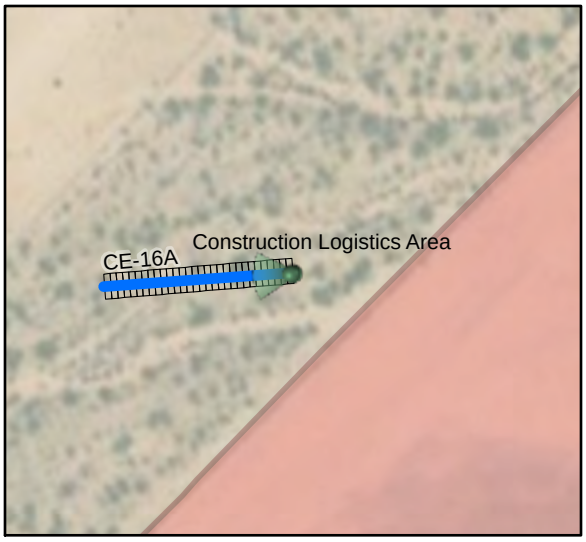
Site Photographs:

Date: 04/29/2018
Transect Line ID: CE-16A
Point Type: Start Point

Easting: 639437
Northing: 3934758

Compass Bearing (degrees): 265.78

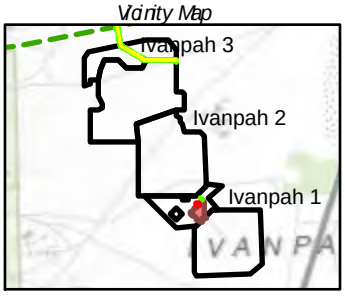
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



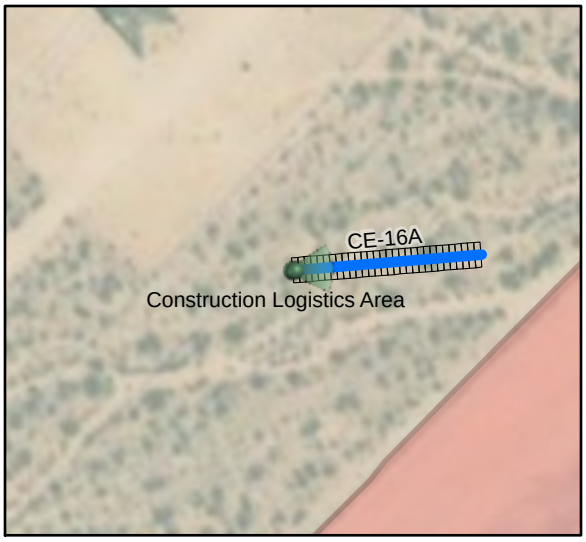
Site Photographs:

Date: 04/29/2018
Transect Line ID: CE-16A
Point Type: End Point

Easting: 639410
Northing: 3934756

Compass Bearing (degrees): 85.78

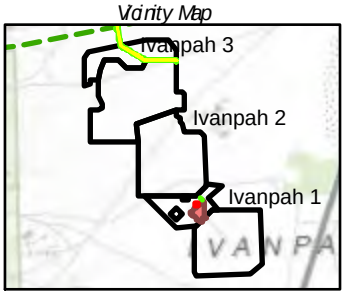
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

Date: 04/26/2018
Transect Line ID: CE-17
Point Type: Start Point

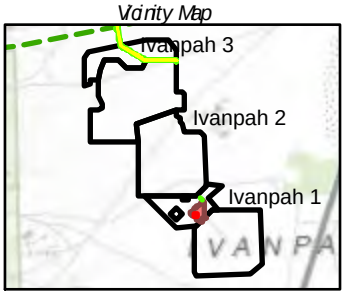
Easting: 639385
Northing: 3934433

Compass Bearing (degrees): 236.82

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



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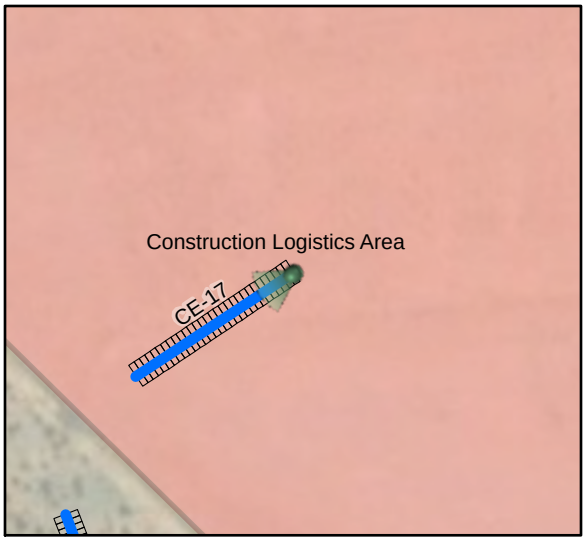


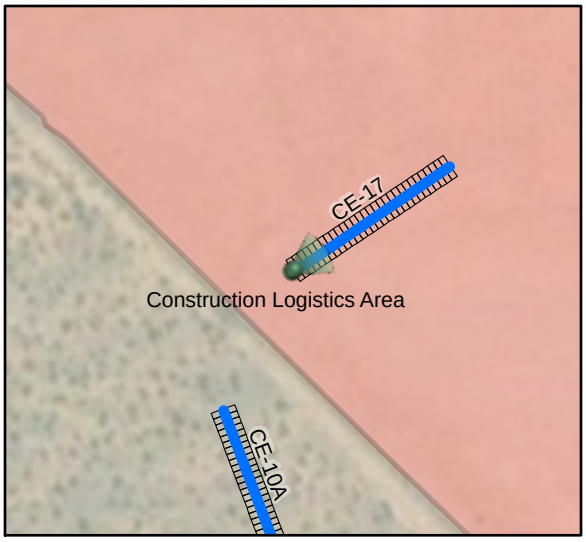
Site Photographs:

Date: 04/26/2018
Transect Line ID: CE-17
Point Type: End Point

Easting: 639359
Northing: 3934416

Compass Bearing (degrees): 56.82

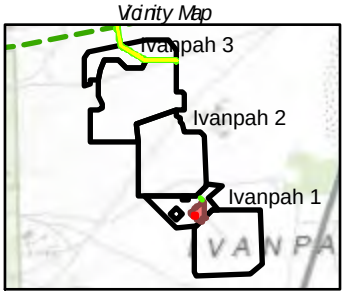
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

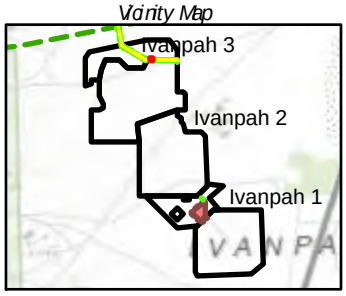
Date: 04/27/2018
Transect Line ID: NGL-3
Point Type: Start Point

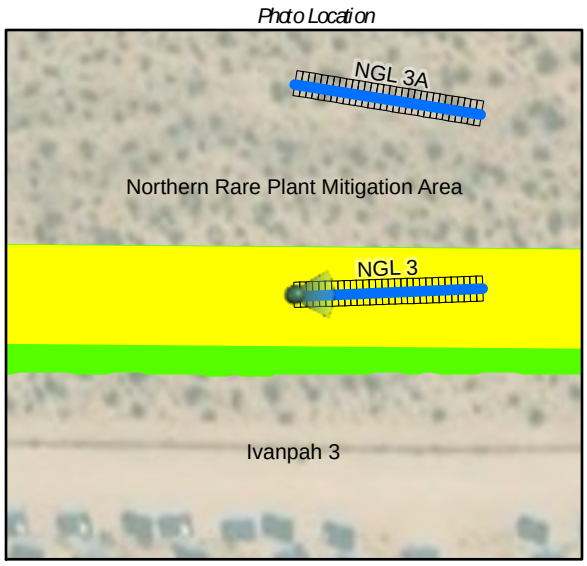
Easting: 638057.1792
Northing: 3939139.0767

Compass Bearing (degrees): 88.65

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Site Photographs:

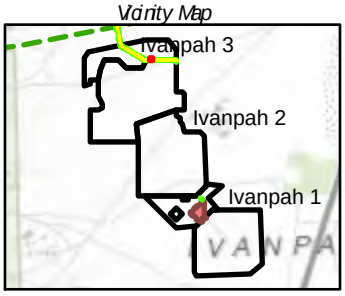
Date: 04/27/2018
Transect Line ID: NGL-3
Point Type: End Point

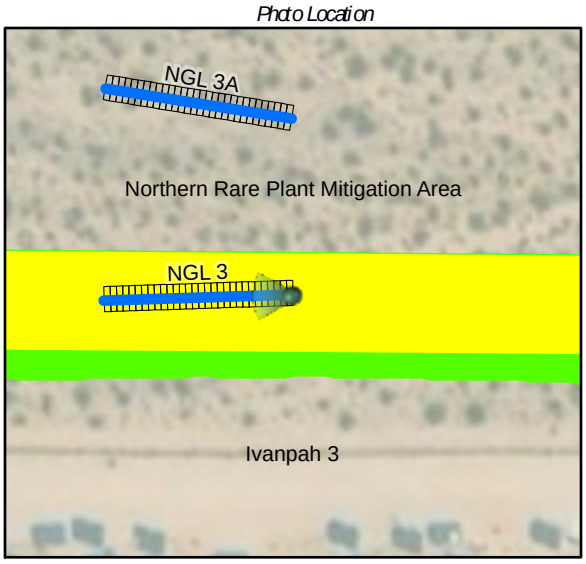
Easting: 638086.263
Northing: 3939139.7588

Compass Bearing (degrees): 268.65

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





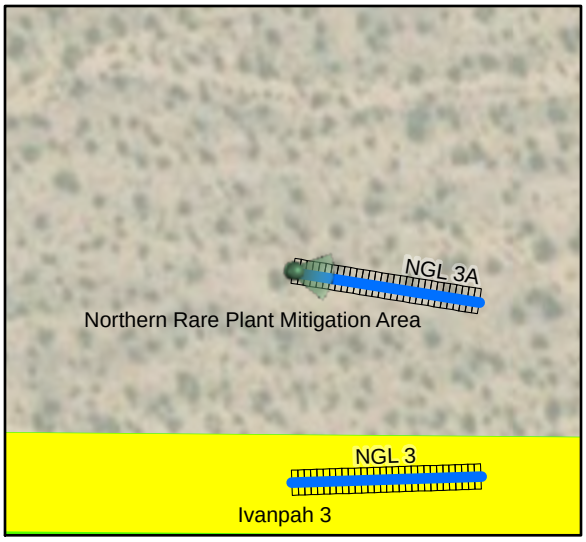
Site Photographs:

Date: 04/27/2018
Transect Line ID: NGL-3A
Point Type: Start Point

Easting: 638057.6692
Northing: 3939172.701

Compass Bearing (degrees): 99.84

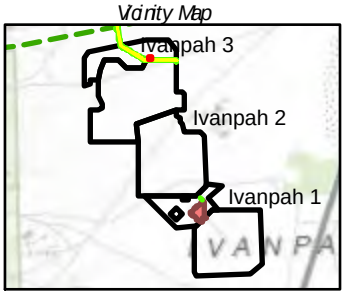
Photo Location



Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats

Vicinity Map



Site Photographs:

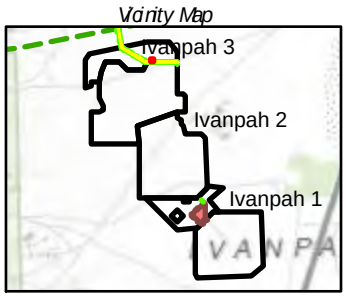
Date: 04/27/2018
Transect Line ID: NGL-3A
Point Type: End Point

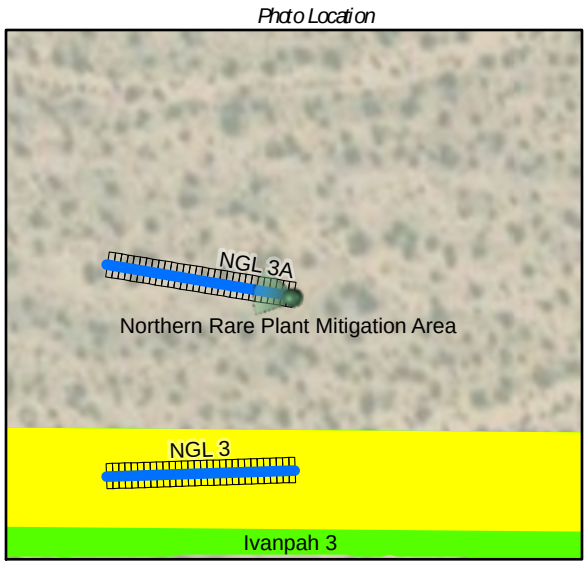
Easting: 638087.7932
Northing: 3939167.477

Compass Bearing (degrees): 279.84

Legend

Photo Points
Releve Point
Reveg Area 2013
Reveg Area 2012
Reveg Area 2015
Belt Transects
Quadrats





Appendix I

Condition of Certification BIO-17

Desert Tortoise Compensatory Mitigation Fencing Annual Inspection, Repairs and Maintenance

energyservices
an NRG service

NRG Ivanpah Solar Thermal Power Plant
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2012 Fax: 702-815-2030

January 8, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) and BLM Right-of-Way Grant CACA-055666
Desert Tortoise Compensatory Mitigation – Fencing Annual Inspection, Repairs and Maintenance; Rehabilitated Routes, to fulfill California Energy Commission Condition of Certification, BIO-17

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification BIO-17 of the Commission's approval of the Ivanpah Solar Electric Generating System, the project owner shall provide to the CPM and CDFG an annual report describing: the results of the annual inspection of fencing and rehabilitated routes; a summary of fence repairs and maintenance of reclaimed routes completed during the year; and recommendations and a cost estimate for repairs and maintenance activities needed for the upcoming year.

The construction of 50 miles of Desert Tortoise Exclusion Fencing along the northbound side of Interstate 15 (I-15) between Nipton Road and Yates Well Road (approximately 5 miles), and the tortoise exclusion fencing along the eastbound and westbound sides of Interstate 40 (I-40) between Goffs Road and US Route 95 (approximately 45 miles) were inspected quarterly on March 3-6, 2018, May 22-24, 2018, August 25-29, 2018 and December 4-7, 2018. There are eleven (11) large breaches and four (4) small breaches identified along the I-15 fence caused by an accident and rain events. Similarly, there are 42 large breaches and 151 small breaches identified along the I-40 fences. These breaches were repaired during the quarterly inspections with a total of 161 linear feet repaired on I-15, and 338 linear feet large breaches repaired and 140 linear feet small breaches repaired on I-40. These repairs include rectifications on 174 linear feet fence repairs performed by CalTrans on I-40 that were not in accordance with the repair and installation specifications; particularly along the north side of the East Water Road, and on the north side between Goffs Road and Mountain Springs Road. A copy of the annual inspection report is attached.

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NRG Ivanpah Solar Thermal Power Plant
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2012 Fax: 702-815-2030

As reported in the 2016 annual compliance report, no further reporting is required for the Fifty-one BLM Routes with BLM's confirmation on February 26, 2015 that the requirements of this condition were satisfied.

Please feel free to contact me with any questions.

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

2018 Annual Report

For

Biological Opinion

FWS-SB-13 80466-13 F0489

Solar Partners' Desert Tortoise Exclusion Fencing along Interstates 15 and 40, San Bernardino County, California (6843 (P), CACA048668, CAD090.01)

Project Description

This is an annual report for Biological Opinion FWS-SB-13 80466-13 F0489 and Grant CACA-055666 - Desert Tortoise Exclusion Fence: A Mitigation required habitat enhancement project in association with the ISEGS Project. The BO and grant requires that:

Once constructed, as stipulated in their authorizations for the ISEGS project, Solar Partners will be responsible for the fence inspections and repair work. Solar Partners shall ensure that the highway fence is inspected at least quarterly and after major rainfall events, which are defined as any rainfall that causes the ephemeral washes in the project area to flow and thereby potentially damage the fencing.

This report serves as documentation that all 2018 quarterly inspections and repairs of the tortoise exclusion fence were complete. All inspections were conducted on foot with all 50 miles walked by an Authorized Biologist. We defined a large breach as a breach an adult tortoise could potentially fit through and a small breach as one a small tortoise could potentially fit through. Most large breaches occurred at washes where water caused the damage. Most small breaches were caused by minor erosion, rodents, or by water at small wash crossings and were generally less than 1ft in length, with most less than 4-6 inches. Numerous fence repairs by Cal-Trans are not being done correctly and not according to specifications.

Below is a table of dates and the amount of feet fixed at large breaches for each inspection.

	I-15		I-40	
	Date	Ft fixed	Date	Ft fixed
Q1	March 6th	0	Mar 3-6th	16
Q2	May 24th	0	May 22-23rd	94
Q3	Aug 25-26th	123	Aug 27-29th	191
Q4	Dec 5th	38	Dec 4-7th	37

Incidental Take

No incidental take occurred under this Biological Opinion in 2018 during maintenance activities. This includes both I-15 and I-40 project locations. No live tortoises were observed within the project limits in either portion of the project in 2018. No known tortoise mortality or injury occurred as a result of project activities. Tortoise scat was found along the I-40 portion of the fence during the Q4 inspection. The scat was from this last fall or summer and was on the correct side of the fence. It was approximately 2 miles west of Highway 95 on the north side of I-40.

Personnel and Experience

Two Authorized Biologists worked on the project in 2018: Bruce Weise and Dave Prival.

Appendix J

Condition of Certification BIO-18

Special-status Plants Post-Construction Annual Report

Ivanpah Solar Electric Generating System

Year 5 (2018) Special-status Plants BIO-18 Post-Construction Monitoring Annual Report

Final

January 2019

Solar Partners II, LLC; Solar Partners I, LLC;
and Solar Partners VIII, LLC

Ivanpah Solar Electric Generating System

Project No:	701975CH
Document Title:	Year 5 (2018) Special-status Plants BIO-18 Post-Construction Monitoring Annual Report
Document No.:	AX1214181403LAS
Revision:	Final
Date:	January 2019
Client Name:	NRG Energy Services, LLC
Project Manager:	Jerry Salamy, Jacobs Engineering Group Inc. (Jacobs)
Author:	Morgan King, Jacobs

Jacobs Engineering Group Inc.

2485 Natomas Park Drive, Suite 600
Sacramento, California 95833
United States
T +1.916.920.0300
www.jacobs.com

Contents

Acronyms and Abbreviations

BIO-18	Condition of Certification Biology - 18 Special-status Plant Impact and Avoidance and Minimization
BLM	Bureau of Land Management
CEC	California Energy Commission
CH2M	CH2M HILL Engineers, Inc.
CLA	Construction Logistics Area
COC	Condition of Certification
ESA	environmentally Sensitive Area
ft	foot (feet)
GIS	geographic information system
ha	hectare(s)
ISEGS	Ivanpah Solar Electric Generating System
Jacobs	Jacobs Engineering Group Inc.
km	kilometer(s)
kV	kilovolt(s)
MW	megawatt(s)
NGL	Natural Gas Pipeline
No.	number
Plant ID	plant identification
Protection Plan	Ivanpah SEGS Special-status Plant Protection and Monitoring Plan, Revision 1
RPTA	rare plant protection area
Solar Partners	Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC
SSPPA	Special-status Plant Protection Area
U.S.	United States

1. Introduction

1.1 Project Description

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners) are the owners of the Ivanpah Solar Electric Generating System (ISEGS), a nominal 370-megawatt (MW) solar energy project in Southern California's Mojave Desert, near the Nevada border. The project was developed by BrightSource Energy, Inc. and is operated for Solar Partners by NRG Energy Services, LLC. The project is located on a 3,471-acre (1,405-hectare [ha]) site, west of Ivanpah Dry Lake, on land managed by the Bureau of Land Management (BLM). CH2M HILL Engineers, Inc. (CH2M), now Jacobs Engineering Group Inc. (Jacobs), has provided environmental compliance support during construction and operations of the solar facility.

Ivanpah 1 (the southern unit) covers approximately 913.5 acres (370 ha); Ivanpah 2 (the middle unit) covers approximately 1,077 acres (436 ha); and Ivanpah 3 (the northern unit) is larger and covers approximately 1,235 acres (500 ha) (Figure 1-1, which is located at end of this section). The remaining disturbance areas include common access roads, gas lines, electrical generation tie lines, and construction and operations facilities. All three generation facilities share an administration building, an operations and maintenance building, a substation located between Ivanpah 1 and 2, and paved roads to access each site. The project ties into the existing Kern River gas transmission line about 0.5 mile (0.8 kilometer [km]) north of the Northern Rare Plant Mitigation Area and into the Southern California Edison 230/115-kilovolt (kV) line that crosses between the Ivanpah 1 and 2 sites.

1.2 Report Objective

The objective of this report is to present the results of the Year 5 (2018) post-construction special-status plant monitoring. This report complies with the annual reporting requirement of California Energy Commission (CEC) Commission Decision Condition of Certification (COC) Biology - 18 Special-status Plant Impact and Avoidance and Minimization (BIO-18) (CEC, 2010) measures included in Section 8 of the *ISEGS Special-status Plant Protection and Monitoring Plan* (Protection Plan) (Solar Partners, 2010a), and as required by the BLM Right-of-Way Grant (BLM, 2010).

BIO-18 includes 11 measures intended to avoid and minimize project impacts to five special-status plants:

1. Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola*)
2. Mojave milkweed (*Asclepias nyctaginifolia*)
3. Desert pincushion (*Coryphantha chlorantha*)
4. Nine-awned pappus grass (*Enneapogon desvauxii*)
5. Parish's club-cholla (*Grusonia parishii*)

The overarching goal of BIO-18 is to maintain the special-status plant species as healthy, reproductive populations that can be sustained in perpetuity.

The Protection Plan defines two post-construction monitoring requirements: success criterion and long-term persistence trend monitoring (Solar Partners, 2010a). These two post-construction monitoring requirements meet BIO-18 Measures 2 and 5 (CEC, 2010). Success criterion monitoring was completed in Year 4 (2017) (CH2M, 2018a) after documenting 75 percent survivorship for five species for 4 of the 10 post-construction years in the Special-status Plant Protection Areas (SSPPA) and mitigation areas. Long-term persistence and trend monitoring (including characteristics, such as health and vigor, reproduction, seed production, and recruitment) will be monitored over a 10-year post-construction time frame but have no fixed success criteria. This report provides the Year 5 (2018) post-construction monitoring results of the long-term persistence trend monitoring.

1.3 BIO-18 Compliance Measures

The project complies with all BIO-18 measures, 1 through 11 (CEC, 2010); and eight of the BIO-18 measures are complete: 1, 3, 5, 6, 7, 9, 10, and 11. No additional work on these measures is required. Table 1-1 lists the COC measures and the current compliance status of each measure. The project complies with BIO-18 Measures 2, 4, and 8, but they are not considered complete (Table 1-1) because these measures include long-term monitoring and reporting components.

Measure 2 protection goals (75 percent survivorship for five plant species for 4 out of the 10 years of the post-construction monitoring period) were met in 2017 and is the only measure with quantitative success criteria. Measure 2 also has a long-term persistence and trend monitoring requirement, which are to be conducted over a 10-year post-construction time frame, as described in the Protection Plan (Solar Partners, 2010a). Long-term persistence and trend monitoring will be performed over time but have no fixed success criteria.

In addition, BIO-18 Verification (CEC, 2010) requires annual reports for Measure 2 to continue for the life of the project, regardless of when the success criterion was met during the period. Measure 4 – Protection of Adjacent Occurrences requires that plants adjacent to the facility be monitored during operations to verify persistence (Solar Partners, 2010a). Measure 8 – Gas Pipeline Revegetation and Monitoring requires the establishment of a special-status plant on the Natural Gas Pipeline (NGL); this criterion was successfully met in 2017 (CH2M, 2018b). BIO-18, Verification (CEC, 2010) requires annual reports for Measure 8 to continue for 10 years post-construction regardless of when the success criteria were met during the period.

Table 1-1. Summary of Condition of Certification BIO-18 Compliance Measures Completed and In Progress

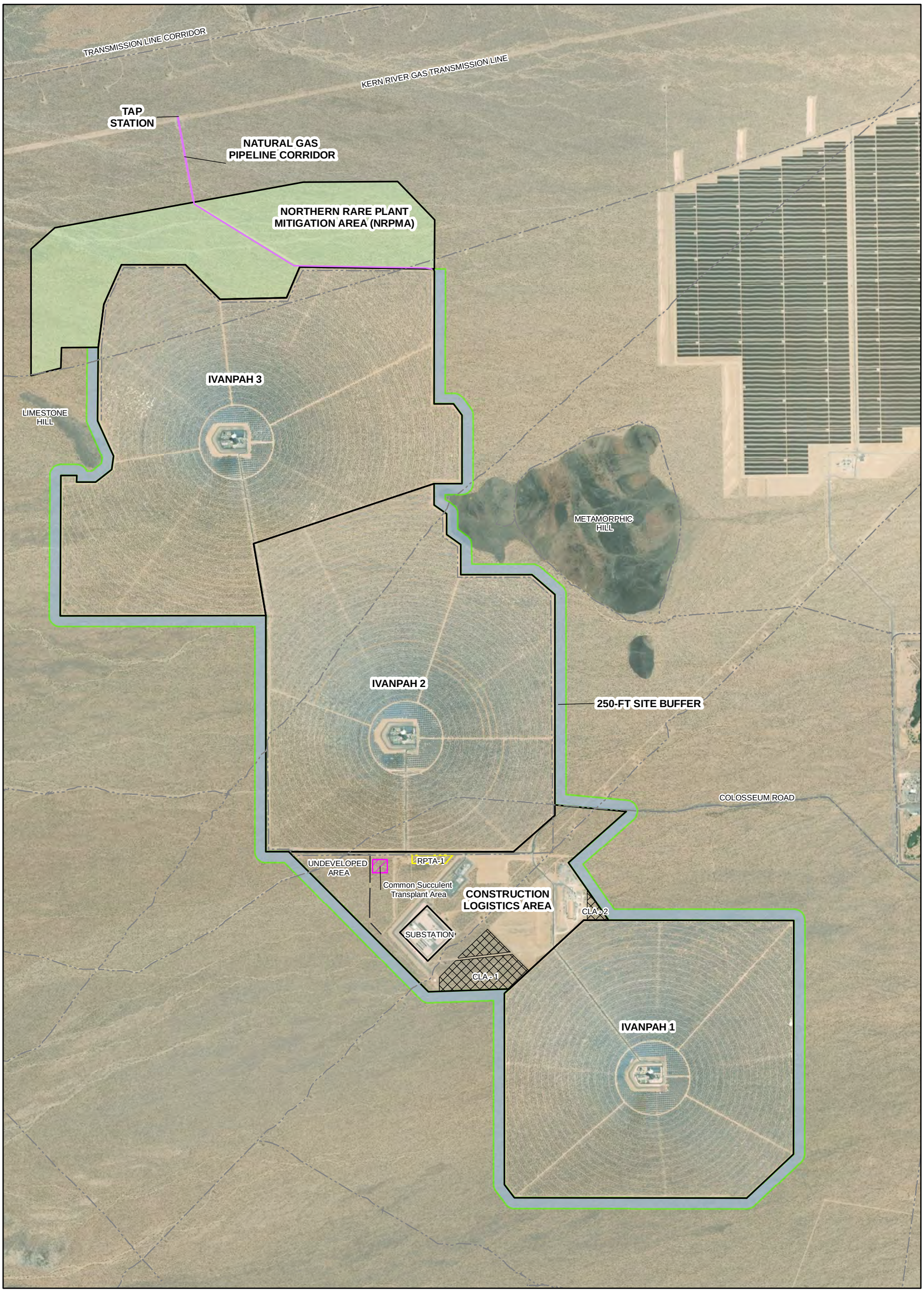
No.	COC BIO-18 Measure	In Compliance?	Task Complete?
1	Onsite Plant Avoidance and Minimization Areas	Yes. SSPPAs were established	Yes.
2	Protection Goals	Yes. Project is in compliance. SSPPAs have been created. The 75% protection goals set forth in Measure 2 were met for 4 years post-construction in 2017. Protection goal monitoring is now complete. Long-term persistence and trend monitoring will continue for 10 years (Solar Partners, 2010a).	Ongoing. 75% protection success criterion goals were met in 2017. Long-term persistence and trend monitoring will continue for 10 years post-construction (Solar Partners, 2010a). Per the BIO-18 Verification, for the life of the project, record summaries need to be submitted consistent with the Protection Plan and Remedial Action Plan.
3	Identify and Establish SSPPAs	Yes. Project is in compliance. Surveys of the 250-ft (76-m) buffer were performed in spring 2010 and fall 2011, and were updated with 2012, 2013, and 2014 finds. Localities were designated as ESAs and SSPPAs.	Yes.
4	Protection of Adjacent Occurrences	Yes. Project is in compliance. Surveys of the 250-ft (76-m) buffer were performed in spring 2010 and fall 2011, and localities have been designated as ESAs.	Ongoing. Additional checks during operation will be needed to confirm that no indirect impacts to special-status plant ESAs in the buffer have occurred.
5	Develop and Implement a Special-status Plant Protection and Monitoring Plan	Yes. Project is in compliance. The Protection Plan (Solar Partners, 2010a) was submitted in 2010.	Yes.
6	Develop Special-status Plant Remedial Action Plan	Yes. Project is in compliance. The Remedial Action Plan (Solar Partners, 2010b) was submitted in 2010.	Yes.

Table 1-1. Summary of Condition of Certification BIO-18 Compliance Measures Completed and In Progress

No.	COC BIO-18 Measure	In Compliance?	Task Complete?
7	Seed Collection	Yes. Project is in compliance. Special-status plant seed and propagules were collected in 2010, 2011, 2012, and 2013. Remaining seed and propagules have been placed in onsite cold storage for later use in revegetation of short-term disturbance areas or remedial measures, should they be needed.	Yes.
8	Gas Pipeline Revegetation and Monitoring	Yes. Project is in compliance. Success criteria (establishment of Rusby's desert mallow, desert pincushion, or Mojave milkweed) were met in 2016, and monitoring is now complete.	Ongoing. Success criteria were met in 2016, and monitoring is now complete. The BIO-18 Verification requires 10 years post-construction monitoring and for records of monitoring to be submitted consistent with the Gas Pipeline Revegetation and Monitoring Plan (CH2M, 2010).
9	Surveys on Acquired and Public Lands	Yes. Project is in compliance. Focused surveys were performed in 2011 for Mojave milkweed and Rusby's desert mallow. The requirement to identify at least the same number of Mojave milkweed and Rusby's desert mallow localities outside of the SSPPAs was met in 2011.	Yes.
10	Security for Implementation of Plans	Yes. Funding has been provided.	Yes.
11	Acquire Offsite Occurrence of Mojave Milkweed or Adjacent Land	Yes. Security was provided. Mojave milkweed was identified on one privately owned parcel in the New York Mountains in the northern Lanfair Valley. The parcel has been purchased, and the easement is in place. The execution and fee transfer to the U.S. Government was recorded on April 20, 2017. The property will be managed by the National Park Service.	Yes.

Source: COC BIO-18 (CEC, 2010)

Notes:
% = percent
ESA = Environmentally Sensitive Area
ft = foot (feet)
m = meter(s)
No. = number
U.S. = United States



LEGEND

- Trails and Roads
- Project Site
- 250-foot Site Buffer
- 50-foot Corridor of Gas Line
- Rare Plant Mitigation Area
- Mitigation Area
- Rare Plant Transplantation Area (RPTA-1)
- Common Succulent Transplant Area

Aerial Imagery courtesy of
ESRI Basemaps (NAIP 2016):
April 20, 2016

N

0 1,000 2,000
Feet

Figure 1-1
Site Layout
Ivanpah Solar Electric Generating System
San Bernardino County, California

JACOBS

SAC \\SACFPP02\SACGIS\PROJ\352897_IVANPAH\MAPFILES\2018_IVANPAH\HEALTHASSESSMENT\FIGURE1-1_OVERVIEWMAP.MXD SSCOPES 1/14/2019 2:57:55 PM

2. Methods

Year 5 (2018) of post-construction monitoring was conducted in 2018 and is the subject of this report. Post-construction monitoring occurred during Year 1 (2014), Year 2 (2015), Year 3 (2016), and Year 4 (2017); and the results were provided in annual compliance reports (CH2M, 2015, 2016, 2017, 2018a).

Table 2-1 provides the special-status plant post-construction monitoring and reporting schedule.

Table 2-1. Special-status Plant Post-construction Monitoring Schedule

Location	Post-construction Monitoring										
	Year										
	1	2	3	4	5	6	7	8	9	10	11
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Success Criterion Monitoring[a]											
Percent survivorship	X	X	X	X							
Long-term Persistence Trend Monitoring											
Health and vigor data	X	X	X	X	X	X	X	X	X	X	
Annual reporting	X	X	X	X	X	X	X	X	X	X	
Final evaluation of success criterion and reporting											X

Source: Adapted from Table 8-1 (Solar Partners, 2010a)

[a] The percent survivorship goal of BIO-18 is 75 percent and was met in Year 4 (2017). Success criterion monitoring is now complete.

Note:

X denotes that collection or monitoring was or will be performed in the given area or for the identified task.

2.1 Success Criterion Monitoring

The BIO-18 75 percent special-status plant survivorship goal for the five special-status plant species was attained in Year 1 (2014), Year 2 (2015), Year 3 (2016), and Year 4 (2017) (CH2M, 2015, 2016, 2017, 2018a). After meeting success criteria for 4 years of the 10-year monitoring period, success criterion monitoring is now complete.

2.2 Long-term Persistence Trend Monitoring

Fieldwork was conducted by a qualified botanist throughout the solar facility with emphasis on the protection areas that are defined as the SSPPA, the mitigation areas, and the ESA in the 250-ft (76-m) facility buffer (Figure 1-1). SSPPAs are defined as exclusionary fences in the solar field installed around special-status plants and associated habitat (BIO-18 refers to them as “halos”). The mitigation areas are the northern rare plant protection area, the Construction Logistics Area (CLA) CLA-1 and CLA-2, and the rare plant transplant area (RPTA) RPTA-1. ESAs were established to protect special-status plants located in the 250-ft (76-m) facility buffer (BIO-18, Measure 4 – Protection of Adjacent Occurrences).

2.2.1 Monitoring Parameters

A qualified botanist conducted long-term persistence trend monitoring throughout the facility. Long-term persistence is determined using the following 10 monitoring parameters (Solar Partners, 2010a):

1. Flowering
2. Health and vigor

3. Insect visitors and potential pollinators
4. Photo documentation
5. Predation and damage
6. Recruitment within protection areas
7. Recruitment outside of protection areas
8. Reproduction
9. Seeds
10. Size (height and width)

A qualified botanist collected the 10 monitoring parameters throughout the facility on Mojave milkweed, desert pincushion, Parish's club cholla, and Rusby's desert mallow. Nine-awned pappus grass was not observed in Year 5 (2018) because of the lack of adequate summer precipitation. Botanists visited a sampling of each species located at each project component (solar fields [Ivanpah 1, 2, and 3], SSPPA, mitigation areas, and ESAs). Field data were collected on mobile devices using Environmental Systems Research Institute proprietary geographic information system (GIS) ArcGIS Online platform. Hardcopy data sheets were used as a backup. Photographs were taken within the ArcGIS Online platform.

2.2.1.1 New Special-status Plant Recruits

Botanists surveyed for new special-status plant recruits in and outside the protection areas.

With limited success observed during Year 1 (2014) and Year 2 (2015) on transplant survival and herbivory in transplant areas (NGL and RPTA-1) in Year 3 (2016), the qualified botanist recommended that the project leave new special-status plant recruits found outside the protection areas in place, where possible. This procedure is in alignment with BIO-18 Measure 5 – Develop and Implement a Special-status Plant Protection and Monitoring Plan goal to ensure healthy and reproductive populations of special-status plants that can be sustained in perpetuity. The procedure includes training operations staff to recognize that new stakes and small, exclusionary fences are protecting sensitive biological resources, and to avoid those locations.

When a new individual was located, it was assigned a unique plant identification (Plant ID). An aluminum tag with the Plant ID was placed near the base of each plant. A heavy-duty, plastic or wooden stake was also installed near each plant in a more visible location for survey identification. No individual special-status plants were salvaged or transplanted during Year 5 (2018). For Mojave milkweed and desert pincushion, three to four stakes were placed around the perimeter of the plant to provide protection from operations tasks. For Rusby's desert mallow, a small, low, exclusionary fence was erected from t-posts and chicken-wire fence.

2.2.1.2 Environmentally Sensitive Areas

ESAs were established to protect special-status plants located in the 250-ft (76-m) facility buffer (BIO-18, Measure 4). These individuals are monitored annually as a control population for comparison against those individuals in the SSPPAs and mitigation areas, and to provide repairs or upkeep of the sensitive resource signs.

2.2.2 Schedule and Reporting

Special-status plant long-term persistence trend monitoring will be conducted for a period of 10 years from the date of operations, regardless of success criterion monitoring being completed earlier in the period. As required by BIO-18, Verification, record summaries of the annual monitoring will continue for the life of the project to comply with the Protection Plan (Solar Partners, 2010a). The monitoring and reporting schedules are provided in Table 2-1.

3. Results

3.1 Year 5 (2018) Post-construction Monitoring

3.1.1 Success Criterion Monitoring Year 4 (2017) Background

Table 3-1 provides the Year 4 (2017) success criterion monitoring results of persisting special-status plant individuals and locations protected in the project area. The project area includes the solar fields and rare plant mitigation areas as depicted on Figures 3-1 and 3-2. These figures include the locations of the special-status plants identified during success criterion monitoring surveys conducted during Year 1 (2014), Year 2 (2015), Year 3 (2016), and Year 4 (2017). Not all individual special-status plant individuals shown on Figures 3-1 and 3-2 persist, but botanists visited all locations during success criterion monitoring.

Figure 3-1 also shows locations of Rusby's desert mallow that are outside of SSPPAs and mitigation areas. These individuals do not contribute to success criterion goals, but persistence is in alignment with the BIO-18 Measure 5 goal to ensure healthy and reproductive populations of special-status plants that can be sustained in perpetuity. Figures are provided at this end of this section.

Table 3-1. Results of Special-status Plants Success Criterion Monitoring in Year 4 (2017)

Special-status Plant Common Name [a]	Total No. of Localities Avoided Onsite	Total No. of Plants Avoided Onsite
Mojave milkweed	52	173
Desert pincushion	150	157
Parish's club-cholla	154	154
Rusby's desert mallow[b]	3	3
Total	**359**	**487**

[a] Due to the ecology of nine-awned pappus grass, the Protection Plan did not define special avoidance procedures or success criteria (Solar Partners, 2010a). The protection goal for nine-awned pappus grass was attained in 2011 (CH2M, 2012).

[b] During Year 4 (2017) success criterion monitoring, three live Rusby's desert mallow were protected within SSPPAs and mitigation areas. Figures 3-1 and 3-2 show locations of Rusby's desert mallow that have died since post-construction monitoring began and new recruits that persist outside of protection areas. Individuals located outside of protection areas do not contribute to success criterion goals but are important to acknowledge because they show a healthy reproductive population persisting within facility boundaries.

3.1.2 Dates and Staff

Annual assessment of special-status plant status and long-term persistence trend monitoring were conducted on May 21 and 22, July 19 and 20, and October 3, 2018, by Jacobs botanist Morgan King.

3.1.3 Monitoring Parameters

Qualified botanists visited a subset of the special-status plants located in the facility to document monitoring parameters used for long-term persistence trend monitoring. Representative individuals of each species were visited in each project component. The botanist confirmed persistence of Mojave milkweed, desert pincushion, Parish's club cholla, and Rusby's desert mallow in the project area (Figures 3-1 and 3-2). No individuals of nine-awned pappus grass were observed during Year 5 (2018). This species is a summer annual, meaning that it germinates and grows after summer rain; it is, therefore, not expected to occur every year.

Monitoring parameters of health and vigor, size, flowering, reproduction, and pollinators were documented. Appendix A provides photographs of Mojave milkweed in fruit and desert pincushion in bud stages of reproduction. Many individuals of Mojave milkweed and desert pincushion showed signs of predation or damage caused by herbivory.

Representative photographs of each of the special-status species observed during Year 5 (2018) post-construction monitoring are provided in Appendix A.

3.1.3.1 Recruits Located Inside and Outside of the Protection Areas

No new special-status plant recruits were located inside the project facility protection areas in Year 5 (2018).

Five new special-status recruits were observed persisting in the project facility outside of the protection areas: three Mojave milkweeds, one desert pincushion, and one Rusby's desert mallow. These individuals were marked and protected in place with stakes or a small, exclusionary fence.

3.1.3.2 Environmentally Sensitive Areas

Botanists performed annual checks and repairs of the signs adjacent to the special-status plants located in ESAs to comply with BIO-18 Measure 4 – Protection of Adjacent Occurrences.

3.1.4 Reporting Schedule

As required by BIO-18, Verification (CEC, 2010), record summaries of the annual monitoring will continue for the life of the project to comply with the Protection Plan, regardless of the success criterion being met earlier in the 10-year monitoring period (Solar Partners, 2010a).

3.2 Additional Special-status Plant Compliance Monitoring

3.2.1 Year 6 (2019) Post-construction Monitoring

Monitoring of the protection areas and other elements of the Special-status Plant Protection Program will be conducted as described in the Protection Plan (Solar Partners, 2010a). Monitoring data will be collected and assessed over the 10-year monitoring period to identify short- and long-term persistence trends. Short- and long-term protection goals, and the monitoring procedures for each special-status species are described in Sections 7 and 8 of the Protection Plan (Solar Partners, 2010a). In accordance with the Protection Plan, long-term persistence trend monitoring will continue for 10 years post construction, regardless of the success criterion being met earlier in the period. Annual monitoring reports following construction will be provided by January 31st of each calendar year within the 10-year monitoring time frame (2014-2023). The Year 6 (2019) post-construction monitoring report will be submitted by January 31, 2020.

NOTE: RARE PLANTS LOCATED OUTSIDE PROJECT AREA ARE NOT SHOWN ON MAPS

NORTHERN RARE PLANT MITIGATION AREA

IVANPAH 3

IVANPAH 2

IVANPAH 1

LIMESTONE HILL

METAMORPHIC HILL

COLOSSEUM ROAD

UNDEVELOPED AREA

RPTA-1

COMMON LOGISTICS AREA

SUBSTATION

CLA - 2

SEE FIGURE 3

CLA - 1

LEGEND

- Mojave milkweed (ASNY) *Asclepias nyctaginifolia*
- Rusby's Desert Mallow (SPRUER) *Sphaeralcea rusbyi var. eremicola*
- Desert pincushion *Coryphantha chlorantha (COCH)*
- Parish's club cholla *Grusonia (=Opuntia) parishii (GRPA)*

- Trails and Roads
- Project Site
- 250-foot Site Buffer
- 50-foot Corridor of Gas Line
- Rare Plant Mitigation Area
- Mitigation Area
- Rare Plant Transplantation Area (RPTA-1)

Aerial Imagery courtesy of **ESRI Basemaps (NAIP 2016: June 21, 2017)**

N

0 1,000 2,000

Feet

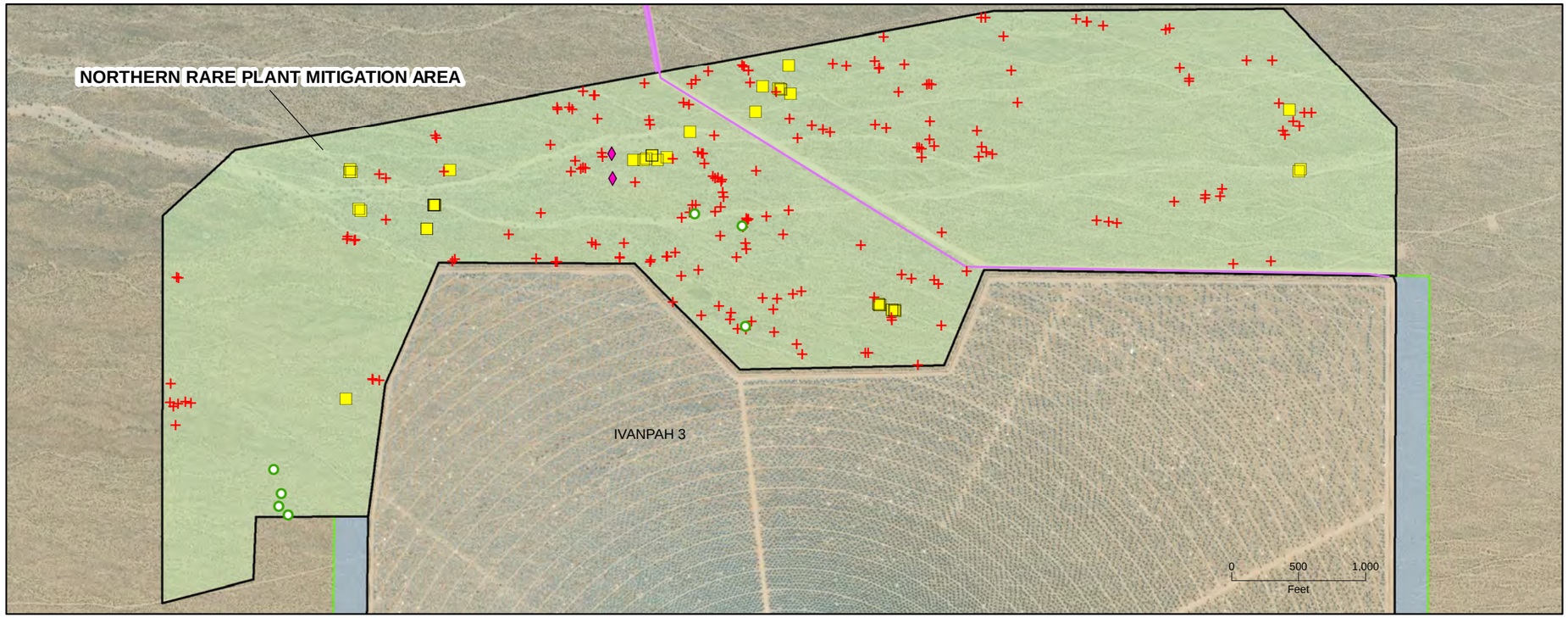
Note:
1) Rare plant localities within the 250-foot buffer are Environmental Sensitive Areas (ESAs).

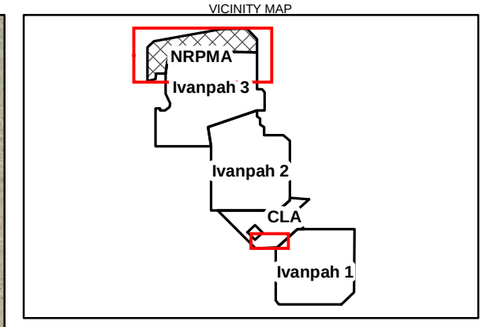
2) Several plants shown are located outside Special-status Plant Protection Area (SSPPA) in the solar field and are protected by small exclusionary fences or stakes. These individuals do not count towards success criteria.

Figure 3-1
Location of Special-status Plants in Solar Field and 250-foot Site Buffer
Post-Construction Monitoring Report
Ivanpah Solar Electric Generating System
San Bernardino County, California

JACOBS

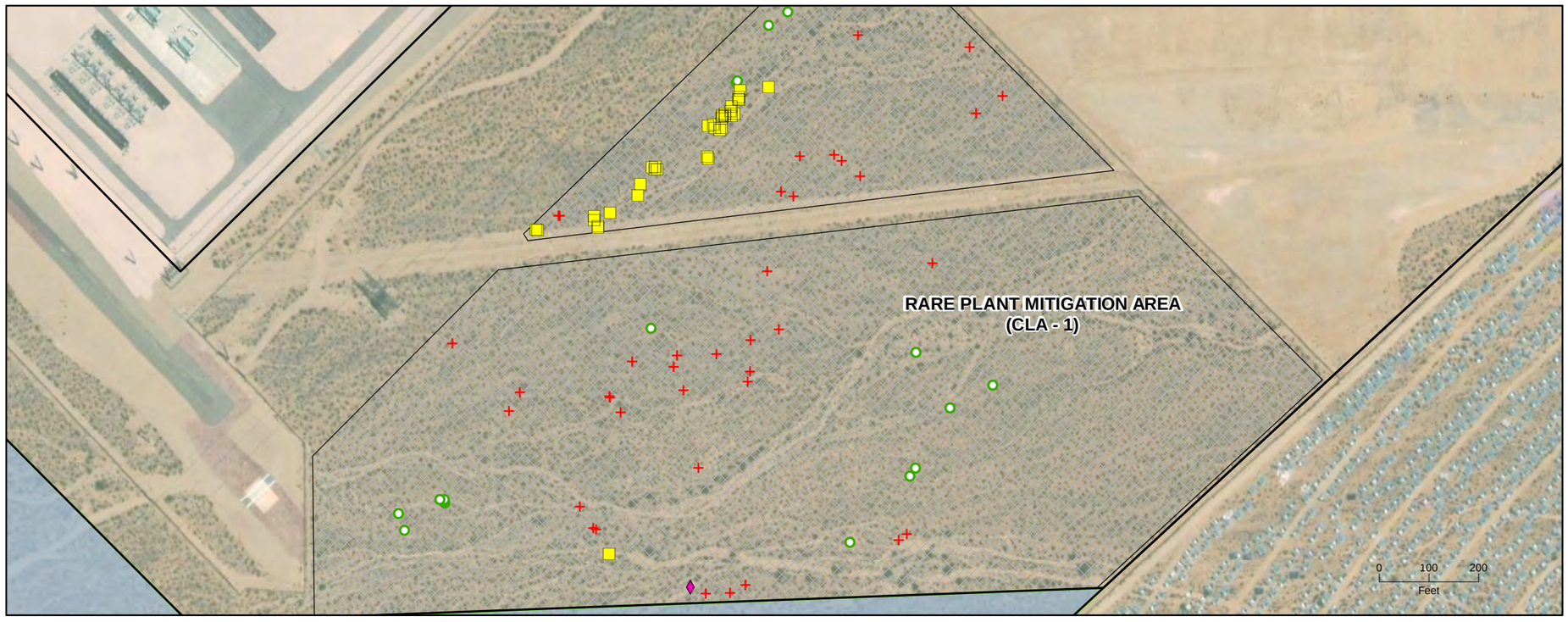
SAC \\SACFPP02\SACGIS\PROJ\352897_IVANPAH\MAPFILES\2018_IVANPAH\HEALTHASSESSMENT\FIGURE3-1_SOLARARRAYPLANTS.MXD SSCOPES 1/14/2019 3:02:09 PM





LEGEND

- Mojave milkweed (ASNY) *Asclepias nyctaginifolia*
- Rusby's Desert Mallow (SPRUER) *Sphaeralcea rusbyi var. eremicola*
- Desert pincushion *Coryphantha chlorantha (COCH)*
- Parish's club cholla *Grusonia (=Opuntia) parishii (GRPA)*
- Mitigation Area
- Rare Plant Mitigation Area
- 250-foot Site Buffer
- 50-foot Corridor of Gas Line
- Project Site



Aerial Imagery courtesy of
ESRI Basemaps (NAIP 2016):
June 21, 2017

N

Figure 3-2
Location of Special-status Plants in Mitigation Areas
Post Construction Monitoring Report
Ivanpah Solar Electric Generating System
San Bernardino County, California

JACOBS

4. References

Bureau of Land Management (BLM). 2010. Right-of-Way Lease/Grant Serial Number CACA-49502 for the Construction Logistics Area and common shared facilities necessary for the construction, operation, and termination of the Ivanpah Solar Electric Generating System. Needles Field Office: U.S. Department of the Interior. October 7.

California Energy Commission (CEC). 2010. Ivanpah Solar Electric Generating System. Commission Decision. September 22. Docket Number 07-AFC-5.

CH2M HILL Engineers, Inc. (CH2M). 2010. *Closure, Revegetation, and Rehabilitation Plan for the Ivanpah Solar Electric Generating System*. *COCs BIO-14, BIO-18 & COMP-11. Eastern Mojave Desert. San Bernardino County, California*. Revision 4. Includes the *Gas Pipeline Revegetation and Monitoring Plan (BIO-18)*. Prepared for Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC. September 29.

CH2M HILL Engineers Inc. (CH2M). 2012. *Condition of Certification (COC) BIO-18 Special-status Plants 2011 Annual Compliance Report for the Ivanpah Solar Electric Generating System*. Prepared for Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners III, LLC. January.

CH2M HILL Engineers Inc. (CH2M). 2015. *Condition of Certification (COC) BIO-18 Year 1 (2014) Special status Plants Post-Construction Monitoring Annual Report for the Ivanpah Solar Electric Generating System (ISEGS)*. Prepared for Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC. January.

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CH2M HILL Engineers Inc. (CH2M). 2017. *Condition of Certification (COC) BIO-18 Year 3 (2016) Special status Plants BIO-18 Post-Construction Monitoring Annual Report for the Ivanpah Solar Electric Generating System*. Prepared for Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC. January.

CH2M HILL Engineers Inc. (CH2M). 2018a. *Condition of Certification (COC) BIO-18 Year 4 (2017) Special status Plants BIO-18 Post-Construction Monitoring Annual Report for the Ivanpah Solar Electric Generating System*. Prepared for Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC. January.

CH2M HILL Engineers Inc. (CH2M). 2018b. *Condition of Certification (COC) BIO-18 Year 4 (2017) Special-status Plants Post-construction Natural Gas Pipeline Monitoring Report for the Ivanpah Solar Electric Generating System*. Prepared for NRG Energy Services, LLC. January.

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners). 2010a. *COC-BIO-18. Ivanpah SEGS Special-status Plant Protection and Monitoring Plan*. *Eastern Mojave Desert San Bernardino County, California*. Revision 1. Submitted to the California Energy Commission. With assistance from CH2M and GANDA. October.

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners). 2010b. *Ivanpah SEGS Special-status Plant Remedial Action Plan*. *Eastern Mojave Desert. San Bernardino County, California.* Revision 0. Submitted to the California Energy Commission. With Assistance from CH2M HILL and GANDA. November 9.

Appendix A
Photo Log

Project Title	**Ivanpah Solar Electric Generating System**
Location	Nipton, San Bernardino County, California
Date	January 2019

Photograph 1: Desert pincushion (COCH-MA-CLA1-0-08) in Construction Logistics Area 1 Mitigation Area

Taken by: ***Morgan King*** ***Date taken:*** ***May 21, 2018***

Photograph 2: Desert pincushion (COCH-1-A-18-01) in Ivanpah 1 Special-status Plant Protection Area (SSPPA)

Taken by: ***Morgan King*** ***Date taken:*** ***May 22, 2018***

Photograph 3: Desert pincushion (COCH-B-00-00-14) in environmentally sensitive area (ESA) in 250-foot facility buffer

Taken by: ***Morgan King*** ***Date taken:*** ***July 20, 2018***

Photograph 4: Mojave milkweed (ASNY-B-00-00-12) in an ESA in the 250-foot facility buffer

Taken by: ***Morgan King*** ***Date taken:*** ***July 20, 2018***

Photograph 5: Mojave milkweed (ASNY-3-D-01-01) in Ivanpah 3 in a SSPPA

Taken by: ***Morgan King*** ***Date taken:*** ***October 3, 2018***

Photograph 6: Parish's club cholla (GRPA-MA-NRPMA-0-18) in the Northern Rare Plant Mitigation Area

Taken by: ***Morgan King*** ***Date taken:*** ***May 21, 2018***

Photograph 7: Parish's club cholla (GRPA-CW-R1-0-48) in the Rare Plant Protection Area nursery

Taken by: ***Morgan King*** ***Date taken:*** ***May 21, 2018***

Photograph 8: Rusby's desert mallow (SPRUER-MA-CLA1-0-01) in Construction Logistics Area 1 Mitigation Area

Taken by: ***Morgan King*** ***Date taken:*** ***May 21, 2018***

Photograph 9: Rusby's desert mallow (SPRUER-2-C-05-01) in Ivanpah 2 SSPPA

Taken by: ***Morgan King*** ***Date taken:*** ***May 22, 2018***

Appendix K

Condition of Certification BIO-18

Special-status Plants Post-Construction Natural Gas Pipeline Monitoring Report

Ivanpah Solar Electric Generating System

Year 5 (2018) Special-status Plants Post-Construction Natural Gas Pipeline Monitoring Report

Final

January 2019

Solar Partners II, LLC; Solar Partners I, LLC;
and Solar Partners VIII, LLC

Ivanpah Solar Electric Generating System

Project No:	701975CH
Document Title:	Year 5 (2018) Special-status Plants Post-Construction Natural Gas Pipeline Monitoring Report
Document No.:	AX1214181403LAS
Revision:	Final
Date:	January 2019
Client Name:	NRG Energy Services, LLC
Project Manager:	Jerry Salamy, Jacobs Engineering Group Inc. (Jacobs)
Author:	Morgan King, Jacobs

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Contents

Figure

Acronyms and Abbreviations

BIO-18	Condition of Certification Biology -18 Special-status Plant Impact and Avoidance and Minimization
BLM	Bureau of Land Management
CEC	California Energy Commission
CH2M	CH2M HILL Engineers, Inc.
COC	Condition of Certification
gen-tie	electrical generation tie-in lines
ha	hectare(s)
ISEGS	Ivanpah Solar Electric Generating System
Jacobs	Jacobs Engineering Group Inc.
km	kilometer(s)
kV	kilovolt(s)
MW	megawatt(s)
NGL	Natural Gas Pipeline
NRG	NRG Energy Services, LLC
ROW	right-of-way
Solar Partners	Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC

1. Introduction

1.1 Project Description

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners) are the owners of the Ivanpah Solar Electric Generating System (ISEGS), a nominal 370-megawatt (MW) solar energy project in Southern California's Mojave Desert, near the Nevada border. The project was developed by BrightSource Energy, Inc. and is operated for Solar Partners by NRG Energy Services, LLC (NRG). The project is located on a 3,471-acre (1,405-hectare [ha]) site, west of Ivanpah Dry Lake, on land managed by the Bureau of Land Management (BLM). CH2M HILL Engineers, Inc. (CH2M), now Jacobs Engineering Group Inc. (Jacobs), has provided environmental compliance support during construction and operations of the solar facility.

Ivanpah 1 (the southern unit) covers approximately 913.5 acres (370 ha); Ivanpah 2 (the middle unit) covers approximately 1,077 acres (436 ha); and Ivanpah 3 (the northern unit) is larger and covers approximately 1,235 acres (500 ha). The remaining disturbance areas include common access roads, gas lines, electrical generation tie (gen-tie) lines, and construction and operations facilities. All three generation facilities share an administration building, an operations and maintenance building, a substation located between Ivanpah 1 and 2, and paved roads to access each site. The project ties into the existing Kern River gas transmission line about 0.5 mile (0.8 kilometer [km]) north of the Northern Rare Plant Mitigation Area and into the Southern California Edison 230/115-kilovolt (kV) line that crosses between the Ivanpah 1 and 2 sites. The Natural Gas Pipeline (NGL) and tap station are located in an 8.84-acre (3.58-ha) linear right-of-way (ROW) between the Kern River gas transmission line and the northeastern corner of Ivanpah 3.

1.2 Report Objective

During Year 3 (2016) post-construction monitoring, success criteria were met through the establishment of target densities of Mojave milkweed (*Asclepias nyctaginifolia*), desert pincushion (*Coryphantha chlorantha*), nine-awned pappus grass (*Enneapogon desvauxii*), and Parish's club-cholla (*Grusonia parishii*) on the NGL. Density monitoring on the NGL is now complete. As required by Condition of Certification (COC) Biology-18 Special-status Plant Impact and Avoidance and Minimization (BIO-18), Verification (CEC, 2010), record summaries of the post-construction special-status plant revegetation monitoring of the NGL will continue to be included in the Annual Compliance Reports for a period of not less than 10 years, regardless of whether success criteria were met earlier in the 10-year period. Therefore, the objective of this report is to present the results of Year 5 (2018) post-construction special-status plant revegetation monitoring of the NGL corridor in accordance with the annual reporting requirement of the California Energy Commission's (CEC's) Commission Decision (CEC, 2010) COC BIO-18 Measure 8, Gas Pipeline Revegetation and Monitoring.

This report also complies with measures included in Section 8 of the *ISEGS Special-status Plant Protection and Monitoring Plan* (Solar Partners, 2010) and with the *Closure, Revegetation, and Rehabilitation Plan for the Ivanpah Solar Electric Generating System* (CH2M, 2010), which includes the *Gas Pipeline Revegetation and Monitoring Plan*, as required by the BLM ROW Grant (BLM, 2010).

BIO-18 Measure 8 (CEC, 2010) includes a requirement to re-establish the following special-status plants within the disturbed NGL corridor:

- Rusby's desert mallow (*Sphaeralcea rusbyi* var. *eremicola*)
- Mojave milkweed (*Asclepias nyctaginifolia*)
- Desert pincushion (*Coryphantha chlorantha*)
- Nine-awned pappus grass (*Enneapogon desvauxii*)
- Parish's club-cholla (*Grusonia parishii*)

During Year 5 (2018) monitoring, a qualified botanist conducted a limited field survey to confirm persistence of special-status plants to support the Annual Compliance Report. Annual monitoring summaries will be provided by January 31 of each calendar year within the 10-year monitoring timeframe.

2. Results

2.1 Post-Construction Monitoring

2.1.1 Background

Progress criteria for special-status plant density and survivorship (CH2M, 2015) were met during Year 3 (CH2M, 2016, 2017), and monitoring is now complete. Previously, soil preparation, seed collection, hand-broadcast seeding, and planting was performed from 2012 through 2014. At the end of December 2013, substantial completion of construction was achieved. Year 1 post-construction monitoring was performed in 2014 (CH2M, 2015), Year 2 post-construction monitoring was performed in 2015 (CH2M, 2016), Year 3 post-construction monitoring was performed in 2016 (CH2M, 2017), and Year 4 post-construction monitoring was performed in 2017 (CH2M, 2018).

2.1.2 Year 5 (2018)

Since success criteria were met in Year 3 (CH2M, 2017), no density or survivorship analyses were conducted during Year 4 or Year 5 monitoring. During Year 5 (2018) monitoring, botanist Morgan King of Jacobs performed the annual assessment of special-status plants within the NGL disturbance area. Fieldwork was conducted on May 22 and July 20, 2018.

Botanists confirmed the persistence of Mojave milkweed, desert pincushion, and Parish's club cholla on the NGL disturbance area (Figure 2-1). No individuals of Rusby's desert mallow were observed during Year 5 monitoring. Also, no individuals of nine-awned pappus grass were observed during Year 5. Surveys were not proceeded by significant rainfall events, and this species is a summer annual, meaning that it germinates and grows after summer rain; it is, therefore, not expected to occur every year. Nine-awned pappus grass was observed during Year 1 (2014) monitoring.

Figure 2-1. Representative Photographs of Special-Status Plants on the Natural Gas Pipeline
Mojave milkweed, desert pincushion, and Parish's club cholla

2.1.3 Reporting Schedule

As required by BIO-18, Verification (CEC, 2010), record summaries of the NGL post-construction special-status plant revegetation monitoring will continue to be included in the Annual Compliance Reports for a period of not less than 10 years, regardless of the success criteria being met earlier in the 10-year monitoring period. The monitoring and reporting schedule for the NGL commenced with the end of construction in 2013, with the first of the 10-year reports due by January 2014, and will be completed in January 2024.

3. Discussion

Revegetation monitoring shows that the BIO-18 Measure 8 Gas Pipeline Revegetation success criteria (CH2M, 2015) have been met by the establishment of target densities of Mojave milkweed, desert pincushion, nine-awned pappus grass, and Parish's club-cholla on the NGL. During the 10-year post-construction period, a botanist will conduct an annual field assessment on the NGL but will not conduct density or survivorship analyses.

4. References

Bureau of Land Management (BLM). 2010. Right-of-Way Lease/Grant Serial Number CACA-49502 for the Construction Logistics Area and common shared facilities necessary for the construction, operation, and termination of the Ivanpah Solar Electric Generating System. Needles Field Office: Department of Interior. October 7.

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Appendix L

Condition of Certification BIO-18

Mojave Milkweed Land Acquisition (Hudgen's Parcel) Annual Report

energyservices
an NRG service

NRG Ivanpah Solar Thermal Power Plant
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2012 Fax: 702-815-2030

January 9, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C)
Mojave Milkweed Land Acquisition (Hudgen's Parcel) Annual Report, to fulfill California Energy Commission Condition of Certification, BIO-17 and BIO-18

Dear Mr. Payne and Mr. Ahrens,

Pursuant to the requirements of CEC Condition of Certification BIO-18, measure 11, the project owner shall acquire, in fee or in easement, a parcel or parcels of land that includes at least 30 acres supporting a viable occurrence of Mojave milkweed (or suitable habitat adjacent to a known occurrence). The terms and conditions of this acquisition or easement shall be as described in Condition of Certification BIO-17 with the additional criteria that the Mojave milkweed mitigation lands: 1) provide habitat for the special-status plant species that is of similar or better quality (e.g., in terms of native plant composition) than that impacted; 2) contain or abut a known occurrence of Mojave milkweed, ideally with populations that are stable, recovering, or likely to recover, that shares the same watershed as the land; and 3) be adequately sized and buffered to support self-sustaining special-status plant populations.

On April 20, 2017, ISEGS transferred ownership of the 37-acre Hudgen's Parcel to the U.S. Government which now being managed by the National Park Service (NPS). Solar Partners/ISEGS has fulfilled its Mojave milkweed mitigation obligation required by Conditions of Certification BIO-17 measure 2 and BIO-18 measure 11 with the above successful execution and fee title transfer of the Hudgen's Parcel and with the acceptance of NPS. Therefore, no further reporting is required. However, Solar Partners/ISEGS will continue to provide these statements in the annual compliance report until CEC and BLM acknowledge that this milkweed mitigation obligation is complete and no further reporting is required.

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NRG Ivanpah Solar Thermal Power Plant
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2012 Fax: 702-815-2030

Please feel free to contact me with any questions.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Appendix M

Condition of Certification BIO-19

Society for Conservation of Bighorn Sheep Annual Report

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 9, 2018

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C)
Big Horn Sheep Mitigation Plan Society For Conservation for the Conservation of Bighorn Sheep (SCBS) Annual Report, to fulfill California Energy Commission Conditions of Certification, BIO-19

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Section 3.3 of the Big Horn Sheep Mitigation Plan, of the Conditions of Certification BIO-19 of the Commission's approval of the Ivanpah Solar Electric Generating System (ISEGS), the SCBS will provide to the project owner an annual report no later than January 15th of each year, and the project owner will provide to the CEC and BLM the annual report no later than January 31st of each year.

Despite repeated request attempts, ISEGS has not received an update to the Bighorn Sheep Mitigation Report from SCBS dated March 2015. ISEGS will no longer attempt to contact SCBS, and affirms that it has met the intent of the Conditions of Certification BIO-19.

Please feel free to contact me with any questions.

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Appendix N

Condition of Certification BIO-20

Streambed Impact Minimization Measure
Change of Condition Report

TECHNICAL MEMORANDUM

Condition of Certification BIO-20 Change of Conditions Report for ISEGS, May 2018

PREPARED FOR:	Tim Sisk/NRG Energy Amanda Scheib/Designated Biologist
COPY TO:	Jacobs Environmental Staff
PREPARED BY:	Morgan King/ Jacobs
DATE:	May 7, 2018
PROJECT NUMBER:	701975

Introduction

The California Energy Commission's *Ivanpah Solar Electric Generating System Commissions Decision* (2010) Condition of Certification (COC) BIO-20 states, in part, that Solar Partners' must identify:

> "…any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts… As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project."

Potential changes of conditions include changes to assumptions resulting from new data provided during the operations phase biological resource surveys of Ivanpah Solar Electric Generating System (ISEGS). In spring 2017 and 2018, environmental staff identified the presence of two new plant species, which represents a change in the biological conditions for ISEGS.

New Plant Occurrences

Change of Conditions

The new plant species not previously observed onsite were brassy bryum (*Bryum chryseum*) and rocketsalad (*Eruca vesicaria*).

Brassy Bryum

Brassy bryum is a byrophyte in the moss (Bryaceae) family. This species has a California Native Plant Society rarity status California Rare Plant Rank 4.3, which means it has limited distribution in California (CNPS, 2018).

Bryophytes require a microscope for identification. This species was found in the Northern Rare Plant Mitigation Area (north of the facility) in a rocky limestone outcrop near an ephemeral wash. Samples were taken in April 2017 and a qualified bryologist was able to identify in March 2018. This is the first occurrence of this species in San Bernardino County, California. Since this species is already located in a mitigation area, no further protection is required.

Rocketsalad

Rocketsalad is a non-native species in California, introduced from elsewhere but naturalized in the wild (Calfora, 2018). It occurs throughout California in disturbed locations. This individual was found in highly active area in Construction Logistics Area East, northeast of the Heliostat Assembly Building .

Rocketsalad does not meet the criteria of an ISEGS target weed, defined as a species included on the weed list of the California Department of Food and Agriculture (CDFA), California Invasive Plant Council (Cal-IPC), or Mojave Weed Management Area (MWMA) (CH2M, 2010; CDFA, 2018; Cal-IPC, 2018; MDRCD, 2018). Because this is a non-native species, it was manually removed in accordance with BIO-13 weed management guidelines (CH2M, 2010).

Recommendations

No recommendations are necessary to accommodate this change in conditions. Brassy bryum is protected in current location in the Northern Rare Plant Mitigation Area. Rocketsalad was manually removed in accordance with weed management guidelines (CH2M, 2010). Biological staff will continue to monitor the project site for new plant species while complying with requirements BIO-18 special-status plants and BIO-13 noxious weeds (CEC, 2010).

References

Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria [web application]. 2018. Berkeley, California: The Calflora Database. Available: http://www.calflora.org/ (Accessed: May 07, 2018).

California Native Plant Society, Rare Plant Program. 2018. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 07 May 2018].

California Department of Food and Agriculture (CDFA). 2018. Noxious Weed List – Section 4500 Food and Agriculture Code (PDF). Accessed May 2018. http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm.

California Invasive Plant Council (Cal-IPC). 2018. California Invasive Plant Inventory Database. California Invasive Plant Council, Berkeley. Accessed May 2018. http://cal-ipc.org/paf/

California Energy Commission (CEC). 2010. Commission Decision. *Ivanpah Solar Electric Generating System Documents*. Docket Number 07-AFC-5. September 22. Accessed June 2017. http://www.energy.ca.gov/sitingcases/ivanpah/documents/index.html

CH2M HILL (CH2M). 2010. *Weed Management Plan for the Ivanpah Solar Electric Generating System (Revision 2)*. Sacramento, CA.

Mojave Desert Resource Conservation District (MDRCD). 2018. Mojave Weed Management Area – Long Range Plan. Accessed May 2018. http://www.mojavewma.org/index.html

TECHNICAL MEMORANDUM

JACOBS

Condition of Certification BIO-20 Change of Conditions Report for ISEGS, December 2018

PREPARED FOR:	Tim Sisk/NRG Energy Amanda Scheib/Designated Biologist
COPY TO:	CH2M Environmental Staff
PREPARED BY:	Morgan King/Jacobs
DATE:	January 7, 2019
PROJECT NUMBER:	701975CH

Introduction

The California Energy Commission's *Ivanpah Solar Electric Generating System Commissions Decision* (2010) Condition of Certification (COC) BIO-20 states, in part, that Solar Partners' must identify:

> "…any change of conditions to the project, the jurisdictional impacts, or the mitigation efforts… As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project."

Potential changes of conditions include changes to assumptions resulting from new data provided during the operations phase of Ivanpah Solar Electric Generating (ISEGS) surveys. Environmental staff identified one noxious weed species previously observed at ISEGS that had changed agency status with either California Department of Food and Agriculture (CDFA), California Invasive Plant Council (Cal-IPC), or Mojave Weed Management Area (MWMA).

Noxious Weed Status Changes

Change of Conditions

Cal-IPC changed the noxious weed rating of London rocket (*Sisymbrium irio*) from Moderate to Limited.

London Rocket

London rocket is an annual herbaceous plant in the mustard (Brassicaceae) family. It is an invasive non-native species in California, which was introduced from elsewhere but naturalized in the wild. It occurs throughout California, mostly in the southern half of state and in the Central Valley in elevations up to 7,775 feet above mean sea level. It occurs in disturbed areas and individual plants can produce several thousand seeds annually.

When the ISEGS Weed Management Plan was written in 2010, Cal-IPC rated London rocket as Moderate. The definition of Cal-IPC Moderate rated weed is:

> These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread (Cal-IPC, 2018).

In 2018, Cal-IPC downgraded London rocket to Limited rating. The definition of Cal-IPC Limited rated weed is:

> These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic (Cal-IPC, 2018).

London rocket is not included on the CDFA or MWMA lists (CDFA, 2018; MDRCD, 2018).

London rocket was first recorded at ISEGS in 2008 (CH2M, 2010). London rocket has been observed since 2008 and manually removed in accordance with BIO-13 weed management protocols. Occurrences of this species were reported in the BIO-13 Annual Monitoring Reports (Solar Partners, 2015; Solar Partners, 2016; Solar Partners, 2017; Solar Partners, 2018).

Recommendations

Recommend revising the ISEGS Weed Management Plan (Table 1 Observed and Potentially Occurring Noxious Weeds at ISEGS) to include those noxious weed species that have changed CDFA, Cal-IPC, or MWMA status since 2010.

References

California Department of Food and Agriculture (CDFA). 2018. Noxious Weed List – Section 4500 Food and Agriculture Code (PDF). Accessed December 31 2018. http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm.

California Invasive Plant Council (Cal-IPC). 2018. California Invasive Plant Inventory Database. California Invasive Plant Council, Berkeley. Accessed December 2018. http://cal-ipc.org/paf/

California Energy Commission (CEC). 2010. Commission Decision. *Ivanpah Solar Electric Generating System Documents*. Docket Number 07-AFC-5. September 22. Accessed September 2017. http://www.energy.ca.gov/sitingcases/ivanpah/documents/index.html

CH2M HILL (CH2M). 2010. *Weed Management Plan for the Ivanpah Solar Electric Generating System (Revision 2)*. Sacramento, CA.

Mojave Desert Resource Conservation District (MDRCD). 2018. Mojave Weed Management Area – Long Range Plan. Accessed December 2018. http://www.mojavewma.org/index.html

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners). 2018. *Ivanpah Solar Electric Generating System California Energy Commission (07-AFC-5C) Bureau of Land Management (CACA-48668, 49502, 49503, and 49504) Conditions of Certification BIO-13, Annual Weed Management Report January 1, 2017 – December 31, 2017.* Prepared by Designated Biologists. Submitted January 2018.

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners). 2017. *Ivanpah Solar Electric Generating System California Energy Commission (07-AFC-5C) Bureau of Land Management (CACA-48668, 49502, 49503, and 49504) Conditions of Certification BIO-13, Annual Weed Management Report January 1, 2016 – December 31, 2016.* Prepared by Designated Biologists. Submitted January 12, 2017.

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners). 2016. *Ivanpah Solar Electric Generating System California Energy Commission (07-AFC-5C) Bureau of Land Management (CACA-48668, 49502, 49503, and 49504) Conditions of Certification BIO-13, Annual Biological Report January 1, 2015 – December 31, 2015.* Prepared by Designated Biologists. Submitted January 31, 2016.

Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC (Solar Partners). 2015. *Ivanpah Solar Electric Generating System California Energy Commission (07-AFC-5C) Bureau of Land Management (CACA-48668, 49502, 49503, and 49504) Conditions of Certification BIO-13, Annual Biological Report January 1, 2014 – December 31, 2014.* Prepared by Designated Biologists. Submitted January 31, 2015.

Exhibit 5

Hazardous Materials
Conditions of Certification

Appendix O

Condition of Certification HAZ-1

List of Hazardous Materials Contained in ISEGS Facility

LIST OF HAZARDOUS MATERIALS CONTAINED AT ISEGS FACILITY

In accordance with the requirements of the Conditions of Certification HAZ-1 of the Commission's approval of the Ivanpah Solar Electric Generating System (ISEGS) (07-AFC-5C), the project owner shall provide to BLM's Authorized Officer and the CPM in the Annual Compliance Report a list of hazardous material contained at the facility.

There are no new chemicals used in the facility in 2018. Table 1 provides the updated list of Hazardous Materials contained and currently in use at the ISEGS facility.

Table 1 - List of Chemicals Contained at ISEGS Facility (2018)

In accordance with CEC Condition of Certification HAZ-1, the following is the list of hazardous materials contained in the facility.

Common Name	Chemical Name	Chemical Location	CAS Number	Largest Container	Estimated Average Daily Amount	Maximum Quantity	Units	Application
Ammonium Hydroxide	Ammonium Hydroxide	Power Block 1, 2, & 3 Injection Skids	1336-21-6	500	330	1,500	gallons	Used for pH control on the condensate and feed water systems.
Mineral Oil	Mineral Oil	Power Block Transformers/Switchyards, Solar Field Transformers, Admin Building and HAB Transformers	8012-95-1	9,900	9,900	57,445	gallons	Insulating oil used for transformers
Lubricating oil	Turbinas EP 32 (Turbine Oil)	Power Block STG Lube Oil System, Boiler Feed Pump Turbine, Startup Boiler Feed Pump, Emergency Generators, Diesel fire pumps and Chemical Storage Areas	64742-54-7	5,800	20,000	28,408	gallons	Lubricate rotating equipment (e.g., steam turbine bearings)
Lead Acid Batteries	Lead	Power Block PSB/Battery Rooms, SRSG - UPS EEM Baterry Rooms, Admin. Bldg Battery Room, Emergency Generator Enclosures, Diesel Fire Pump Enclosures	7439-92-1	727	311,348	311,348	pounds	Back-up power / electrical
Lead Acid Batteries	Sulfuric Acid	Power Block PSB/Battery Rooms, SRSG - UPS EEM Baterry Rooms, Admin. Bldg Battery Room, Emergency Generator Enclosures, Diesel Fire Pump Enclosures	7664-93-9	145	52,849	52,849	pounds	Back-up power / electrical
Sodium Hypochlorite	Sodium Hypochlorite	Administration Building Potable Water Chemical Skid	7681-52-9	275	275	275	gallons	Potable water treatment and WSAC oxidizer
Polypropylene glycol	Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-hydro-.omega.-hydroxy-	Contained as a mixture in the WSAC reservoir tank	25322-69-4	800	350	798	gallons	Propylene gylcol is in mixture with water in the WSAC system.
Polypropylene glycol	Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-hydro-.omega.-hydroxy-	Satelitte Accumulation Storage Areas Units 1,2,3; Hazardous Waste Storage Areas	25322-69-4	55	30	385	gallons	Waste propylene gycol for disposal
Diesel Fuel No. 2	Diesel Fuel No. 2	Unit 1, Unit 2, Unit 3 and Admin. Building Emergency and Fire Pump Generators	68476-34-6	840	2,852	3,565	gallons	Fuel for Emergency Generators and Fire Pump engines
Methane	Methane	Piped in supply to Units 1, 2 & 3	74-82-8	Metered	3,346,329	1,575,000,000	cu. feet	Fuel for Auxiliary Boilers and Nighttime Preservation Boilers
Sulfur Hexafluoride	Sulfur Hexafluoride	Switchgear assemblies	2551-62-4	73	73	403	pounds	Used in switchyard/switchgear devices
Heptafluoropropane - HFC 227	1,1,1,2,3,3,3-Heptafluoropropane	Power Block PSB, Administration Building & Emergency Diesel Generator Enclosures	431-89-0	475	475	11,648	pounds	Fire/explosion extinguishing, suppression and prevention agent
Intercool NFP-P (Intercool P-300)	Propylene Glycol	Power Block 1, 2, & 3 and Heliostat Assembly Building	57-55-6	55	165	1,045	gallons	Night shutdown vacuum pump skid. Used as heat transfer fluid
Acetylene	Acetylene	Heliostat Assembly Building	74-86-2	130	750	1,595	cu. feet	Used for welding/cutting metals
Air Compressed	Air	Heliostat Assembly Building	132259-10-0	218	218	872	cu. feet	used for remote tools
Argon Compressed	Argon Compressed	Heliostat Assembly Building	7440-37-1	336	436	9,525	cu. feet	Used for welding
Carbon Dioxide	Carbon Dioxide	Power Block Emergency Generator Enclosure	124-38-9	180	436	1,620	cu. feet	Fire suppression
Helium	Helium	Heliostat Assembly Building	7440-59-7	218	654	1,744	cu. feet	For leak detection

Common Name	Chemical Name	Chemical Location	CAS Number	Largest Container	Estimated Average Daily Amount	Maximum Quantity	Units	Application
Liquefied Petroleum Gas (lpg)	Propane	Heliostat Assembly Building & Administration Building	74-98-6	22	53	125	gallons	Used as fuel for equipment
Nitrogen	Nitrogen	Heliostat Assembly Building	7727-37-9	304	3,924	12,160	cu. feet	Used for purging gas systems
Oxygen	Oxygen	Heliostat Assembly Building	7782-44-7	251	1,800	5,620	cu. feet	Used for welding/cutting metals
Oily Debris - Hazardous Waste	Oily Debris	Satellite Accumulation Storage Areas Units 1,2,3; Hazardous Waste Storage Areas	70514-12-4	55	165	3,470	pounds	Waste - for disposal
Lubricating oils, used	Used lubricating oils	Satellite Accumulation Storage Are Units 1,2,3; Hazardous Waste Storage Area	70514-12-4	55	165	440	gallons	Waste - for disposal
Lead	Broken Mirrors - Primer Paint Lead Content	Heliostat Assembly Building	7439-92-1	40,000	690	131,090	pounds	Waste - for disposal

Appendix P

Condition of Certification HAZ-5

Operations Security Plan
Background Investigations for All Employees and Contractors

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2012 Fax: 702-815-2030

January 9, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 9236

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Operation Security Plan Project Owner Statement Pertaining to All Current Employee and Contractor Background Investigation to fulfill California Energy Commission Conditions of Certification, HAZ-5

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification HAZ-5 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

All current NRG employees undergo full background investigations as required in NRG hiring process. All contractors (vendors) who provide services to the project/facility go through pre-qualification process and NRG internal approval process, "Adapt-One". The certification statements are appended in the Operations Security Plan.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

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NRG Ivanpah Solar Electric Generating /system
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2012 Fax: 702-815-2030

January 9, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 9236

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Project Owner Statement Pertaining to Operations Security Plan Includes Hazardous Materials Transport Vendor Certifications for Security Plans and Employee Background Certifications to fulfill California Energy Commission Conditions of Certification, HAZ-5

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification HAZ-5 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following statement as a requirement in the Annual Compliance Report:

ISEGS Operations do not transport hazardous materials. Hazardous wastes generated on site are transported to the TDSF (Treatment Storage and Disposal Facility) by an approved vendor. The vendor certification and employee background certifications are appended in the Operations Security Plan.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Affidavit of Compliance for Contractors by Project Owners

I, **William Dusenbury, General Manager**

(Name of Person signing Affidavit and Title)

do hereby certify that all Contractors who are approved to work at Ivanpah Solar Electric Generating Station have gone through NRG energy internal approval process "Adapt-one"

for contract work at

Ivanpah Solar Electric Generating System located at 100302 Yates Well Rd, Nipton, CA 92364

(Project Name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above-named project.

Will Dusenbury

(Signature of Officer or Agent)

Dated this 16 day of January, 2019.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

Affidavit of Compliance for Project Owners

I, **William Dusenbury, General Manager**

(Name of Person signing Affidavit and Title)

do hereby certify that background investigations to ascertain accuracy of the identity and employment history of all employees of

NRG Energy Services

(Company Name)

for employment at

Ivanpah Solar Electric Generating System located at 100302 Yates Well Rd, Nipton, CA 92364

(Project Name and location)

have been conducted as required by the U.S. Bureau of Land Management Right-of-Way and California Energy Commission Decision for the above-named project.

Will Dusenbury

(Signature of Officer or Agent)

Dated this 16th day of JANUARY, 2019.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY BLM's AUTHORIZED OFFICER AND THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

Exhibit 6

Land Use and Recreation
Conditions of Certification

Appendix Q

Conditions of Certification
LAND-3 & RECREATION-1

Solar/Ecological Interpretive
Center Annual Report

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 7, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) / Bureau of Land Management (CACA-055108) Summary of Estimated Public Use of Solar/Ecological Interpretive Center and Issues Associated with Operating and Maintenance Activities, to fulfill California Energy Commission Conditions of Certification, LAND-3 AND RECREATION-1

Dear Mr. Payne and Mr. Ahrens,

Pursuant to the requirements of Conditions of Certification LAND-3 and RECREATION-1 of the Commission's approval of the Ivanpah Solar Electric Generating System (ISEGS), we are providing the following information as a requirement in the Annual Compliance Report:

As required by COC LAND-3 and REC-1 verification, the project owner shall provide a summary of estimated public use of the Solar / Ecological Interpretive Center (SEIC) and summarize any issues associated with operating and maintenance activities in each Annual Compliance Report.

When the SEIC facility was accepted by BLM on May 13, 2015, ISEGS has transferred ownership of the facility to BLM, including operations and maintenance activities. ISEGS has no longer has jurisdiction of the facility; therefore, we are unable to provide information on annual estimated public use or issues related to operations and maintenance activities on this report, and in future reports.

In order for ISEGS for completely fulfill its mitigation obligation for the SEIC, ISEGS is required to provide panels that will be posted into the information kiosk. ISEGS completed and submitted the kiosk design to BLM for review and approval on December 19, 2016. BLM completed the review of the kiosk panels and approved the design on February 22, 2018. BLM also suggested that ISEGS may pre-pay the kiosk panels fabrication in order to fulfill its mitigation obligation. ISEGS subsequently sent the payment for the kiosk panels to BLM on April 2, 2018, and BLM received on April 5, 2018. On November 14, 2018, BLM

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100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

confirmed that they were satisfied with the effort provided by NRG and accepted the mitigation requirement for LAND-3 and RECREATION-1 as complete. A copy of BLM acceptance is attached.

Please feel free to contact me with any questions.

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Amansec, Manolito

From: Ahrens, Michael <mahrens@blm.gov>
Sent: Wednesday, November 14, 2018 1:49 PM
To: Sisk, Tim
Cc: Amansec, Manolito; Shelley Gregory; Ramona Daniels; Vaught, Daniel; Dusenbury, William R.; Piantka, George
Subject: Re: [EXTERNAL] RE: Kiosk Panels -

Tim,

Frankly we have had some embarrassing delays on our end of this project which I very much regret. NRG on the other hand has been nothing less that responsive and has done everything necessary on their part to complete this mitigation requirement. I am very satisfied with the effort provided by NRG and accept this mitigation requirement as complete.

Let me know if you would prefer a more formal response, and please accept my apology.

Mike Ahrens
Field Manager
BLM, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363
Ph. 760 326 7001
Cell 760 221 8844

On Wed, Nov 14, 2018 at 12:54 PM Sisk, Tim <Tim.Sisk@nrg.com> wrote:

> Mike,
>
> As we approach the end of 2018, I'm hoping we/Ivanpah can receive confirmation from BLM that Ivanpah has met the obligation for the Kiosk Panels as it relates to the mitigation requirement. I know the CEC and DOE would like to see that this mitigation requirement has been completed in the upcoming annual reports.
>
> Please let me know if we can do anything to support this effort?
>
> Thanks again,
>
> **Timothy R. Sisk**
> Manager, Environmental Business
> NRG Energy, West Region
> 4600 Carlsbad Boulevard

Carlsbad, CA 92008
760-710-2129 (o)

860-334-8081 (c)

From: Sisk, Tim
Sent: Monday, April 02, 2018 2:36 PM
To: mahrens@blm.gov
Cc: Amansec, Manolito; Shelley Gregory (ssgregory@blm.gov); Ramona Daniels (m1daniel@blm.gov); Sisk, Tim; Daniel Vaught (dvaught@blm.gov)
Subject: Kiosk Panels -

Mike,

As we discussed previously, ISEGS has sent the payment for the Kiosk Mitigation Panels to the BLM Accounts Receivable Group on behalf of the BLM National Sign Program (see attachments). I believe that this fulfills ISEGS responsibility to comply with this mitigation requirement. Perhaps, there are other steps that are required, and if so can you please let us know what else is required?

If ISEGS has completed this mitigation requirement with this payment, can we please receive written confirmation that this requirement has been completed? The California Energy Commission has been requesting an update on the status of this mitigation, and we'd like to provide them with BLM confirmation.

Regards,

Timothy R. Sisk
Manager, Environmental Business
NRG Energy, West Region
5790 Fleet Street, Suite 200
Carlsbad, CA 92008
760-710-2129 (o)

860-334-8081 (c)

Exhibit 7

Soil & Water Conditions of Certification

Appendix R

Condition of Certification S&W-1

Storm Water BMP Monitoring and Maintenance Activities Report

Ivanpah Solar Electric Generating System
California Energy Commission (07-AFC-5C)
Bureau of Land Management
(CACA-48668, 49502, 49503, and 49504)
Conditions of Certification Soil & Water-01

January 1, 2018 – December 31, 2018
Reporting Period
Submitted
January 31, 2019

Prepared by: Designated Biologist on behalf of Solar Partners I, II, VIII LLC
100302 Yates Well Road
Nipton, CA 92364

In accordance with the requirements of the Conditions of Certification SOIL & WATER-01 of the Commission's approval of the Ivanpah Solar Electric Generating System (07-AFC-5C), the project owner shall provide in the annual compliance report, information on the results of storm water best management practices (BMP) monitoring and maintenance activities.

Table 1 outlines the repairs performed during 2018 to SWPPP BMP at ISEGS.

Table 1: Storm Water Pollution Prevention Plan BMP Repairs

Date	Description
7/18/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
7/19/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
8/1/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
8/2/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
8/8/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
8/9/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
8/16/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
8/17/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
10/29/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
10/30/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
10/31/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
12/3/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
12/4/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.
12/5/18	Remove debris, perform repairs, reset straw bales and wattles, and sand bags.

Appendix S

Condition of Certification S&W-2

Storm Water Pollution Prevention Plan Annual Report

2017-2018

ANNUAL REPORT

FOR STORM WATER DISCHARGES
ASSOCIATED WITH INDUSTRIAL ACTIVITIES

Reporting Period July 1, 2017 through June 30, 2018

Retain a copy of the completed Annual Report for your records.

Please remember that a Notice of Termination and new Notice of Intent are required whenever a facility operation is relocated or changes ownership.

If you have any questions, please contact your Regional Board Industrial Storm Water Permit Contact. The names, telephone numbers, and e-mail addresses of the Regional Board contacts, as well was the Regional Board office addresses, can be found at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/contact.shtml

General Information

A. Facility Information

WDID: 6B36I024279

Business Name: ISEGS

Physical Address: 100302 Yates Well Road

City: Nipton
State: CA
Zip: 92364

Contact Person: Marco Tule
Phone: 702-815-2016
Email: marco.tule@nrg.com

Standard Industrial Classification (SIC) Codes: 4911-Electric Services

B. Facility Owner Information

Business Name: NRG EnergyServices LLC

Mailing Address: 100302 Yates Well Road

City: Nipton
State: CA
Zip: 92364

Contact Person: Marco Tule
Phone: 702-815-2016
Email: marco.tule@nrg.com

C. Facility Billing Information

Business Name: Ivanpah Solar Electric Generating Station

Mailing Address: 100302 Yates Well Road

City: Nipton
State: CA
Zip: 92364

Contact Person: Marco Tule
Phone: 702-815-2016
Email: marco.tule@nrg.com

Question Information

1. Has the Discharger conducted monthly visual observations (including authorized and unauthorized Non-Storm Water Discharges and Best Management Practices) in accordance with Section XI.A.1?

☒ Yes ☐ No

If No, see Attachment 1, Summary of Explanation.

2. Has the Discharger conducted sampling event visual observations at each discharge location where a sample was obtained in accordance with Section XI.A.2?

☐ Yes ☒ No

If No, see Attachment 1, Summary of Explanation.

3. Did you sample the required number of Qualifying Storm Events during the reporting year for all discharge locations, in accordance with Section XI.B?

☐ Yes ☒ No

If No, see Attachment 1, Summary of Explanation.

4. How many storm water discharge locations are at your facility?

5

5. Has the Discharger chosen to select Alternative Discharge Locations in accordance with Section XI.C.3?

☐ Yes ☒ No

6. Has the Discharger reduced the number of sampling locations within a drainage area in accordance with the Representative Sampling Reduction in Section XI.C.4?

☐ Yes ☒ No

7. Permitted facilities located within an impaired watershed must assess for potential pollutants that may be present in the facility's industrial storm water discharge. Using the table below, populated based on the facility's location, indicate the presence of the potential pollutant at the facility.

The facility is not located within an impaired HUC 10 watershed. You are not required to select any Industrial Pollutants. Skip Questions 8 and 9.

8. Has the Discharger included the above pollutants in the SWPPP pollutant source assessment and assessed the need for analytical monitoring for the pollutants?

☒ Yes ☐ No

If No, what date will the parameter(s) will be added to the SWPPP and Monitoring Implementation Plan?

9. Were all samples collected in accordance with Section XI.B.5?

☐ Yes ☒ No

If No, see Attachment 1, Summary of Explanation.

10. Has any contained storm water been discharged from the facility this reporting year?

☐ Yes ☒ No

If Yes, see Attachment 1, Summary of Explanation.

11. Has the Discharger conducted one (1) annual evaluation during the reporting year as required in Section XV?

☒ Yes ☐ No

If Yes, what date was the annual evaluation conducted? 06/28/2018

If No, see Attachment 1, Summary of Explanation.

12. Has the Discharger maintained records on-site for the reporting year in accordance with XXI.J.3?

☒ Yes ☐ No

If No, see Attachment 1, Summary of Explanation.

If your facility is subject to Effluent Limitation Guidelines in Attachment F of the Industrial General Permit, include your specific requirements as an attachment to the Annual Report (attach as file type: Supporting Documentation).

ANNUAL REPORT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel propoerly gether and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name: William Dusenbury

Title: Plant Manager Date: 07/12/2018

2017-2018

Annual Report for WDID 6B36I024279

Summary of Explanations

Explanation Question	Explanation Text
Question 2	No sampling events for 2017-2018
Question 3	No QSE produced runoff during normal operating hours. 7/19/2017 QSE did not produce runoff 8/25/2017 QSE did not produce runoff 1/9/2018 QSE occured outside of normal operating hours and did not produce runoff. Also, thunderstorms did not allow us to sample safely
Question 9	No QSE produced runoff during normal operating hours for 2017-2018

Summary of Attachments

Attachment Type	Attachment Title	Description	Date Uploaded	Part Number	Attachment Hash

2017-2018

Annual Report for WDID 6B36I024279

List of Identified Pollutants within the Impaired Watershed

Parameter	Pollutant	Present at Facility?

Water Boards Storm Water Multiple Application & Report Tracking System

Help Logout

You are logged-in as: **William Dusenbury**
If this account does not belong to you, please log out.

Navigate To:

Storm Water Annual Report Monitoring (SWARM)

Facility Name:	ISEGS	**Agency:**	NRG EnergyServices LLC	**WDID ID:**	6B36I024279
SIC Code(s):	4911-Electric Services	**Report Period:**	2017-18	**Report Status:**	Submitted
Compliance Group:					

General Info | Questions | Attachments | Certify | Status History | Notes | Back To Report Main | Back To NOI Summary

Your electronic Annual Report has been succesfully received by the State Water Resources Control Board's database and is hereby certified. Your confirmation information for this certification is as follows:

WDID	6B36I024279
Reporting Period	2017-18
Certifier Name	William Dusenbury
Certifier Title	Plant Manager
Date Certified	07/12/2018
Certification ID	942947

All records must be retained for 5 years from the date of the report or monitoring activity.

Print Annual Report

Appendix T

Condition of Certification S&W-4

Annual Groundwater Consumption Record

2018 IVAPAH SOLAR ELECTRIC GENERATING SYSTEM WATER CONSUMPTION

(Compliance with SOIL&WATER-4)

MONTH	Well #1				Well #2				CONSUMPTION DISTRIBUTION								2018 TOTAL BY MONTH
	Permit #2010110649 (WP 6877)				Permit #2010110649 (WP 6877)												
	Pump A Common				Pump B Common				UNIT 1		UNIT 2		UNIT 3		COMMON AREA		
	FIT1010				FIT2010												
	Start (Meter Reading)	Finish (Meter Reading)	(gallons)	(acre feet)	Start (Meter Reading)	Finish (Meter Reading)	(gallons)	(acre feet)	(gallons)	(acre feet)	(gallons)	(acre feet)	(gallons)	(acre feet)	(gallons)	(acre feet)	(acre feet)
Jan-2018	0	937,559	937,559	2.8773	0	386,866	386,866	1.1872	323,944	0.9941	438,972	1.3472	388,364.55	1.1918	173,145	0.5314	4.0645
Feb-2018	937,559	1,681,805	744,246	2.2840	386,866	460,709	73,843	0.2266	206,542	0.6339	287,789	0.8832	309,502.57	0.9498	14,256	0.0438	2.5106
Mar-2018	1,681,805	2,636,350	954,545	2.9294	460,709	626,861	166,152	0.5099	214,196	0.6573	354,658	1.0884	355,072.01	1.0897	196,770	0.6039	3.4393
Apr-2018	2,636,350	3,796,380	1,160,030	3.5600	626,861	907,899	281,038	0.8625	189,312	0.5810	500,807	1.5369	490,703.18	1.5059	260,246	0.7987	4.4225
May-2018	3,796,380	5,302,710	1,506,330	4.6228	907,899	1,144,688	236,789	0.7267	295,168	0.9058	788,692	2.4204	612,744.98	1.8804	46,514	0.1427	5.3494
Jun-2018	5,302,710	8,370,550	3,067,840	9.4149	1,144,688	1,326,945	182,257	0.5593	632,919	1.9424	1,406,612	4.3167	1,113,002.80	3.4157	97,564	0.2994	9.9742
Jul-2018	8,370,550	10,738,410	2,367,860	7.2667	1,326,945	1,522,615	195,670	0.6005	586,213	1.7990	999,497	3.0673	742,525.49	2.2787	235,294	0.7221	7.8672
Aug-2018	10,738,410	13,478,830	2,740,420	8.4100	1,522,615	1,636,176	113,561	0.3485	671,995	2.0623	1,309,805	4.0196	569,078.88	1.7464	303,103	0.9302	8.7585
Sep-2018	13,478,830	16,241,770	2,762,940	8.4792	1,636,176	1,636,176	0	-	482,222	1.4799	1,274,502	3.9113	886,355.45	2.7201	119,861	0.3678	8.4792
Oct-2018	16,241,770	17,611,660	1,369,890	4.2040	1,636,176	1,636,176	0	-	252,355	0.7744	678,106	2.0810	389,930	1.1967	49,499	0.1519	4.2040
Nov-2018	17,611,660	18,566,378	954,718	2.9299	1,636,176	1,637,731	1,555	0.0048	96,961	0.2976	580,953	1.7829	265,273	0.8141	13,086	0.0402	2.9347
Dec-2018	18,566,378	19,793,108	1,226,730	3.7647	1,637,731	1,637,731	0	-	296,729	0.9106	518,981	1.5927	345,993	1.0618	65,026	0.1996	3.7647
TOTAL			**19,793,108**	**60.7428**			**1,637,731**	**5.0260**	**4,248,556**	**13.0383**	**9,139,375**	**28.0477**	**6,468,546**	**19.8512**	**1,574,363**	**4.8315**	**65.7688**
YTD (gallons)	**21,430,839**								**21,430,839**								
YTD (acre feet)	**65.77**								**65.77**								
ANNUAL LIMIT (acre feet)	**100.00**								**100.00**								
REMAINING CAPACITY (acre feet)	**34.23**								**34.23**								

Appendix U

Condition of Certification S&W-5

Annual Summary of Heliostats Failed, Cause of Failure, Cleanup and Mitigation Performed

energyservices
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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 10, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Annual Summary Heliostats Failed, Cause of the Failure, Cleanup and Mitigation Performed, to fulfill California Energy Commission Conditions of Certification, SOIL&WATER-5

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Condition of Certification SOIL&WATER-5 of the Commission's approval of the Ivanpah Solar Electric Generating System (ISEGS), the project owner shall prepare an annual summary of the number of heliostats which failed, cause of the failure, and cleanup and mitigation performed for each failed heliostat.

Ivanpah Solar Electric Generating System (ISEGS) has a total of 173,655 heliostats as designed through Ivanpah 1, 2, and 3. High wind gusts in excess of 50mph are predominantly the main cause of failure of heliostats and heliostat assemblies with a very small percentage of heliostat failures due to lightning strike and ground collision with vegetation and other objects. The Ivanpah Control Room monitors wind speeds daily and advises everyone working in the solar field to clear the area when wind speed is >25mph to avoid potential injuries. ISEGS recorded a maximum wind speed of 87mph on July 14, 2018, a 82mph wind speed on August 22, 2018, and a 81mph on February 15, 2018. The following are the main two types of heliostat failures cause by high winds:

- Broken Heliostats - Either one of both of the heliostats or mirrors are broken.
- Heliostat Assembly Failures - The heliostat assembly has come off the pylon resulting in broken heliostats.

The table below shows the number of days the ISEGS Distributed Control System recorded wind speeds in excess of 50-mph for each month in 2018.

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

Month	No. of Days Wind Speed Exceeded 50mph	Maximum Recorded Wind Speeds
Jan-18	0	48 mph
Feb-18	3	81 mph
Mar-18	1	51 mph
Apr-18	5	63 mph
May-18	3	66 mph
Jun-18	1	53 mph
Jul-18	5	87 mph
Aug-18	4	82 mph
Sep-18	3	75 mph
Oct-18	2	69 mph
Nov-18	2	61 mph
Dec-18	1	53 mph

On July 29, 2018, Ivanpah experienced a hail storm event that resulted in a significant number of broken heliostats. The projected number of broken heliostats damaged during this event was estimated between 10,000 to 12,000 heliostats. Illustrations of the location of the damaged areas are attached including photographs of the storm event and damaged heliostats.

Ivanpah has engaged a trained contractor to perform broken heliostat replacement and clean-up on a regular basis at Ivanpah 1, Ivanpah 2, and Ivanpah 3 solar fields. The broken heliostats collected from each solar field are transferred into a central broken heliostat waste bin accumulation area located within the Heliostat Assembly Building area. However, due to the large volume of broken heliostats at Ivanpah 2 and Ivanpah 3 caused by the hail storm event, one additional bin at each location was placed to facilitate the broken heliostat clean-up. The broken heliostat waste bins are covered with lock, signage, and appropriate waste label(s). Once a broken heliostat waste accumulation bin is full or approaching the 90-day storage limit, it is removed from the site and transported by a facility-contracted licensed waste hauler to an approved facility; currently U.S. Ecology in Beatty, Nevada. Efforts continue to be made to locate a recycler able to accommodate the broken heliostats; however none have been found to date.

Through 2018, 10.84% of the heliostats within the three solar array fields have broken with approximately 3% of the total heliostat breaks within Ivanpah 1, Ivanpah 2, and Ivanpah 3 solar fields are associated with the heliostat assembly failures. Heliostat only and heliostat assembly replacements commenced during the third quarter of 2017. It is anticipated that the replacement of failed heliostats

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Ph: 702-815-2021 Fax: 702-815-2030

and assemblies will continue in 2019. Regardless of failed heliostats and assemblies, Ivanpah remains stable and able to attain and sustain full load. As a preventive measure, regular maintenance of azimuth drive bolts are on-going including tightening and replacement to reduce potential heliostat assembly failures in the future. A summary of failed heliostats is shown by location on the table below.

2018 Heliostat Annual Summary Report

	Ivanpah 1	Ivanpah 2	Ivanpah 3	Total
No. of Heliostats (As Designed)	53,555	60,050	60,050	**173,655**
No. Broken Heliostats (Through 2018)	2,952	7,973	7,899	**18,824**
Broken Heliostat Percentage	5.51%	13.28%	13.15%	**10.84%**
Replacement of Failed Heliostats (2018)	372	168	185	**725**
Percentage of Failed Heliostats Replaced	13%	2%	2%	**4%**
No. of Broken Heliostats to be Replaced	2,580	7,805	7,714	**18,099**

A summary of the above listed components is tracked to potentially assist in predicting component failures in future operating years.

Please feel free to contact me if you have questions.

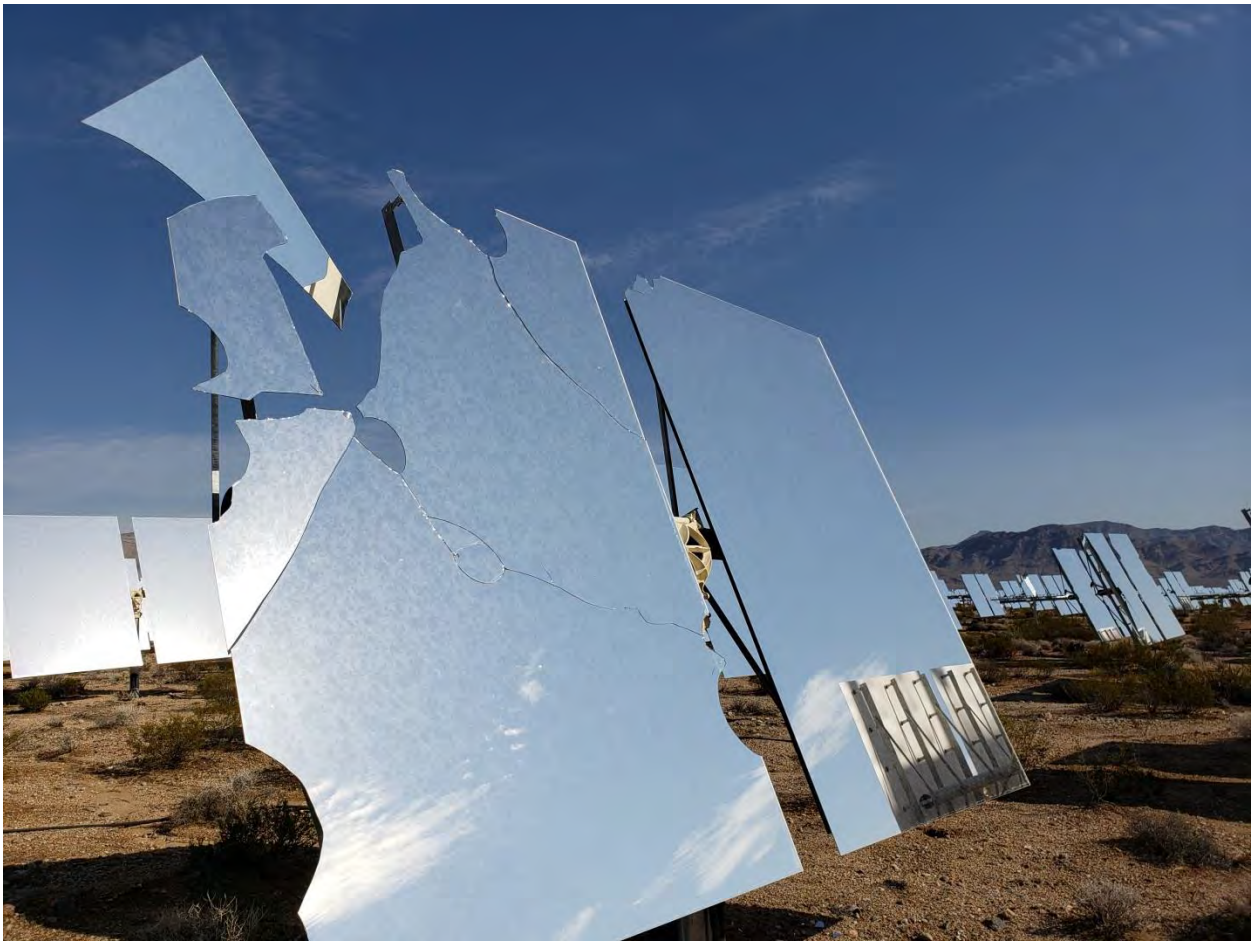
William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

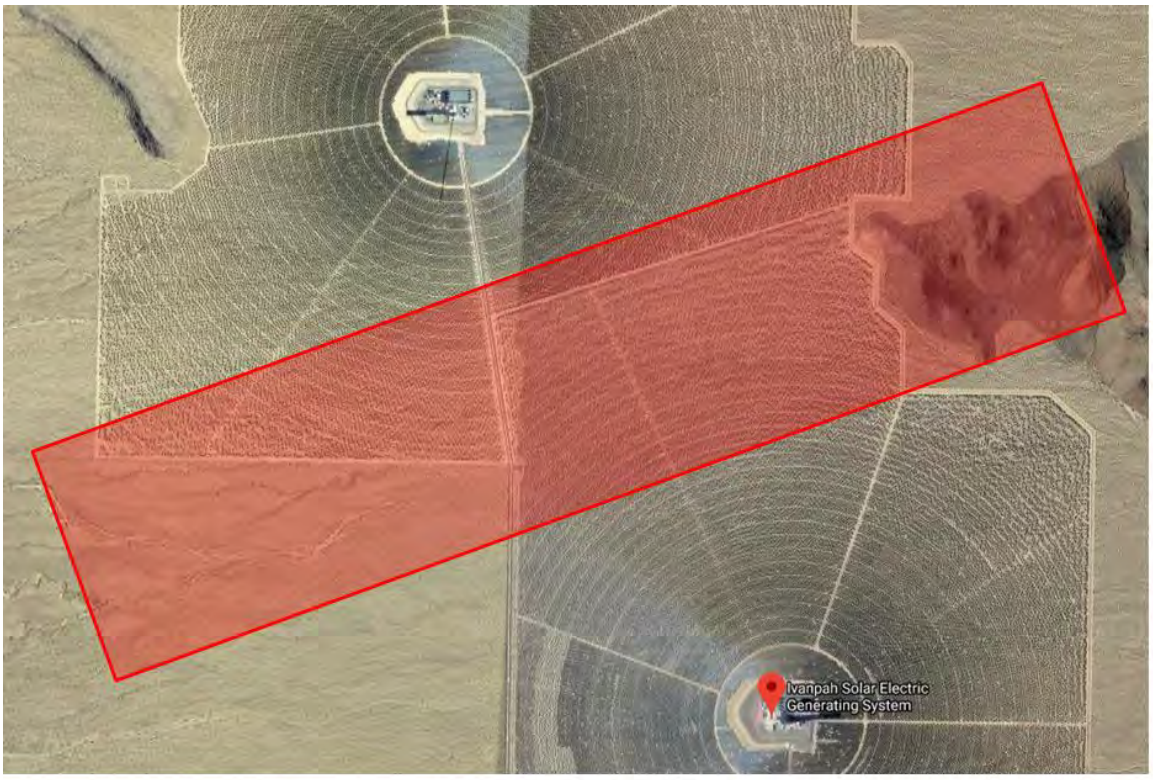
CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Attachment A

July 29, 2018 Hail Storm Event Photographs



Hail Storm Damage Map




Unit 3
Unit 2
Ivanpah Solar Electric Generating System
Google

Exhibit 8

Traffic and Transportation Conditions of Certification

Appendix V

Condition of Certification TRANS-3

Heliostat Positioning Plan Update

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NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

December 12, 2018

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C)
2018 Update to Ivanpah Solar Electric Generating System Heliostat Positioning Plan (TRANS-3)

Dear Mr. Payne and Mr. Ahrens,

Pursuant to the requirements of CEC Condition of Certification, TRANS-3 and Section 6 of the Heliostat Positioning Plan (HPP), the 2018 update to the HPP is being submitted, on behalf of Solar Partners I, II, and VIII, LLCs, for your review. In accordance with TRANS-3, the HPP shall be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project. This submittal will be the fifth year and future updates will be performed every 2 years.

Please feel free to contact me with any questions or concerns.

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

2018 Update Report to Ivanpah Solar Electric Generating System Heliostat Positioning Plan

Background:

This report is provided specific to the annual HPP update as required by Section 6 of the monitoring plan per TRANS-3. As required by TRANS-3, the Heliostat Positioning Plan (HPP) Section 6.0 provides for a monitoring plan that a) obtains field measurements in response to legitimate complaints; b) verifies that the HPP would avoid the potential for human health and safety hazards including temporary or permanent blindness at locations of observers; and c) provides requirements and procedures to document, investigate and resolve legitimate complaints regarding glare. Furthermore, TRANS-3 requires that the monitoring plan should be coordinated with the FAA, U.S. Department of the Navy, CalTrans, CHP, and Clark County Department of Aviation in relation to the proposed Southern Nevada Supplemental Airport. The HPP is to be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

Previously, Sandia National Laboratories (Sandia) obtained ground-based measurements of glare on April 24, 2014. The established threshold level for glare is the "potential after image" as described in Section 2.1.1 and 2.2 and Figure 2-1 of the approved HPP. Ground-based measurements have not shown levels above this threshold. As a result, a report was submitted on December 8, 2014 that recommended removing the requirement for ground-based cameras to monitor for glare from the facility.

Aerial measurements obtained of glare from the facility during the April 24, 2015 monitoring did show two measurements in excess of the established threshold. The Ivanpah facility implemented new flux/standby dispersal algorithms in response to these measurements on July 17, 2014. Subsequently, measurements were obtained of glare from the facility on July 22, 2014. None of the measurements obtained were above the threshold established in the approved HPP. However, as reported by Sandia, glare was bright enough that reports from aerial observers may still be expected.

Pilot Reports and HPP Modifications in 2018:

There were no formal pilot or airline reports due to glint or glare concerns at Ivanpah in 2018.

There were no HPP modifications made in 2018.

While Ivanpah is constantly exploring potential enhancements to the operational algorithms, the approved HPP is working as intended. The facility will continue to remain in compliance with the requirements of the approved HPP.

Activities 2018:

The Ivanpah facility continues to investigate potential refinements to the positioning algorithms to reduce the potential for reports from aerial observers, in collaboration with the CEC, the BLM, the other agencies named in TRANS-3. Ivanpah continued to collaborate as well with Dr. Clifford Ho and Sandia in 2018. Sandia, in cooperation and with the support of the Ivanpah facility, completed their multi-year grant in 2018 which sought to develop revised positioning algorithms to decrease glare from the facility. These efforts had commenced in 2016. The efforts by Sandia have included enhancements to a suite of software used for the analysis of glare, flux and optical modeling. The first of the tools that was enhanced is the Solar Glare Hazard Analysis Tool (SGHAT), a model that determines when and where solar glare can occur throughout the year from a user-specified array and observation points. This tool, in combination with SolTrace, a model that displays data as flux maps and SolarPILOT, a comprehensive power tower optical-modeling tool, was used to analyze different heliostat aiming strategies in 2017. In addition, Sandia implemented the Tower Illuminance Model (TIM), a software tool that uses interactive 3D graphics to allow users to "fly" over CSP plants and evaluate the flux and ocular hazards at various locations. TIM was developed to evaluate solar glare and ocular impacts from concentrating solar power towers. For a specified plant configuration, date, and time of day, TIM determines the irradiance, number of heliostats producing glare, and ocular impact at user-prescribed locations in the airspace above the heliostat field . Ivanpah continued to operate with the previously made improvements and no changes to the HPP were recommended by Sandia in 2018.

Ivanpah and Sandia met periodically in early-2018 to schedule and coordinate a helicopter flyover which was conducted on May 24, 2018. Previous flyovers had been conducted at Ivanpah in April 2014, July 2014, and March 2015. The California Energy Commission also conducted two flyovers of Ivanpah in May 2014 and April 2015. The purpose of the current flyover was to evaluate current glare conditions relative to previous flyovers and to provide data for model validation. With regard to the most recent flyover of Ivanpah on May 24, 2018, photographs of glare from Units 2 & 3 (Unit 1 was not operational) were analyzed using the PHLUX tool [50] for corneal and retinal irradiances, subtended glare angles, and potential ocular hazard. In addition, TIM and SolTrace simulations of the glare at Ivanpah were performed and compared to the measured irradiances. The helicopter flyover of Ivanpah on May 24, 2018, was performed by the Mission Test and Support Services out of Nellis Air Force Base in Nevada. Photographs of the glare were taken at various locations around the Ivanpah plant from ~11:30 AM – 12:30 PM. The photograph locations were similar to locations where photographs were taken during previous flyovers by Sandia. The time of day was chosen to coincide with the most number of heliostats in standby position. The May 24, 2018 flyover of Ivanpah revealed that the observed glare was less persistent and less intense than during previous flyovers. This was attributed to an aiming strategy that randomly spread the aimpoints to both sides of the receiver within a large annulus of varying radii. This resulted in observable glare that originated from individual heliostats rather than clusters of heliostats. Models of the ocular hazard yielded a low potential for after-image. Simulations of the glare using SolTrace were difficult due to the large number of rays required, and there was a lack of correlation with the measured values. TIM results also lacked a clear correlation with the measured values, partly

because of the aiming strategy that limited the glare area from individual heliostats and caused strongly varying irradiance values. However, the TIM simulations and analytical values showed generally similar trends of decreasing irradiances with increasing distances.

Amansec, Manolito

From: Sisk, Tim
Sent: Monday, December 10, 2018 3:00 PM
To: leonidas.payne@energy.ca.gov; mahrens@blm.gov
Cc: karen.mcdonald@faa.gov; 'robert.p.alenander@faa.gov'; 'brian.armstrong@faa.gov'; 'davis.kessler@faa.gov'; 'terr.hansen@usmc.mil'; 'jamal.elsaleh@dot.ca.gov'; 'moe.bhuyian@dot.ca.gov'; 'tarnold@co.clark.nv.us'; 'jmartin@co.clark.nv.us'; Dusenbury, William R.; Amansec, Manolito; Sisk, Tim; Piantka, George
Subject: Ivanpah Solar Electric Generating System - TRANS-3 HPP 2018 Update
Attachments: 2018 TRANS-3 Heliostat Positioning Plan Update - Final.pdf

Mr. Payne and Mr. Ahrens,

In compliance with 07-AFC-5 TRANS-3 Heliostat Positioning Plan (HPP), please find Ivanpah Solar Electric Generating System (ISEGS) 2018 update attached.

Regards,
Timothy R. Sisk
Manager, Environmental Business
NRG Energy, West Region
4600 Carlsbad Boulevard
Carlsbad, CA 92008
760-710-2129 (o)
860-334-8081 (c)

Exhibit 9

Transmission Line Safety & Nuisance Conditions of Certification

Appendix W

Condition of Certification TLSN-3

Summary of Inspection Results and Fire Prevention Activities along the Right-of-Way

Ivanpah Solar Electric Generating System
California Energy Commission (07-AFC-5C)
Bureau of Land Management
(CACA-48668, 49502, 49503, and 49504)
Conditions of Certification TLSN-3

Summary of Inspections
January 1, 2018 – December 31, 2018
Reporting Period
Submitted
January 31, 2019

Prepared by: Designated Biologist on behalf of Solar Partners I, II, VIII LLC

100302 Yates Well Road
Nipton, CA 92364

Introduction

This report is submitted in accordance with condition of certification (COC) TLSN-3 of the California Energy Commission (CEC) Ivanpah Solar Electric Generating System (ISEGS) Commission Decision, which states "During the first 5 years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the rights-of-way and provide such summaries in the Annual Compliance Report provided to BLM's Authorized Officer and the CPM."

Summary

Infestations of weeds are a known fuel source for fires. Biological monitors conducted bi-monthly weed surveys per COC BIO-13 from February through November on perimeter fence lines, which includes the generation tie line. The bi-monthly weed surveys require the noxious weeds to be identified to species level, record the locations of weeds to identify areas requiring increased weed removal efforts, and all weeds are removed and disposed of off-site.

Exhibit 10

Visual Resources
Conditions of Certification

Appendix X

Condition of Certification VIS-1

Surface Treatment of Project Structures and Buildings Status Report

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 11, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C) Surface Treatment of Project Structures and Buildings Status Report to fulfill California Energy Commission Conditions of Certification, VIS-01

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of Conditions of Certification VIS-01 of the Commission's approval of the Ivanpah Solar Electric Generating System, we are providing the following status report as a requirement in the Annual Compliance Report:

The permanent structures Administration Building and the Units 1, 2, & 3 Plant Services Buildings (PSB) are in good condition. No structural repairs or modifications were performed during the reporting period to Units 1, 2 or 3. The Heliostat Assembly Building (HAB) sustained wind related damages in February 2018 to the material seams and required repairs. Those seams has been repaired and in currently in good condition.

Maintenance for the Administration Building and Units 1, 2, & 3 (PSB) included bi-monthly HVAC service, quarterly and annual fire system inspections, and some minor door repairs. HAB maintenance and repairs have consisted of bi-monthly HVAC service, quarterly and annual fire system inspections, patching of torn tent seams, insulation replacement due to wind/rain damage, and strapping of tent panels to secure to frame structure during wind events.

Scheduled maintenance for structures and buildings for 2019 include bi-monthly HVAC service, quarterly and annual fire system inspections, and minor repairs as necessary. Continued repairs or replacement of panels and insulation on the HAB will likely be a continued maintenance process in 2019 and beyond.

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Ph: 702-815-2021 Fax: 702-815-2030

Please feel free to contact me with any questions.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

Appendix Y

Condition of Certification VIS-2

Golf Course Landscape Screening Maintenance Activities Report

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

January 10, 2019

Mr. Leonidas Payne
Compliance Project Manager
California Energy Commission, Siting, Transmission and Environmental Protection (STEP) Division
1516 9th Street, MS-15
Sacramento, CA 95814

Mr. Michael Ahrens
Authorized Officer
Bureau of Land Management, Needles Field Office
1303 U.S. Hwy 95 S.
Needles, CA 92363

RE: Ivanpah Solar Electric Generating System (07-AFC-5C)
Golf Course Landscape Screening Maintenance Report, to fulfill California Energy Commission Conditions of Certification, VIS-2

Dear Mr. Payne and Mr. Ahrens,

In accordance with the requirements of the Conditions of Certification VIS-2 of the Commission's approval of the Ivanpah Solar Electric Generating System, the project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each annual compliance report.

As indicated in the previous reports, Primm Valley Golf Club (PVGC) has assumed responsibility for the maintenance and irrigation of the plants that were previously installed/provided at their property pursuant to the CSA. In this regard, ISEGS deemed that its responsibility under the requirement of Condition of Certification VIS-2 has been fully satisfied as acknowledged by PVGC with their letter dated September 16, 2015. Therefore, we are unable to provide information on the landscape maintenance activities, including replacement of dead or dying vegetation in this report, and will not be providing such information in future reports since PVGC does not provide this information to ISEGS since September 2015; as they assumed full responsibility of the golf course landscape screening maintenance required under CEC Condition of Certification VIS-2.

Please feel free to contact me with any questions.

energyservices
an NRG service

NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, HCR1, Box 280 Nipton, CA 92364
Ph: 702-815-2021 Fax: 702-815-2030

Thank you.

William Dusenbury

General Manager,
NRG Ivanpah Solar Electric Generating System
100302 Yates Well Road, Nipton, CA – 92364

CC: Tim Sisk, NRG
Document Control Specialist – NRG.

par·4 Golf Management | your Partner in Golf

September 16, 2015

Solar Partners II, I & VIII, LLC
c/o Doug Davis
Ivanpah Solar Thermal Power Plant
100302 Yates Well Road, HCR1, Box 280
Nipton, CA 92364

Dear Solar Partners :

At our request, the Solar Partners Ivanpah Solar Thermal Power Plant project ("Ivanpah") prepared and implemented a perimeter landscape screening plan to reduce the visibility of the Ivanpah project as seen from our golf course. This plan and its purposes are described by the California Energy Commission ("CEC") in its Condition VIS-2 for Ivanpah. The purpose of the VIS-2 plan was to provide screening of the power project while retaining as much of the scenic portion of the overall views of Ivanpah Valley and Clark Mountains as feasible.

To implement CEC Condition VIS-2, Ivanpah entered into a Consulting Services Agreement with Par-3 Landscape and Maintenance, Inc., dated August 20, 2013 (the "CSA"). The CSA called for the installation of Modell Pines trees and hybrid Mexican Fan Palms. The trees were installed under the CSA, and the work completed in October of 2013.

As a result of our most recent meetings, Ivanpah has agreed to pay the replacement costs for twenty-two (22) trees: ten (10) Modell Pines trees and twelve (12) hybrid Mexican Fan Palms. The trees will be installed by PVGC, and Ivanpah will reimburse PVGC for the costs of installation.

As a result of these actions, PVGC believes that Ivanpah has fully satisfied the spirit and the letter of CEC Condition VIS-2, and we are satisfied with the result of Ivanpah's cooperative efforts. Accordingly, from this date forward, PVGC will assume responsibility for maintenance and irrigation of these new plantings as well as the other plantings made on our property pursuant to the CSA. No further action by ISEGS with respect to these plantings is required.

Sincerely,

Kam Brian
Chief Operating Officer
Par 4 Golf Management, Inc.

Exhibit 11

Waste Management

Conditions of Certification

Appendix Z

Condition of Certification WASTE-6

Operations Waste Management Plan Annual Report

Ivanpah Solar Electric Generating System (07-AFC-5C)

Operations Waste Management Plan Annual Report (WASTE-6)

January 10, 2019

OPERATIONS WASTE MANAGEMENT PLAN ANNUAL REPORT

In accordance with the requirements of the Conditions of Certification WASTE-6 of the Commission's approval of the Ivanpah Solar Electric Generating System (07-AFC-5C), the project owner shall also document in each Annual Compliance Report the following information:

- Actual volume of wastes generated, and the waste management methods used during the year.
- Provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan.
- Update the Operation Waste Management Plan as necessary to address current waste generation and management practices.

Wastes at ISEGS are managed according to the Ivanpah Solar Electric Generating System, Environmental Procedures, and Operations Waste Management Plan. Wastes are classified according to California Code of Regulations (CCR) Title 22, Division 4.5, and Chapter 11. Patriot Environmental Services (Patriot) is the ISEGS designated waste transporter of hazardous waste, and U.S. Ecology, 12 miles south of Beatty Nevada is the primary destination facility, with the exception of non-hazardous wastewater which is transported to Patriot Waste Water in Orange County, CA. Hazardous waste manifests are maintained in the Environmental Specialist's office and electronically on a NRG centralized server. These manifests are also provided to Department of Toxic Substances Control within two weeks of waste shipment. The Plan divides wastes into two streams. However for efficiency of disposal, both streams are mixed for transportation. *Tables 1 and 2* provide a comparison of the projected and actual waste streams from Operations and Maintenance respectively. *Table 3* lists the manifested wastes shipped from ISEGS during 2018.

Table 1: Waste Stream Summary - Operations Phase

Waste	Frequency	Projected Amount	Actual Amount	Notes
Oily water and oil-water separator sludge	Continuously	1,000 gal/year	1,200 gal	The majority of oily water came from rinsing containers and miscellaneous equipment. There was no oil spill in 2018.
Waste oil	Continuously	750 gal/year	0	Waste oil
Oily Debris	Continuously	2 tons/year	2,875 lbs / 1.44 tons	Used rags, absorbents and routine pick up of contaminated soil from minor leaks.
Universal wastes (fluorescent light tubes, batteries, mercury-containing devices, electronic wastes, aerosol cans)	Continuously	500 lb/year	100 lbs	Should remain well under 500 lb/yr. Primarily alkaline batteries with some lithium batteries, aerosols, fluorescent tubes, and electronic wastes.
Empty containers <55 gallons	Continuously	200 lb/year	0	No empty containers were shipped in 2018.
Empty containers > 5 gallons	Continuously	200 lb/year	395 lbs	Empty tote last contained glycol and oil
Municipal refuse and garbage	Continuously	50 CY/year	3,500 CY	Working on recycling program with vendor
Broken Mirrors with Lead Paint	Continuously	Unknown due to unanticipated breakage	131,090 lbs	Mirrors are divided into two categories those with RCRA levels of lead contamination and those with California only levels.

Table 2: Waste Stream Summary – Maintenance Activities

Waste	Frequency	Projected Amount	Actual Amount	Notes
Uncontaminated scrap metal, including equipment, machinery, piping	Infrequently	20 CY/year	0	No shipment in 2018
Uncontaminated soil and asphalt	Infrequently	10 CY/year	0	No shipment in 2018
Waste paint and paint-related debris	Infrequently	25 lb/year	260 lbs	Used aerosol cans which would normally be shipped as universal waste had to be shipped
Waste maintenance chemicals (oils, greases, paints, etc.)	Infrequently	500 lb/year	85 lbs	Waste maintenance chemicals are captured in the waste oil and oily debris identified above as they are accumulated together. This waste comprised of aerosols.
Waste/spent corrosives	Infrequently	50 gal/year	17 gal	Material was hypochlorite solids cleaned out from containment and waste ammonia solution.
Water treatment resins	Infrequently	0 gal/year	0	Water treatment resins are recharged (recycled) and reused.
Lead-acid batteries	Infrequently	8 batteries/year	150 lbs	2 containers of batteries were shipped for recycle.
Decontamination wastewater (e.g., tank and sump emptying and cleaning)	Infrequently	2,000 gal/year	0	From pumping out non-hazardous process water from boiler feed pump skids.
Misc. Non-RCRA Hazardous Waste Solid	Infrequently	2,000 lb/year	1,250 lbs	Rags, PPE, absorbent pads, soil and debris impacted with lube oil
Misc. Non-RCRA Hazardous Waste Solid	Infrequently	1,500 gal/year	580 gal	Oily water, lube oil, glycol water and rinseate water with oil

The majority of waste streams were simplified and categorized into two (2) major waste streams: Miscellaneous Non-RCRA Hazardous Waste Solid and Miscellaneous Non-RCRA Hazardous Waste Liquid. Miscellaneous Non-RCRA Hazardous Waste Solid includes rags, PPE, absorbent pads and soil and debris impacted with lubricating oil while miscellaneous Non-RCRA Hazardous Waste liquid includes lube oil, oily water, glycol water, and rinseate water impacted with lubricating oil. Most of these wastes are generated during the annual maintenance of equipment at each power block with smaller amounts through the remainder of the year.

Ivanpah no longer uses NALCO 73801WR, Sodium Hypochlorite and Soda Ash at the three power blocks' potable water skid(s) which significantly decrease the volume of hazardous corrosive liquid wastes generated on an annual basis. The only source of corrosive liquid wastes is the waste ammonia solution.

After 5 years of operation, the following list is the projected most common waste stream from both Operations and Maintenance;

- Universal Waste Fluorescent Tubes, Used for Recycling
- Non-RCRA Hazardous Waste Solid, (Oily Debris, Absorbents, and Rags)
- Non-RCRA Hazardous Waste Liquid, (Oily water, Waste Oil, Waste Lubricants, Glycol Water, Rinseate)
- UN3090 Lithium Battery, 9, II
- Batteries, Dry sealed n.o.s. (Alkaline Batteries, Universal Waste)
- Batteries Wet filled with acid, Electric Storage 8, III
- Hazardous Waste Solid, n.o.s. (Broken Glass, Lead Paint), 9, III
- Non-RCRA Empty Containers previously containing Non-RCRA Hazardous Waste Liquids
- Hazardous Waste Liquid (UN12672, Waste Ammonia Solution)

Ivanpah remains a Large Quantity Hazardous Waste Generator in 2018 due to the quantity of lead-containing mirrors being shipped for disposal.

ISEGS continues to refine procedures and maintenance activities and schedules, which affect the type and frequency of waste generation. For example, procedures have been put in place to reduce, or potentially eliminate the disposal of propylene glycol. Municipal wastes are being shipped offsite by Republic Services, and a contract to provide documented recycling services has been in place since late 2018.

Table 3 - 2018 HAZARDOUS, NON-HAZARDOUS and UNIVERSAL WASTES SHIPMENTS

Date Shipped	Profile #	Manifest #	Material	Waste Classification	Container		Total Quantity	Unit Wt. / Vol	Total Weight	Unit	Federal Waste Code	State Waste Code	Haz Waste Report Management Method Code	Manifest Signed By	Shipper / Transporter	US EPA ID No.	Receiving Facility	US EPA ID No.
					No.	*Type*												
1/2/2018	070246968-0	015770091 JJK	Non-RCRA Broken Glass	Non-RCRA Hazardous Waste Solid	1	CM	20	Cu. Yard	5,540	Pounds	N/A	181	H132	Tim Higdon	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
1/2/2018	070242098-1	015770092 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	18	Cu. Yard	15,080	Pounds	D008	181	H132	Tim Higdon	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070137747-13862	10-18-00184	Non Hazardous Waste Liquid (Polypropylene Glycol)	Non Hazardous Waste Liquid	1	TP	200	Gallons	200	Gallons	N/A	N/A	N/A	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070128043-13922	10-18-00184	Non Hazardous Waste Solid (Absorbent Pads with Trace of Polypropylene Glycol)	Non Hazardous Waste Solid	7	DM	1,600	Pounds	1,600	Pounds	N/A	N/A	N/A	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070128043-13877	10-18-00184	Non Hazardous Waste Solid (Boiler Solids)	Non Hazardous Waste Solid	1	DM	75	Pounds	75	Pounds	N/A	N/A	N/A	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070137710-32616	014903554 JJK	UN1760 Waste Corrosive Liquids, n.o.s. 8 PGIII	RCRA Hazardous Waste Liquid, n.o.s.	1	DF	2	Gallons	2	Gallons	D002	135	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070137710-32617	014903554 JJK	UN12672, Waste Ammonia Solution, relative density between 0.880 and 0.957 at 15 degrees C in water, with more than 10% but not more than 35% ammonia	RCRA Hazardous Waste Liquid, n.o.s.	3	DF	15	Gallons	15	Gallons	D002	135	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070131570-31643	014903554 JJK	Oily Water	Non-RCRA Hazardous Waste Liquid	5	DM	300	Gallons	300	Gallons	N/A	223	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070242831-0	014903554 JJK	Oily Debris	Non-RCRA Hazardous Waste Solid	10	DM	2,025	Pounds	2,025	Pounds	N/A	181	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070242098-1	014903555 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	DM	450	Pounds	450	Pounds	D008	181	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
4/19/2018	070131570-31643	014903555 JJK	Oily Water	Non-RCRA Hazardous Waste Liquid	1	TP	200	Gallons	200	Gallons	N/A	223	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070265447-0	014903560 JJK	UN1263, Paint Related Material, 3, PG III	RCRA Hazardous Waste Solid, n.o.s.	3	DM	260	Pounds	260	Pounds	D001/D018	135	H141	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070128300-27124	014903560 JJK	Contaminated Rags	Non-RCRA Hazardous Waste Solid	1	CF	350	Pounds	350	Pounds	N/A	352	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070242831-0	014903560 JJK	Misc. Non RCRA Hazardous Waste Solids	Non-RCRA Hazardous Waste Solid	4	DM	800	Pounds	800	Pounds	N/A	181	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070242831-0	014903560 JJK	Misc. Non RCRA Hazardous Waste Solids	Non-RCRA Hazardous Waste Solid	1	DM	100	Pounds	100	Pounds	N/A	181	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070131570-31643	014903562 JJK	Misc. Non RCRA Hazardous Waste Liquids	Non-RCRA Hazardous Waste Liquid	2	DF	100	Gallons	100	Gallons	N/A	343/223	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070131570-31643	014903562 JJK	Misc. Non RCRA Hazardous Waste Liquids	Non-RCRA Hazardous Waste Liquid	1	DF	50	Gallons	50	Gallons	N/A	343	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070131570-31643	014903562 JJK	Misc. Non RCRA Hazardous Waste Liquids	Non-RCRA Hazardous Waste Liquid	1	DM	30	Gallons	30	Gallons	N/A	343	H039	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/19/2018	070128300-25468	014903562 JJK	Non-RCRA Empty Containers	Non-RCRA Hazardous Waste Solid	11	DF	395	Pounds	395	Pounds	N/A	352	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/25/2018	070242098-1	014903564 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	18	Cu. Yard	13,320	Pounds	D008	181	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
6/25/2018	070246968-0	014903569 JJK	Non-RCRA Broken Glass	Non-RCRA Hazardous Waste Solid	1	CM	18	Cu. Yard	9,220	Pounds	N/A	181	H132	Marco Tule	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
10/2/2018	-	-	Fluorescent Light Tubes	Universal Waste (for Recycling)	1	DF	100	Pounds	100	Pounds	N/A	N/A	N/A	Kevin Itter	Patriot Environmental Services	CAD053866794	Lighting Resources, LLC	N/A
10/2/2018	-	-	Baterries	Universal Waste (for Recycling)	3	DF	150	Pounds	150	Pounds	N/A	N/A	N/A	Kevin Itter	Patriot Environmental Services	CAD053866794	Nevada Battery Supply	N/A
10/2/2018	070131570-31643	015766788 JJK	Misc. Non RCRA Hazardous Waste Liquids	Non-RCRA Hazardous Waste Liquid	2	DM	400	Pounds	400	Pounds	N/A	223	H039	Kevin Itter	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
10/2/2018	070242831-0	015766788 JJK	Oily Debris	Non-RCRA Hazardous Waste Solid	7	DM	850	Pounds	850	Pounds	N/A	181	H132	Kevin Itter	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
10/2/2018	070131570-31643	015766788 JJK	Oily Water	Non-RCRA Hazardous Waste Liquid	2	DM	700	Pounds	700	Pounds	N/A	223	H039	Kevin Itter	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
10/19/2018	070242098-1	015768734 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	18	Cu. Yard	11,980	Pounds	D008	181	H132	Frank Scoffield	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
11/6/2018	070242098-1	015766729 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	18	Cu. Yard	21,160	Pounds	D008	181	H132	Frank Scoffield	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
11/6/2018	070242098-1	015766730 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	18	Cu. Yard	9,380	Pounds	D008	181	H132	Frank Scoffield	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
11/19/2018	070242098-1	015766616 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	18	Cu. Yard	14,520	Pounds	D008	181	H132	Frank Scoffield	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
12/17/2018	070242098-1	015766624 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	15	Cu. Yard	13,200	Pounds	D008	181	H132	Frank Scoffield	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000
12/18/2018	070242098-1	015766720 JJK	NA3077, Broken Glass, Lead Paint, 9, III	RCRA Hazardous Waste Solid, n.o.s.	1	CM	20	Cu. Yard	17,240	Pounds	D008	181	H132	Frank Scoffield	Patriot Environmental Services	CAD053866794	US Ecology, Inc.	NVT330010000