DOCKETED

Docket Number:	07-AFC-05C
Project Title:	Ivanpah Solar Electric Generating System (Compliance)
TN #:	201928
Document Title:	Ivanpah Petition to Amend No. 4
Description:	N/A
Filer:	Karen Mitchell
Organization:	Ellison, Schneider & Harris L.L.P.
Submitter Role:	Applicant Representative
Submission Date:	3/26/2014 4:44:29 PM
Docketed Date:	3/26/2014

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March 26, 2014

Joe Douglas
Compliance Project Manager
07-AFC-5C
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814

RE: IVANPAH SOLAR ELECTRIC GENERATING SYSTEM (07-AFC-5C)
CONDITION OF CERTIFICATION AQ-SC8: AIR PERMIT MODIFICATIONS SUBMITTED TO MDAQMD FOR CONDITIONS AQ-12 AND AQ-34 AND CONFORMING AMENDMENT TO CONDITION AQ-SC10

Dear Mr. Douglas:

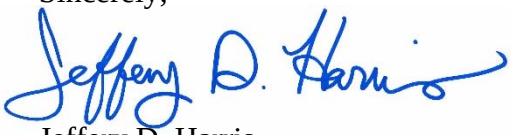
On March 25, 2014, Ivanpah Solar Electric Generating System (ISEGS) submitted to the Mojave Desert Air Quality Management District (MDAQMD) an Application for Revisions to the Authority to Construct for the ISEGS powerplants. Specifically, the proposed revisions seek revisions to the annual fuel use limits in Conditions AQ-12 and AQ-34. Condition of Certification AQ-SC8 requires the project owner to submit to the CPM any proposed air permit modifications submitted to the MDAQMD within five working days of submission. Please find attached hereto, ISEGS' Application for Revisions to the MDAQMD for proposed revisions to Conditions AQ-12 and AQ-34. This petition also requests modifications to Condition of Certification AQ-SC10, which is related to Conditions AQ-12 and AQ-34 but does not appear in the District permit.

ISEGS is requesting an increase in the maximum allowable annual fuel usage limit from 328 MMSCF per power block to 525 MMSCF. The requested change would require modification of the annual fuel use limits in Conditions AQ-12 and AQ-34. Condition AQ-SC10 limits total annual natural gas fuel heat input to each of the three ISEGS powerplants to not more than 5 percent of the total heat input from the sun. We are requesting revisions to AQ-SC10 that will make the condition consistent with the proposed changes to Conditions AQ-12 and AQ-34.

This filing is consistent with the requirements of Section 1769 of the California Energy Commission regulations. Specifically, the information presented herein provides a complete description of the proposed modifications, including the new language for the affected Conditions AQ-SC10, AQ-12 and AQ-34, as required by Section 1769(a)(1)(A). This filing also includes a discussion of the necessity of the proposed changes, per Section 1769(a)(1)(B). This filing is based on information that was not known during the time of the certification, and it does not undermine the assumptions, rationale, findings, or other bases for the final decision, per Sections 1769(a)(1)(C) and 1769(a)(1)(D). As discussed above, the minor modifications to the AQ-SC10, AQ-12 and AQ-34 condition language do not have the potential to create any significant impacts on the environment, and the project remains consistent with all applicable LORS, per Sections 1769(a)(1)(E) and 1769(a)(1)(F). The proposed revisions will not adversely affect the public, per Section 1769(a)(1)(G). In addition, the proposed revisions will have no adverse effects on nearby property owners, per Section 1769(a)(1)(H) and 1769(a)(1)(I).

Should you have questions, please do not hesitate to contact me at 916-447-2166.

Sincerely,



Jeffery D. Harris
Ellison, Schneider & Harris L.L.P.

Attorneys for ISEGS

Attachment: Petition for Amendment No. 4

sierra research

Petition to Amend Air Quality Conditions of Certification for Ivanpah Solar Electric Generating System (07-AFC-5C)

Petition to Amend #4

prepared for:

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners VIII, LLC

submitted to:

California Energy Commission

March 2014

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95811
(916) 444-6666

Petition to Amend Air Quality Conditions of Certification for Ivanpah Solar Electric Generating System (07-AFC-5C)

Petition to Amend #4

Prepared for:

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners VIII, LLC

Submitted to:

California Energy Commission

March 2014

Prepared by

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Petition to Amend Air Quality Conditions of Certification for the Ivanpah Solar Electric Generating System

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ACRONYMS AND ABBREVIATIONS

AFC	Application for Certification
ARB	Air Resources Board
BACT	Best Available Control Technology
CEC	California Energy Commission
COC	Condition of Certification
ISEGS	Ivanpah Solar Electric Generating System
LORS	Laws, Ordinances, Regulations, and Standards
MDAQMD	Mojave Desert Air Quality Management District
MMSCF	million standard cubic feet
MW	megawatt
PTA	Petition to Amend
U.S. EPA	United States Environmental Protection Agency

1. INTRODUCTION

1.1 Background

The California Energy Commission (CEC) certified the Ivanpah Solar Electric Generating System ("ISEGS" or the "Project") on September 22, 2010 (07-AFC-05C). The ISEGS Project consists of three individually certified powerplants sharing common facilities: ISEGS Powerplant 1 is a nominal 120 MW plant located on approximately 914 acres; Powerplant 2 is a nominal 125 MW plant located on approximately 1,097 acres; and Powerplant 3 is a nominal 125 MW plant located on approximately 1,227 acres.[1] ISEGS is located in San Bernardino County, California; the location of the Project is shown in Figure 1.

The CEC Compliance Project Manager (CPM) issued a letter authorizing the start of construction activities on October 8, 2010. Commercial operations at the powerplants began in December 2013.

Pursuant to Section 1769 of the CEC Siting Regulations, each of Solar Partners I, LLC, Solar Partners II, LLC, and Solar Partners VIII, LLC (collectively, the "Petitioner") petitions the CEC for approval of amendments to three ISEGS license Conditions of Certification. A brief discussion of each change follows.

- **Condition of Certification AQ-SC10:** Petitioner requests that this condition be revised to be consistent with the proposed changes to conditions AQ-12 and AQ-34.

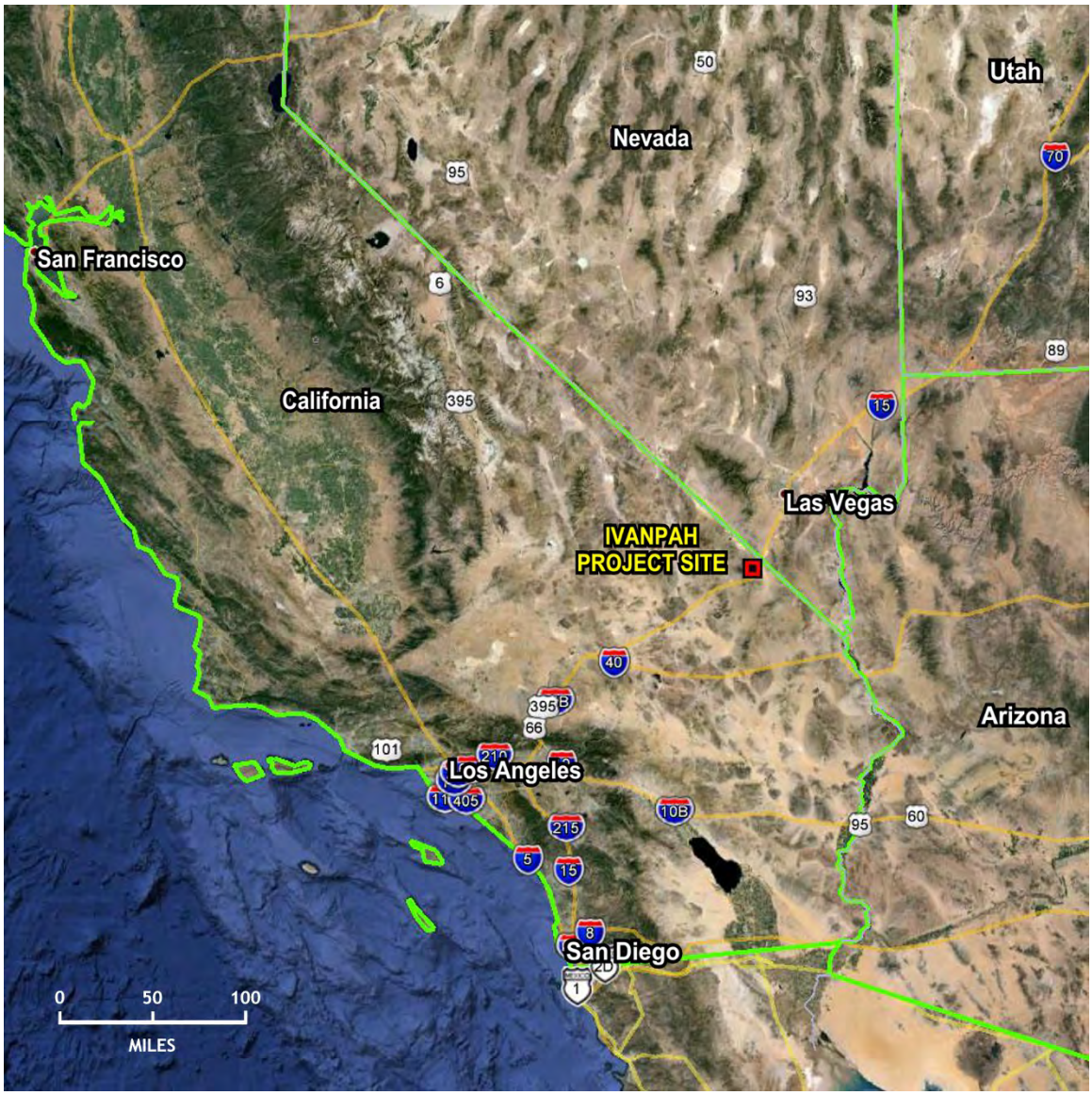
- **Condition of Certification AQ-12:** Petitioner requests that the fuel use limit be increased to 525 MMSCF per year for each powerplant.

- **Condition of Certification AQ-34**: Petitioner requests that the fuel use limit be increased to 525 MMSCF per year for each powerplant.

Conditions AQ-12 and AQ-34 each limit the combined fuel use for the auxiliary boiler and nighttime preservation boiler at each powerplant. An application for approval of corresponding modifications to the air permits for ISEGS powerplants has been submitted to the Mojave Desert Air Quality Management District (MDAQMD), and is provided as Appendix A. (AQ-SC10 is not a condition in the MDAQMD permits.)

[1] The Commission issued three separate yet similar Adoption Orders, one each for Powerplant 1, Powerplant 2, and Powerplant 3. The Petitioner respectfully requests that the approval of this PTA similarly include three separate yet similar Adoption Orders.

Figure 1
Project Location



1.2 Description of Proposed Amendments

1.2.1 Condition of Certification AQ-SC10

Petitioner requests that this condition be revised to be consistent with the proposed change to conditions AQ-12 and AQ-34 described below.

1.2.2 Conditions of Certification AQ-12 and AQ-34

Petitioner requests that the fuel use limit be increased to 525 MMSCF per year for each powerplant; this limit applies to the combined fuel use for the auxiliary boiler and nighttime preservation boiler at each powerplant.

1.3 Necessity of Proposed Changes

Sections 1769 (a)(1)(B) and 1769 (a)(1)(C) of the CEC Siting Regulations require a discussion of the necessity for the proposed changes to the Project and a discussion of whether this modification is based on information that was known by the petitioner during the certification proceeding.

CEC's Condition of Certification AQ-SC10 states that 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. Conditions of Certification AQ-12 and AQ-34 (which replicate Permit Conditions 13 and 9, respectively, of the air permits issued by the MDAQMD for the auxiliary boilers and nighttime preservation boilers) limit fuel use from the two boilers at each powerplant to 328 MMSCF per year. Petitioner requests that these limits be modified. Petitioner also proposes to revise Condition AQ-SC10 to be consistent with the proposed changes to conditions AQ-12 and AQ-34, which propose to increase the allowable annual fuel use at each solar powerplant from its current limit to a new limit of 525 MMSCF per year per powerplant. The need for these changes was not known to Petitioner during the CEC licensing process for the ISEGS Project.

ISEGS is unique. For some aspects of operation, the only way to fully understand how the systems work has been through the experience of operating the powerplants. Petitioner first became aware of the need to increase annual fuel use after the completion of construction and commencement of commercial operations, which began in December 2013. The experience gained during commercial operations indicates that more boiler steam would be needed than previously expected in order to operate the system efficiently and in a manner that protects plant equipment, and to maximize solar electricity generation.

- Auxiliary boilers typically need to operate an average of approximately 4.5 hours a day[2] during startup (an increase from 1 hour daily average originally expected) in order to ensure that (1) steam flow is sufficient to carry excess heat from the receivers in the towers, and (2) when weather conditions are sufficient to permit plant operation, plant equipment and systems are ready to operate as designed.
- Actual operation of the plants informs the need for additional fuel use during some days to compensate for intermittent cloud cover in order to maintain peak power production and prevent the steam turbine from tripping off line.

[2] The current permit provides operating flexibility by allowing 24 hours of auxiliary boiler operation on any given day. The Applicant does not propose to change this. The numbers in this description are provided to illustrate the basis for the requested increase in allowable annual fuel usage, and characterize typical rather than maximum daily operation.

- When cloud cover is dense enough and/or persists long enough to trip the plant offline, steam generated by the auxiliary boilers is needed to restart solar power production.
- Auxiliary boiler operation is needed at the end of the day to stabilize/support steam turbine operation, particularly during the peak summer period, to maximize the capture of solar energy as solar insolation declines.[3]

Based on this experience, Petitioner has revised the annual operating scenario to account for the need to operate the boiler more often during the daily startup period; during periods of intermittent cloud cover to maintain peak output and to prevent steam turbine trips; for restarts of a power block due to extended periods of cloud cover; at the end of the day to extend the capability for solar power production; and to account for days when a system start is terminated when it becomes apparent that persistent cloud cover precludes operation of the solar collectors. Operation during startup, to maintain power output during intermittent cloud cover, and at the end of the day, were gas uses that were anticipated and discussed in the March 2012 Petition to Amend, and are not new uses of gas fuel.

1.4 Summary of Environmental Impacts

Section 1769 (a)(1)(E) of the CEC Siting Regulations requires that an analysis be conducted to address impacts that the proposed revisions may have on the environment and proposed measures to mitigate significant adverse impacts. Section 1769 (a)(1)(F) requires a discussion of the impacts of proposed revisions on the certificate holder's ability to comply with applicable laws, ordinances, regulations, and standards (LORS).

The proposed changes referenced in this PTA will not result in any additional potential significant impacts beyond those already identified in the Final Decision, as amended. Section 3 discusses the potential impacts of the proposed changes on the environment, as well as the proposed revisions' consistency with LORS.

1.5 Consistency of Amendment with License

Section 1769 (a)(1)(D) of the CEC Siting Regulations requires a discussion of the consistency of each proposed project revision with the assumptions, rationale, findings, or other basis of the Final Decision and whether the revision is based on new information that changes or undermines the bases of the final decision. Also required is an explanation of why the changes should be permitted.

Consistent with the CEC Siting Regulations Section 1769(a)(1)(A), this section includes a description of the requested Project modifications, as well as the necessity for the changes. As set forth in the following sections, the proposed revisions do not undermine the assumptions, rationale, findings, or other bases of the Final Decision for the Project.

[3] Since each auxiliary boiler can supply steam only to the intermediate-pressure stage of the steam turbine, without solar boost the auxiliary boiler is capable of facilitating less than 20% of each steam turbine's rated output.

2. DESCRIPTION OF PROJECT CHANGES

2.1 Proposed Changes

The ISEGS is the largest solar thermal power tower system in the world. The ISEGS comprises three solar concentrating thermal powerplants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of each heliostat array. ISEGS Powerplant 1 is a nominal 120 MW plant located on approximately 914 acres; Powerplant 2 is a nominal 125 MW plant located on approximately 1,097 acres; and Powerplant 3 is a nominal 125 MW plant located on approximately 1,227 acres. Each site has a single receiver and heliostat array.

In each solar plant, one Rankine-cycle reheat steam turbine receives live steam from the solar collector located in the power block at the top of a tower. The solar field and power generation equipment is started each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to keep the turbine online.

Each plant also includes two natural gas-fired steam boilers: an auxiliary boiler and a nighttime preservation boiler. The auxiliary boiler is used for thermal input to the steam turbine during the morning start-up cycle to assist the plant in coming up to operating temperature and producing electricity from solar energy quickly. The auxiliary boiler is also operated during transient cloudy conditions, in order to maintain the steam turbine on-line and ready to resume production from solar thermal input, after the clouds pass. When cloud cover persists long enough to trip power production, steam from the auxiliary boilers is needed to restart solar power production. The nighttime preservation boiler is a small boiler that provides steam to maintain seals and preserve heat overnight.

Operating experience since commencement of commercial operation in December 2013 has shown that more steam will be needed from the auxiliary boilers than originally expected in order to optimize operations and maximize solar output.

- Auxiliary boilers typically need to operate an average of approximately 4.5 hours a day[4] during startup (an increase from 1 hour daily average originally expected) in order to ensure that (1) steam flow is sufficient to carry excess heat from the

[4] The current permit provides operating flexibility by allowing 24 hours of auxiliary boiler operation on any given day. The Applicant does not propose to change this. The numbers in this description are provided to illustrate the basis for the requested increase in allowable annual fuel usage, and characterize typical rather than maximum daily operation.

receivers in the towers, and (2) when weather conditions are sufficient to permit plant operation, plant equipment and systems are ready to operate as designed.

- Actual operation of the plants informs the need for additional fuel use during some days to compensate for intermittent cloud cover in order to maintain peak power production and prevent the steam turbine from tripping off line.
- When cloud cover is dense enough and/or persists long enough to trip the plant offline, steam generated by the auxiliary boilers is needed to restart solar power production.
- Auxiliary boiler operation is needed at the end of the day to stabilize/support steam turbine operation, particularly during the peak summer period, to maximize the capture of solar energy as solar insolation declines.

Based on this experience, Petitioner has revised the annual operating scenario to account for the need to operate the boiler more often during the daily startup period, during periods of intermittent cloud cover to maintain peak output and to prevent steam turbine trips, for restarts of a power block due to extended periods of cloud cover, at the end of the day to extend the capability for solar power production, and to account for days when a system start is terminated when it becomes apparent that cloud cover precludes operation of the solar collectors.

To address these needs, Petitioner proposes to increase the allowable annual fuel use in each set of boilers from 328 MMSCF to 525 MMSCF.

2.1.1 Condition of Certification AQ-SC10

Condition of Certification AQ-SC10 currently reads as follows:

> **AQ-SC10** 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.
>
> **Verification**: 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 Annual 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.

The stated purpose of the 5% figure is to match the lower usage (120,000 MMBtu/yr) that formed the basis for emission calculations and the air quality impact analysis in the AFC.[5]

[5] *Final Staff Assessment*, October 2009, page 6.1-23; also 6.1-28 and 6.1-39

Emission calculations and the air quality impact analysis have been prepared that match the proposed fuel usage rate of 525 MMSCF per year. Revised emission calculations for the proposed fuel usage rate are presented in Section II of the application for amendment to the air quality permit, which is included as Appendix A. Dispersion modeling and an air quality impact analysis based on an annual usage of 328 MMSCF (~335,000 MMBTU/yr) were prepared as part of a previous petition to amend the Conditions of Certification for the ISEGS.[6] That air quality impact analysis has been updated for this PTA and demonstrates that the higher fuel usage rate proposed in this amendment will not result in any impacts not previously evaluated. The updated analysis is discussed in Section 3.2 below.

The 5% figure in AQ-SC10 was proposed by staff "to formalize the applicant's stipulation that 'Heat input from natural gas will not exceed 5 percent of the heat input from the sun, on an annual basis', which also generally corresponds [to] the amount of operation included in the applicant's air dispersion modeling impact analysis.[7]" In its comments on the FSA, Petitioner requested that this condition be deleted, because it had no regulatory basis.[8] CEC staff declined to delete the condition, and it was included in the Commission decision.

As discussed in the next section, Conditions AQ-12 and AQ-34, as modified, will limit fuel usage to a level that matches the basis for emission calculations and the air quality impact analysis.

For these reasons, Applicant believes that AQ-SC10 should be revised to be consistent with the proposed change to conditions AQ-12 and AQ-34. The proposed revised language for AQ-SC10 is as follows:

> **AQ-SC10** ~~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.~~ The project owner shall collect data showing the thermal energy in the steam received at the steam turbine from the solar receiver; the energy from natural gas used to produce steam in the auxiliary boiler; and the electrical output from the steam turbine.
>
> **Verification**: Solar and natural gas fuel heat input data shall be collected on a 15-minute basis, and reported as monthly and annual totals, ~~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 Annual Compliance Report shall include documentation of the methodology used to verify compliance with this Condition. The documentation

[6] Petition to Amend, February 2012
[7] Ivanpah Solar Electric Generating System Final Staff Assessment, Air Quality Section, November 2009, p. 1-17
[8] *Applicant's Testimony,* November 16, 2009, p. 37

shall include a heat balance diagram, engineering analysis, assumptions and supporting data.

2.1.2 Conditions of Certification AQ-12 and AQ-34

Conditions of Certification AQ-12 and AQ-34 currently read as follows:

> **AQ-12** The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 328 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); B010376 and B011572 (Ivanpah 2); B010377 and B011573 (Ivanpah 3*).*
>
> **Verification**: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.
>
> **AQ-34** The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed 328 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); B010376 and B011572 (Ivanpah 2); B010377 and B011573 (Ivanpah 3).
>
> **Verification**: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

The original purpose of the 328 MMSCF limit was to match the emission calculations and compliance analysis performed by the District,[9] which were based on 4 hours per day at 231.1 MMBtu/hr for each powerplant.[10]

Petitioner proposes to increase this limit to 525 MMSCF, and has prepared emission calculations and a compliance analysis to support this proposal. Petitioner has submitted an application to the MDAQMD to amend the District permit. Petitioner requests that Conditions AQ-12 and AQ-34 be revised once the District has amended the Authorities to Construct for the powerplants.

2.2 Necessity of Proposed Changes

Sections 1769 (a)(1)(B) and 1769 (a)(1)(C) of the CEC Siting Regulations require a discussion of the necessity for the proposed changes to the Project and whether this modification is based on information that was known by the petitioner during the

[9] MDAQMD, Final Determination of Compliance, Revision C, March 15, 2010

[10] The maximum rated heat input for the auxiliary boilers was revised from 231.1 MMbtu/hr to 249 MMbtu/hr in FDOC Revision E (11/1/2012) and the Commission's 3/13/2013 Order approving a Petition to Modify Air Quality Conditions of Certification; however, the annual fuel use limit in Conditions AQ-12 and AQ-34 were not revised at that time.

certification proceeding. The need for the proposed changes to Conditions of Certification AQ-SC10, AQ-12 and AQ-34 is discussed below.

The auxiliary boilers will need to operate an average of approximately 4.5 hours a day during daily startup (instead of the original expectation of an average of approximately one hour a day) in order to ensure that (1) steam flow is sufficient to carry excess heat from the receivers in the towers, and (2) at the time solar insolation is sufficient to permit operation of the steam turbine and synchronization to the grid, the balance of the plant is ready to operate as designed at full load. Actual operation of the plants informs the need for additional fuel use during some days to compensate for intermittent cloud cover in order to maintain peak power production and prevent the steam turbine from tripping off line. When cloud cover is strong enough and persists long enough to trip power production, steam from the auxiliary boilers is needed to restart solar power production. Finally, auxiliary boiler operation is needed at the end of the day, particularly during the peak summer period, to ensure that the steam turbine remains online as solar insolation declines.

ISEGS is unique. For some aspects of operations, the only way to fully understand how the system works has been through the experience of operating the powerplants, which commenced in December 2013. Petitioner became aware of the need to increase the allowable annual fuel use limit after the completion of construction and commencement of commercial operations. The experience gained during commercial operations indicates that more boiler steam would be needed than previously anticipated in order to operate the system efficiently and in a manner that protects plant equipment.

Based on this experience, Petitioner has revised the annual operating scenario to account for the need to operate the boiler more often during the daily startup period, during periods of intermittent cloud cover to maintain peak output and to prevent steam turbine trips, for restarts of a power block due to extended periods of cloud cover, at the end of the day to extend the capability for solar power production, and to account for days when a system start is terminated when it becomes apparent that cloud cover precludes operation of the solar collectors.

3. ENVIRONMENTAL ANALYSIS OF THE PROJECT CHANGES

3.1 Subject Matter Affected by the Project Changes

The proposed amendments to the ISEGS certification would be limited to changes to the COCs for Air Quality. There are no proposed changes to the Project design or to Project equipment. Accordingly, the discussion that follows focuses on the disciplines of Air Quality and the related subject of Public Health. As discussed below, there would be no changes to the potential environmental effects of the ISEGS as pertains to the other disciplines, and the Project will remain in compliance with applicable LORS.

3.2 Air Quality

The only change proposed that affects Project operation is an increase in the limit on annual fuel usage for the auxiliary and nighttime boilers. For this reason, a review was made of Air Quality requirements that use annual emissions to determine applicability. The detailed Air Quality analysis is set forth in Appendix A, which contains the "Application to the Mojave Desert Air Quality Management District for an Amendment to the Air Quality Permits for Ivanpah Solar Electric Generating System." The increase in potential emissions does not trigger any new regulatory requirements.

A review was also made of Air Quality requirements that are affected by annual emissions. This includes compliance with ambient air quality standards with an annual averaging time. Modeling results from the air quality impact analysis performed for the February 2012 Petition to Amend were scaled up based on the potential increase in emissions, and compared with applicable standards. The estimated annual Project impacts are still less than 0.05 $\mu g/m^3$ for all pollutants with an annual ambient air quality standard; the Project impacts therefore round down to 0.0.

Agency clearinghouses for Best Available Control Technology (BACT) determinations were examined, and it was determined that the boilers still meet BACT. The BACT review is presented in Section III.D of the application for amendment to the air quality permit, which is included as Appendix A.

The Commission Decision determined that the Project would not have significant impacts on Air Quality or Public Health. The changes in the Project operations will not have a significant impact on Air Quality. As described in more detail in Appendix A, the Project will continue to comply with all applicable air quality standards, and will not result in an increase in offsite impacts.

3.2.1 Conditions of Certification and Proposed Changes

Petitioner requests the following changes to the ISEGS Conditions of Certifications.

AQ-SC10 ~~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.~~ The project owner shall collect data indicating the solar energy received at the heliostats; the solar energy used to produce steam at the solar receiver; the energy from natural gas used to produce steam in the auxiliary boiler; the total thermal energy to the steam turbine; and the electrical output from the steam turbine.

Verification: Solar and natural gas fuel heat input data shall be collected on a 15-minute basis, and reported as monthly and annual totals, ~~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 Annual 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.

AQ-12: 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); B010376 and B011572 (Ivanpah 2); B010377 and B011573 (Ivanpah 3).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-34: 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); B010376 and B011572 (Ivanpah 2); B010377 and B011573 (Ivanpah 3).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

3.2.2 LORS

The Commission Decision certifying the ISEGS concluded that the Project is in compliance with all applicable LORS. Section III of Appendix A further elaborates on LORS compliance. The ISEGS Project, as modified with the proposed changes in this PTA, will continue to comply with all applicable LORS.

3.3 Public Health

The only change proposed that affects Project operations is an increase in the limit on annual fuel usage at the auxiliary and nighttime boilers. For this reason, a review was made of public health related requirements that use annual emissions to determine applicability. The increase in potential emissions did not trigger any new regulatory requirements.

Following the procedures for risk management contained in MDAQMD regulations, prioritization scores were determined for the boilers for cancer, non-cancer chronic, and non-cancer acute impacts. It was determined that the risk priority for all three categories of health effects will remain "LOW." Under District risk management guidelines, no further review of toxic air contaminants is required.

The Commission Decision determined that the Project would not have significant impacts on Air Quality or Public Health. Pursuant to this proposed PTA, the changes in the Project operations are not expected to have a significant impact on Public Health.

As described in more detail in Appendix A, emissions of toxic air contaminants from the boilers will be below thresholds of significance, as determined by the District.

3.3.1 Conditions of Certification

There are no Public Health conditions in the Final Decision. The proposed changes to the ISEGS Project would not result in the need for any new Conditions of Certification for Public Health.

3.3.2 LORS

The Commission Decision certifying the ISEGS concluded that the Project is in compliance with all applicable LORS. Section III of Appendix A further elaborates on LORS compliance. The ISEGS Project, as modified with the proposed changes in this PTA, will continue to comply with all applicable LORS.

4. POTENTIAL EFFECTS ON THE PUBLIC AND PROPERTY OWNERS

This section addresses potential effects of the proposed PTA on nearby property owners, the public, and parties in the application proceeding, pursuant to CEC Siting Regulations (Title 20, CCR, Section 1769 (a)(1)(I)). The only property owner within 1,000 feet of the Project boundary is the federal government. The land surrounding the Project is managed by BLM.

The ISEGS Project, as modified, will not differ significantly in potential effects on adjacent land owners, compared with the Project as previously approved. The ISEGS Project would continue to have no significant environmental effects and would remain in compliance with applicable LORS. Therefore, the modifications proposed by the PTA will have no adverse effects on nearby property owners, the public, or other parties in the application proceeding.

5. LIST OF PROPERTY OWNERS

As required by the CEC Siting Regulations §1769(a)(1)(H), a list of property owners potentially affected by the proposed modification must be provided. The only property owner within 1,000 feet of the Project boundary is the federal government. The land surrounding the Project is managed by BLM.

Appendix A

Application for Permit Amendment

sierra research

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Sacramento, CA 95811
Tel: (916) 444-6666
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Ann Arbor, MI
Tel: (734) 761-6666
Fax: (734) 761-6755

March 25, 2014

Mr. Sam Oktay
Mojave Desert Air Quality Management District
14306 Park Avenue
Victorville, CA 92392-2310

Subject: Revisions to the Authority to Construct for Ivanpah Solar Electric Generating System Project

Dear Mr. Oktay:

On December 3, 2008, the District issued the Final Determination of Compliance (FDOC) for the Ivanpah Solar Electric Generating System (ISEGS) project. During the CEC licensing process, project design details were revised, requiring amendments to the District's FDOC and permits. The last revision, Revision E, was issued by the District on November 1, 2012. Solar Partners I, LLC, Solar Partners II, LLC, and Solar Partners VIII, LLC (collectively, the "Applicant") thank the District for its continued hard work, diligence, and responsiveness.

On behalf of the Applicant, we are requesting revisions to the District's permits and associated conditions for the project. Specifically, we are requesting an increase in the maximum allowable annual fuel usage limit from 328 MMSCF per power block to 525 MMSCF. The requested change would require modification of permit conditions affecting all three auxiliary boilers and all three nighttime preservation boilers.

Details of the proposed changes are provided in the enclosed Application, which includes the District forms for the affected sources. Following District guidance, we have calculated filing fees for this application to be $1,470 (6 affected sources at $245 per source), and have submitted a check for that amount (Receipt Number 1229).

Please do not hesitate to contact me if you have any questions.

Sincerely,

Steve Hill

Enclosures

cc: Tim Sisk, NRG Energy

sierra research

Application to the Mojave Desert Air Quality Management District for an Amendment to the Air Quality Permit for Ivanpah Solar Electric Generating System

prepared for:

Solar Partners II, LLC, Solar Partners I, LLC, and Solar Partners VIII, LLC

March 2014

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95811
(916) 444-6666

APPLICATION TO THE
MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT

for an

AMENDMENT TO THE AIR QUALITY PERMIT FOR IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

Submitted by:

Solar Partners II, LLC, Solar Partners I, LLC, and Solar Partners VIII, LLC

March 2014

Prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95811
(916) 444-6666

SUMMARY

Solar Partners II, LLC, Solar Partners I, LLC and Solar Partners VIII, LLC, (collectively Solar Partners or Applicant) are applying for an amendment to the current Air Quality Permits for the Ivanpah Solar Electric Generating System.

The current permits limit the combined fuel use in the auxiliary boiler and nighttime preservation boiler of each power plant to 328 MMSCF per year. The proposed amendment would increase allowable annual fuel use in each power plant to 525 MMSCF per year.

APPLICATION TO THE
MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
for an
AMENDMENT TO THE AIR QUALITY PERMIT FOR IVANPAH SOLAR
ELECTRIC GENERATING SYSTEM

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MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
for an
AMENDMENT TO THE AIR QUALITY PERMIT FOR IVANPAH SOLAR
ELECTRIC GENERATING SYSTEM

I. PROJECT DESCRIPTION

A. Applicant's Name and Business Description

Name of Applicant:	Solar Partners II, LLC, Solar Partners I, LLC, and Solar Partners VIII, LLC (collectively Solar Partners)
Mailing Address:	HCR1 Box 280 Nipton, CA 92364
Facility Address:	100302 Yates Well Road, Nipton, CA 92364
SIC Code:	4911
General Business:	Power Generation
Submitting Officer:	Randall Hickok
Consultants:	Sierra Research, Inc. 1801 J Street Sacramento, California 95814 Contact: Steve Hill (916) 444-6666
Type of Use Entitlement:	Solar Partners II, LLC owns and operates Ivanpah 1. Solar Partners I, LLC owns and operates Ivanpah 2. Solar Partners VIII, LLC owns and operates Ivanpah 3.
Estimated Construction Date:	No construction required.

B. Type of Application

Solar Partners are applying for an amendment to the current Air Quality Permits for the Ivanpah Solar Electric Generating System.

The current permits limit the combined fuel use in the auxiliary boiler and nighttime preservation boiler of each power plant to 328 MMSCF per year (Conditions 13 and 9, respectively, for each plant). The proposed amendment would increase allowable annual fuel use in each power plant to 525 MMSCF per year.

The appropriate MDAQMD application forms are included in Appendix A.

C. General Purpose

The Ivanpah Solar Electric Generating System (ISEGS) is the largest solar thermal power tower system in the world. Operating experience at this facility since it began commercial operation in December 2013 has shown that more steam will be needed from the auxiliary boilers than originally expected in order to optimize the facility's operation and maximize solar output.

- Auxiliary boilers need to operate an average of approximately 5 hours a day during startup (an increase from 1 hour daily average originally expected) in order to ensure that (1) steam flow is sufficient to carry excess heat from the receivers in the towers, and (2) when weather conditions are sufficient to permit plant operation, plant equipment and systems are ready to operate as designed.
- Actual operation of the plants informs the need for additional fuel use during some days to compensate for intermittent cloud cover in order to maintain peak power production and prevent the steam turbine from tripping off line.
- When cloud cover is dense enough and/or persists long enough to trip the plant offline, steam generated by the auxiliary boilers is needed to restart solar power production.
- Auxiliary boiler operation is needed at the end of the day to stabilize/support steam turbine operation, particularly during the peak summer period, to maximize the capture of solar energy as solar insolation declines.

Solar Partners proposes to accomplish this by increasing the annual fuel usage limit from its current value of 328 MMSCF to 525 MMSCF per year.

D. Facility Description

The ISEGS comprises three solar concentrating thermal power plants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of each heliostat array. ISEGS Powerplant 1 is a nominal 120 MW plant located on approximately 914 acres; Powerplant 2 is a nominal 125 MW plant located on approximately 1,097 acres; and Powerplant 3 is a nominal 125 MW plant located on approximately 1,227 acres. Each site has a single receiver and heliostat array.

E. Equipment and Process Description

In each solar plant, one Rankine-cycle reheat steam turbine receives live steam from the solar collector located in the power block at the top of a tower. The solar field and power generation equipment are started each morning after sunrise and insolation build-up, and

shut down in the evening when insolation drops below the level required to keep the steam turbine online.

Each plant also includes two natural gas-fired steam boilers: an auxiliary boiler and a nighttime preservation boiler. The auxiliary boiler is used for thermal input to the steam turbine during the morning start-up cycle to assist the plant in coming up to operating temperature and producing electricity from solar energy more quickly. The auxiliary boiler is also operated during transient cloudy conditions, in order to maintain the steam turbine on-line and ready to resume production from solar thermal input, after the clouds pass. When cloud cover persists long enough to trip power production, steam from the auxiliary boilers is needed to restart solar power production. The nighttime preservation boiler is a small boiler that provides steam to maintain seals and preserve heat overnight.

F. Facility Operations

The only change to facility operations that would result from this permit amendment is a potential increase in annual fuel use. There will be no change to maximum hourly or daily fuel use. No equipment other than the auxiliary and nighttime preservation boilers will be affected.

The increase in allowable annual fuel use will not trigger any air quality requirements that do not already apply to the facility.

II. EMISSION ASSESSMENT

The proposed increase in annual fuel usage will result in an increase in the annual potential to emit pollutants.

Table 1 compares allowable emissions after the project with current limits. Baseline calculations are from District emission calculations in FDOC Revision E.

Table 1
Emissions Changes—Auxiliary Boilers
(per boiler)

Timeframe	Maximum Emissions						
	NOx	CO	ROC	SO_2	PM_{10}	$PM_{2.5}$	Greenhouse Gases
FDOC Revision E (9-6-2012)							
lb/hr	2.7	4.6	1.3	0.7	1.7	1.7	--
lb/day	64.9	109.7	31.7	17.1	41.8	41.8	--
tons/year	1.8	3.1	0.9	0.5	1.2	1.2	19,689
Proposed							
lb/hr	2.7	4.6	1.3	0.7	1.7	1.7	--
lb/day[a]	65.3	110.4	31.9	17.2	41.8	41.8	--
tons/year	2.9	4.9	1.4	0.8	1.9	1.9	31,515
Net Change							
lb/hr	0.0	0.0	0.0	0.0	0.0	0.0	--
lb/day[a]	0.4	0.7	0.2	0.1	0.0	0.0	--
tons/year	1.1	1.9	0.5	0.3	0.7	0.7	11,826

Note:

a. This project is not increasing the daily emissions—these changes are the result of correcting an error in the FDOC Rev E table.[1]

Table 2 summarizes the annual emissions changes at the facility due to the proposed amendment. There will be no change in maximum hourly or daily emissions.

[1] The emission factors that the District used to calculate emissions in the FDOC RevE table were based on a fuel heating value of 1020 btu/scf. However, the gas usage used to calculate emissions corresponded to a heating value of 1026.8 Btu/scf (= 249 MMBtu/hr/0.2425 MMscf/hr) =1026.8. The proposed emissions in Table 1 are calculated using the correct fuel flow at 1020 btu/scf.

Table 2 Changes in Annual Emissions – Facility Total (TPY)[a]							
	Maximum Emissions						
Equipment	NOx	CO	ROC	SO_2	PM_{10}	$PM_{2.5}$	GHGs
FDOC Revision E (9-6-2012)							
Boilers[b]	5.5	9.3	2.7	1.4	3.5	3.5	59,068
Other Units	2.0	1.1	0.1	0.0	0.1	0.1	204
TOTAL	7.5	10.4	2.7	1.4	3.6	3.6	59,272
Proposed							
Boilers[b]	8.8	14.8	4.3	2.3	5.6	5.6	94,545
Other Units	2.0	1.1	0.1	0.0	0.1	0.1	204
TOTAL	10.8	16.0	4.4	2.3	5.7	5.7	94,749
Net Change							
Boilers[b]	3.3	5.6	1.6	0.9	2.1	2.1	35,477
Other Units	0.0	0.0	0.0	0.0	0.0	0.0	0
TOTAL	3.3	5.6	1.6	0.9	2.1	2.1	35,477

[a] The project will not affect maximum hourly or daily emissions.
[b] Boilers include both nighttime boilers and auxiliary boilers at all three plants.

The only proposed change is an increase in allowable annual fuel use in the auxiliary and nighttime boilers.[2] Therefore, the proposed modification will affect annual average impacts but not short-term impacts (i.e., averaging times other than annual).

Maximum impacts from the current permitted emission rates have been modeled as part of previous permit applications.[3,4] The maximum modeled annual NO_2 impact from the facility under the current permit is 0.007 µg/m^3; about two-thirds of this impact is due to the boilers. If the contribution from the boilers is scaled up to reflect the increased allowable annual fuel use, the maximum annual project NO_2 impacts would still round down to 0.0.[5] Therefore, the proposed boiler fuel usage increase will not change the project's worst-case annual NO_2 impacts.

Currently permitted operations have a maximum modeled annual average $PM_{10}/PM_{2.5}$ impact of 0.03 µg/m^3 from all sources; almost all of this impact is due to the boilers. If the contribution from the boilers is scaled up as a result of the increased allowable annual fuel use, the maximum annual project PM impacts would still round down to 0.0.[6] Therefore, the proposed boiler fuel usage increase will not change the project's worst-case annual PM impacts.

Table 3 compares the maximum-plus-background concentrations from the facility with the applicable state and federal ambient air quality standards (AAQS). All of the total impacts are below applicable state and federal standards except for 24-hour PM_{10}.

2 The fuel use for the nighttime boilers is subsumed within the limits for the auxiliary boilers.
3 *Biological Mitigation Proposal ("Mitigated Ivanpah 3")*, February 11, 2010
4 *Petition to Amend, Equipment Change to Reduce Emissions*, February 2012
5 0.007 µg/m3 * 525 MMscf/328 MMscf = 0.011 µg/m3
6 0.03 µg/m3 * 525 MMscf/328 MMscf = 0.048 µg/m3

Existing 24-hour average PM_{10} background concentrations already exceed state standards. However, PM_{10} impacts from Ivanpah operations are very small, and will not contribute significantly to the exceedance of an AAQS.

Table 3
Project Plus Background (µg/m^3)

Pollutant	Averaging Time	Current Project Impact AERMOD[a]	Adjusted Maximum Modeled Impact[b]	Fumigation SCREEN3	Background[c]	Total Impact	State AAQS	National AAQS
NO_2	1-hour	99.1	99.1	4.4	98	197.1	339	--
	Federal 1-hr[d]	25	25		80.8	105.8		188
	Annual[e]	0	0	--	9.5	9.5	57	100
SO_2	1-hour	3	3	1.1	96.1	99.1	655	196
	3-hour	1	1	0.9	44.5	45.5	--	1300
	24-hour	0	0	0.3	15.8	16.1	105	--
CO	1-hour	80	80	7.4	5,060	5,140	23,000	40,000
	8-hour	3.5	3.5	2.3	1,556	1,560	10,000	10,000
PM_{10}	24-hour	0.4	0.4	0.2	81	81.4	50	150
	Annual[e]	0	0	--	12	12	20	--
$PM_{2.5}$	24-hour	0.4	0.4	0.2	11.3	11.7	--	35
	Annual[e]	0	0	--	4	4	12	12

Notes:

a. Short-term impacts are from *ISEGS Application for Permit Amendment*, February 23, 2012. The District permit application was an attachment to the Petition to Amend (PTA) submitted to the CEC in February 2012. Short-term impacts are not affected by the project.

b. Adjusted modeled annual impacts reflect the estimated impacts from increased annual fuel usage in the auxiliary boilers. Because the maximum annual impacts for all pollutants are less than 0.05 µg/m^3, they round down to 0.0 and are unchanged from the original values.

c. CEC staff recommended background values, *ISEGS Staff Analysis of Proposed Modifications to Air Quality Conditions*, December 21, 2012.

d. Federal 1-hour impacts are from a letter from Steve Hill, *Compliance with the One-Hour NO2 NAAQS*, May 11, 2012, p. 2.

e. Current annual project impacts are from modeling performed during evaluation of the February 2012 PTA.

III. COMPLIANCE WITH APPLICABLE RULES AND REGULATIONS

This section evaluates the applicability to this amendment of the rules and regulations listed below.

- Federal Prevention of Significant Deterioration (PSD)
- New Source Performance Standards
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- Best Available Control Technology
- Offsets
- Toxic Risk Management

As shown in this section, the proposed new potential emission levels will not trigger any requirements that were not previously applicable.

The increase in allowable fuel use will be a modification under District rules. As a result, a new BACT analysis has been prepared. As discussed in Section III.D, the current limits continue to meet BACT requirements.

A. Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) is the federal preconstruction review program. It applies to *significant modifications* at *major stationary sources*. It also applies to *new major stationary sources*. A major source is a listed facility (one of 28 PSD source categories listed in Rule 20.1, NSR General Provisions) that emits at least 100 tons/year of an attainment pollutant, or any other facility that emits at least 250 tons/year of an attainment pollutant. The PSD threshold for greenhouse gases (GHGs) is 100,000 tons/year.

For the purposes of determining PSD applicability, all three Ivanpah facilities are considered to be a single stationary source. Table 4 shows that emissions of all PSD pollutants will remain below the major source thresholds. Because ISEGS is not a major stationary source, PSD review does not apply to the proposed project.

Table 4 PSD Applicability			
Pollutant	Major Source Threshold (TPY)	Facility Emissions After Proposed Modification (TPY)	Major Source? (Y/N)
NOx	100	10.8	N
CO	100	16.0	N
ROC	100	4.4	N
SO_2	100	2.3	N
PM_{10}	100	5.7	N
$PM_{2.5}$	100	5.7	N
Greenhouse Gases	100,000	94,749	N

B. New Source Performance Standards

Regulations in 40 CFR Part 60 establish standards of performance to limit emissions from new or modified facilities in specific source categories. These standards are implemented at the local level (MDAQMD) with federal oversight. The applicability of these regulations depends on the equipment size, process rate, and/or the date of construction, modification, or reconstruction of the affected facility.

For the purposes of NSPS applicability, 40 CFR 60.14 (a) defines "modification" to be "any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere…." 40 CFR 60.14(b) states "Emission rate shall be expressed as kg/hr of any pollutant discharged to the atmosphere for which a standard is applicable." Taken together, this means that NSPS applicability is determined based on an increase in the hourly potential to emit a regulated pollutant.

This permit application will allow increased annual fuel usage, but will not result in an increase in the allowable hourly firing rate of any of the affected emission units. Therefore, the changes requested in this application are not a modification under NSPS.

C. National Emission Standards for Hazardous Air Pollutants (NESHAP)

NESHAP Subpart DDDDD (40 CFR 63.4580 et seq.) is the federal standard that regulates hazardous air pollutants (HAPs) emitted by boilers and process heaters at facilities that are major sources for HAPs. A facility is a major source for HAPs if it emits more than 10 tons/year of any one HAP, or 25 tons/year of all HAPs combined. ISEGS is not a major facility for HAPs, and NSPS Subpart DDDDD does not apply.

Facilities that are not major sources for HAPs are "area sources." NESHAP Subpart JJJJJJ (40 CFR 63.11193 et seq.) is the federal standard that regulates HAPS from boilers and process heaters at area sources.

Gas-fired boilers are not subject to NESHAP Subpart JJJJJJ.[7] All of the boilers at ISEGS are gas-fired boilers, and are therefore not subject to NESHAP Subpart JJJJJJ.

D. Best Available Control Technology

District Rule 1303(A)(2) requires application of Best Available Control Technology (BACT) to permit units that are modified and that emit, or have the potential to emit, 25 pounds per day of any nonattainment air pollutants.

Each auxiliary boiler's maximum daily emissions of the following pollutants will exceed 25 pounds per day:

- NOx;
- ROC;
- PM_{10}; and
- $PM_{2.5}$.

Maximum daily emissions of all pollutants from the nighttime boilers are less than 25 pounds per day.

The following published BACT resources were reviewed for BACT determinations: the California Air Resources Board (ARB) BACT clearinghouse, the U.S. Environmental Protection Agency (EPA) BACT/LAER Clearinghouse, the San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT guidelines, the Bay Area Air Quality Management District (BAAQMD) BACT Workbook, and the South Coast Air Quality Management District (SCAQMD) BACT guidelines.

Results of the review are presented in Table 5.

[7] 40 CFR 63.11195(e).

Table 5
BACT Determinations—Boilers 100-250 Million Btu/hr

Capacity	Year	Facility	Location	Database	Pollutant				
					NOx (ppm)	CO (ppm)	ROC (lb/MMbtu)	PM_{10} (lb/MMbtu)	$PM_{2.5}$ (lb/MMbtu)
110 MMBtu/hr	1990	Darling Int	SCAQMD	ARB	9	100	-	-	-
150 MMBtu/hr	2013	Pinecrest Energy	Texas	EPA	16	75	0.9 lb/hr	-	1.14 lb/hr
110 MMBtu/hr	2011	City of Palmdale	Antelope Valley AQMD	EPA	9	50	-	0.8 lb/hr	0.8 lb/hr
250 MMBtu/hr	2009	Power County	Idaho	EPA	15	100	-	0.0052	0.0052
162 MMBtu/hr	2009	Amherst Campus	Massachusetts	EPA	-	-	-	0.020	-
200 MMBtu/hr	2008	Mcdonough	Georgia	EPA	-	50	0.0051	-	-
160 MMBtu/hr	2006	Riverside	Minnesota	EPA	-	114	0.0050	-	-
		Rule 4306	SJVAPCD		9	400			
>50 MMBtu/hr	2010	Achieved in Practice	BAAQMD	BACT Wkbook	25	50	-	-	-

The existing permit limits of 9 ppm NOx, 25 ppm CO, 0.005 lb/MMBtu ROC, and 0.007 lb/MMBtu PM are consistent with BACT determinations for similar facilities.

E. Offsets

District Regulation 1303(B)(1) requires offsets for any new or modified facility that emits or has the potential to emit pollutants above the thresholds listed in Table 6. As shown in the table, facility emissions for all pollutants will remain below the offset thresholds.

Table 6 District Offset Applicability			
Pollutant	Offset Threshold[a] (TPY)	Facility Emissions After Proposed Modification (TPY)	Offsets Required
Carbon Monoxide	100	16	None
Hydrogen Sulfide	10	0	None
Lead	0.6	0	None
PM_{1o}	15	6	None
Oxides of Nitrogen	25	11	None
Oxides of Sulfur	25	2	None
Reactive Organic Compounds	25	4	None

a. From MDAQMD Rule 1303(B)(1)

F. Toxic Risk Management

District Rule 1320 contains new source review requirements for toxic air contaminants (TACs). A modified emission unit is subject to review under this regulation if it emits a state TAC (1320 (B)(2)(a)(i)). The boilers emit TACs, and the proposed modification will result in an increase in the potential annual emissions. As a result, emission unit prioritization scores must be calculated for each auxiliary boiler (1320 (E)(2)(a)).

The calculations of the three prioritization scores for each boiler are summarized in Table 7. As shown in the table, the emission unit prioritization scores for all boilers remain Low. This completes the evaluation of TACs for this project. (1320(E)(2)(b)(ii))

.

Table 7
Emission Unit Prioritization Scores After Proposed Modification[a]

Pollutant	Emission Factor[b,c] (lb/MMCF Fuel)	Boiler Max Firing Rate (MMCF/hr)	Boiler Fuel Use (MMCF/yr)	Boiler emissions			Cancer Unit Risk ($(\mu g/m^3)^{-1}$)	Cancer Priority Score[d]	Chronic REL ($\mu g/m^3$)	Chronic Non-Cancer Priority Score[e]	Acute REL ($\mu g/m^3$)	Acute Non-Cancer Priority Score[e]
				lb/hr	lb/yr	Annual avg lb/hr						
Acetaldehyde	8.87E-03	0.2425	525	2.15E-03	4.66E+00	5.32E-04	2.70E-06	2.14E-05	1.40E+02	5.70E-07	4.70E+02	6.86E-06
Benzaldehyde	1.57E-03	0.2425	525	3.81E-04	8.24E-01	9.41E-05						
Benzene	2.10E-03	0.2425	525	5.09E-04	1.10E+00	1.26E-04	2.90E-05	5.44E-05	6.00E+01	3.15E-07	1.30E+03	5.88E-07
Formaldehyde	6.96E-02	0.2425	525	1.69E-02	3.65E+01	4.17E-03	6.00E-06	3.73E-04	9.00E+00	6.95E-05	5.50E+01	4.60E-04
Hexane	1.80E+00	0.2425	525	4.37E-01	9.45E+02	1.08E-01	3.40E-05	5.46E-02	7.00E+03	2.3116E-06		
Naphthalene	6.10E-04	0.2425	525	1.48E-04	3.20E-01	3.66E-05			9.00E+00	6.09E-07		
PAHs – Total	1.00E-04	0.2425	525	2.43E-05	5.25E-02	5.99E-06	1.10E-04	9.82E-06				
Toluene	3.40E-03	0.2425	525	8.25E-04	1.79E+00	2.04E-04					3.70E+04	3.34E-08
TOTAL								**0.06**		**0.00007**		**0.0005**
Prioritization	**Values < 1 are LOW priority**							**LOW**		**LOW**		**LOW**

Notes:

a. Prioritization prepared following *CAPCOA Facility Prioritization Guidelines*, July 1990
b. California Air Toxics Emission Factor (CATEF) database median emission factor (Acetaldehyde, Benzaldehyde, Benzene, Formaldehyde)
c. AP-42 emission factor (Hexane, Napthalene, Toluene)
d. Cancer priority score for each pollutant = [Annual emission rate (lb/yr)] x [Unit risk] x [Distance adjustment factor (0.001 for >2000 m to nearest receptor)] x 1700 [normalizing factor]
e. Chronic non-cancer priority score for each pollutant = [Annual average emission rate (lb/hr)] / [Chronic REL] x [Distance adjustment] x 150 [normalizing factor]
f. Acute non-cancer priority score for each pollutant = [Maximum hourly emission rate (lb/hr)] / [Chronic REL] x [Distance adjustment] x 1500 [normalizing factor]

IV. PROPOSED PERMIT CONDITIONS

Ivanpah 1

Auxiliary Boiler

13. The combined fuel use from the auxiliary boiler and associated nighttime preservation boiler shall not exceed ~~328~~ 525 MMSCF in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers: B010375 and B011544.

Nighttime Preservation Boiler

9. The combined fuel use from the auxiliary boiler and associated nighttime preservation boiler shall not exceed ~~328~~ 525 MMSCF 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 2

Auxiliary Boiler

13. The combined fuel use from the auxiliary boiler and associated nighttime preservation boiler shall not exceed ~~328~~ 525 MMSCF in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers: B010376 and B011572.

Nighttime Preservation Boiler

9. The combined fuel use from the auxiliary boiler and associated nighttime preservation boiler shall not exceed ~~328~~ 525 MMSCF in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers: B010376 and B011572.

Ivanpah 3
Auxiliary Boiler

13. The combined fuel use from the auxiliary boiler and associated nighttime preservation boiler shall not exceed ~~328~~ 525 MMSCF in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers: B010377 and B011573.

Nighttime Preservation Boiler

9. The combined fuel use from the auxiliary boiler and associated nighttime preservation boiler shall not exceed ~~328~~ 525 MMSCF in any calendar year;

combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers: B010377 and B011573.

Appendix A

MDAQMD Application Forms

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
(760) 245-1661 Facsimile: (760) 245-2022
www.mdaqmd.ca.gov
Eldon Heaston
Executive Director

APPLICATION FOR EXTERNAL COMBUSTION ENGINE (BOILER, ETC.) ONLY

Page 1 of 2: please type or print

REMIT $245.00 WITH THIS DOCUMENT ($140.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Solar Partners II, LLC		1a. Federal Tax ID No.: 36-46018152
2. Mailing/Billing Address (for above company name): HCR1 Box 280 Nipton, CA 92364		
3. Facility or Business License Name (for equipment location): Ivanpah 1		
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 100302 Yates Well Road, Nipton, CA 92364		Facility UTM or Lat/Long: 640E/3933N
5. Contact Name/Title: Shankara Babu	Email Address: Shankara.Babu@nrgenergy.com	Phone/Fax Nos.: 702-815-2012
6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Auxiliary Boiler		
7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*		For modification or change of owner: *Current Permit Number: B010375
8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency		
9. Distances (feet and direction to closest): 3,000 Fenceline; 5.8 miles Residence; 6,700 Business; 40 miles School		
10. General Nature of Business: Power Generation	11. Principal Product: Electricity	
12. Facility Annual Throughput by Quarters (percent): 25 % Jan-Mar; 25 % Apr-Jun; 25 % Jul-Sep; 25 % Oct-Dec	13. Facility Operating Hours: 24 Hrs/Day; 7 Days/Wk; 52 Wks/Yr; 8760 Total Hrs/Yr	
14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No		
15. Signature of Responsible Official: Randall Hickok	Official Title: SVP--Solar Asset Management	
Typed or Printed Name of Responsible Official: Randall Hickok	Phone Number: 760-710-2210	Date Signed: 3/19/14

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
EXTERNAL COMBUSTION APPLICATION, continued

16. INFORMATION ON EQUIPMENT:

[■] Boiler [ ] Dryer [ ] Furnace [ ] Heater [ ] Kiln [ ] Oven [ ] Other, specify: _____

Manufacturer: Rentech

Model No.: NSX-G-120 Serial No.: _____

Maximum heat input rating (use Higher Heating Value): 249 MMBtu/hr or kW

Burner Manufacturer: Todd-Coen Burner Model No.: _____

Number of burners: _____ Burner max heat input rating: _____ MMBtu/hr or kW

Percent excess air (or n/a): 13.9 Operating temps (C or F): _____ Av. _____ Max

Specify Primary Fuel (*attach fuel analysis for these fuels specifying HHV and sulfur content):

[■] Natural Gas [ ] LPG (Propane) [ ] CARB Diesel [ ] Coal* [ ] Petroleum Coke*

[ ] Digester Gas* [ ] Landfill Gas* [ ] Refinery Gas* [ ] Other,* specify: _____

Max hourly primary fuel usage: 0.24 Fuel units (ft^3, gal, etc.): MMSCF

If secondary fuel is proposed, specify: _____ Max hourly usage: _____

Feedstock type and max process rate (specify units): _____

Unit Lat/Long or UTM Coordinates: UTME 640416 UTMN 3933369

Max annual hours: 8,760 Exhaust Stack Height (feet): 130 Inside Diameter (inches): 60

17. EMISSION CONTROLS: Check all that apply:

[■] Low NOx Burner [ ] Oxygen Trim [■] Flue or Exhaust Gas Recirculation (FGR or EGR)

[ ] Oxidation Catalyst [ ] Selective Catalytic Reduction (SCR) [ ] Selective Non-Catalytic Reduction (SNCR)

[ ] Afterburner [ ] ESP [ ] Baghouse [ ] Other - Please specify: _____

18. MAX EMISSION RATES (CONTROLLED):

Pollutant	Concentration ppmvd or gr/dscf	Mass pounds/hour
Oxides of Nitrogen (NOx)	9	2.7
Oxides of Sulfur (SOx)	1.7	0.7
Carbon Monoxide (CO)	25	4.6
Total Particulates (TSP or PM30)	0.007	1.7
Coarse Respirable Particulates (PM10)	0.007	1.7
Fine Respirable Particulates (PM2.5)	0.007	1.7
Total Organics (TOG)	1.3	1.3
Volatile Organic Compounds (VOC, ROG or NMOG)	1.3	1.3

19. DRYERS ONLY Check one:

[ ] Centrifugal [ ] Chip [ ] Fluidized Bed [ ] Rotary [ ] Spray [ ] Other, specify: _____

20. FURNACE ONLY Check one:

[ ] Annealing [ ] Burnoff [ ] Calcining [ ] Crucible [ ] Cupola [ ] Diffusion [ ] Electric [ ] Forge [ ] Pot

[ ] Holding [ ] Heat Treating [ ] Melting [ ] Reverbatory [ ] Rotary [ ] Sweating [ ] Oxide Growth

21. OVEN ONLY Check one:

[ ] Bakery [ ] Baking [ ] Curing [ ] Drying [ ] Fluidized Bed [ ] Stripping [ ] Solder Reflow

[ ] Roasting, specify type: _____ Firing Method: [ ] Direct [ ] Indirect

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
(760) 245-1661 Facsimile: (760) 245-2022
www.mdaqmd.ca.gov
Eldon Heaston
Executive Director

APPLICATION FOR EXTERNAL COMBUSTION ENGINE (BOILER, ETC.) ONLY

Page 1 of 2: please type or print

REMIT $245.00 WITH THIS DOCUMENT ($140.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Solar Partners II, LLC		1a. Federal Tax ID No.: 36-46018152
2. Mailing/Billing Address (for above company name): HCR1 Box 280 Nipton, CA 92364		
3. Facility or Business License Name (for equipment location): Ivanpah 1		
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 100302 Yates Well Road, Nipton, CA 92364		Facility UTM or Lat/Long: 640E/3933N
5. Contact Name/Title: Shankara Babu	Email Address: Shankara.Babu@nrgenergy.com	Phone/Fax Nos.: 702-815-2012
6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Nighttime Preservation Boiler		
7. Application is for: ☐ New Construction ■ Modification* ☐ Change of Owner*		For modification or change of owner: *Current Permit Number: B011544
8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ■ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency		
9. Distances (feet and direction to closest): 3,000 Fenceline; 5.8 miles Residence; 6,700 Business; 40 miles School		
10. General Nature of Business: Power Generation	11. Principal Product: Electricity	
12. Facility Annual Throughput by Quarters (percent): 25 % Jan-Mar; 25 % Apr-Jun; 25 % Jul-Sep; 25 % Oct-Dec	13. Facility Operating Hours: 24 Hrs/Day; 7 Days/Wk; 52 Wks/Yr; 8760 Total Hrs/Yr	
14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ■ No		
15. Signature of Responsible Official: Randall Hickok	Official Title: SVP--Solar Asset Management	
Typed or Printed Name of Responsible Official: Randall Hickok	Phone Number: 760-710-2210	Date Signed: 3/19/14

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
EXTERNAL COMBUSTION APPLICATION, continued

16. INFORMATION ON EQUIPMENT:

■ Boiler ☐ Dryer ☐ Furnace ☐ Heater ☐ Kiln ☐ Oven ☐ Other, specify: _____

Manufacturer: Hurst

Model No.: S Serial No.: _____

Maximum heat input rating (use Higher Heating Value): 6.7 MMBtu/hr or kW

Burner Manufacturer: Power Flame Burner Model No.: _____

Number of burners: _____ Burner max heat input rating: _____ MMBtu/hr or kW

Percent excess air (or n/a): 15 Operating temps (C or F): _____ Av. _____ Max

Specify Primary Fuel (*attach fuel analysis for these fuels specifying HHV and sulfur content):

■ Natural Gas ☐ LPG (Propane) ☐ CARB Diesel ☐ Coal* ☐ Petroleum Coke*

☐ Digester Gas* ☐ Landfill Gas* ☐ Refinery Gas* ☐ Other,* specify: _____

Max hourly primary fuel usage: 9,730 Fuel units (ft^3, gal, etc.): SCF

If secondary fuel is proposed, specify: _____ Max hourly usage: _____

Feedstock type and max process rate (specify units): _____

Unit Lat/Long or UTM Coordinates: UTME 640416 UTMN 3933369

Max annual hours: 8,760 Exhaust Stack Height (feet): 22 Inside Diameter (inches): 15.75

17. EMISSION CONTROLS: Check all that apply:

■ Low NOx Burner ☐ Oxygen Trim ■ Flue or Exhaust Gas Recirculation (FGR or EGR)

☐ Oxidation Catalyst ☐ Selective Catalytic Reduction (SCR) ☐ Selective Non-Catalytic Reduction (SNCR)

☐ Afterburner ☐ ESP ☐ Baghouse ☐ Other - Please specify: _____

18. MAX EMISSION RATES (CONTROLLED):

Pollutant	Concentration ppmvd or gr/dscf	Mass pounds/hour
Oxides of Nitrogen (NOx)	9	0.07
Oxides of Sulfur (SOx)	1.7	0.02
Carbon Monoxide (CO)	50	0.11
Total Particulates (TSP or PM30)		0.04
Coarse Respirable Particulates (PM10)		0.04
Fine Respirable Particulates (PM2.5)		0.04
Total Organics (TOG)	10	0.03
Volatile Organic Compounds (VOC, ROG or NMOG)	10	0.03

19. DRYERS ONLY Check one:

☐ Centrifugal ☐ Chip ☐ Fluidized Bed ☐ Rotary ☐ Spray ☐ Other, specify: _____

20. FURNACE ONLY Check one:

☐ Annealing ☐ Burnoff ☐ Calcining ☐ Crucible ☐ Cupola ☐ Diffusion ☐ Electric ☐ Forge ☐ Pot

☐ Holding ☐ Heat Treating ☐ Melting ☐ Reverbatory ☐ Rotary ☐ Sweating ☐ Oxide Growth

21. OVEN ONLY Check one:

☐ Bakery ☐ Baking ☐ Curing ☐ Drying ☐ Fluidized Bed ☐ Stripping ☐ Solder Reflow

☐ Roasting, specify type: _____ Firing Method: ☐ Direct ☐ Indirect

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APPLICATION FOR EXTERNAL COMBUSTION ENGINE (BOILER, ETC.) ONLY

Page 1 of 2: please type or print

REMIT $245.00 WITH THIS DOCUMENT ($140.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Solar Partners I, LLC		1a. Federal Tax ID No.: 20-8812461
2. Mailing/Billing Address (for above company name): HCR1 Box 280 Nipton, CA 92364		
3. Facility or Business License Name (for equipment location): Ivanpah 2		
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 100302 Yates Well Road, Nipton, CA 92364		Facility UTM or Lat/Long: 644E/3934N
5. Contact Name/Title: Shankara Babu	Email Address: Shankara.Babu@nrgenergy.com	Phone/Fax Nos.: 702-815-2012
6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Auxiliary Boiler		
7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*		For modification or change of owner: *Current Permit Number: B010376
8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency		
9. Distances (feet and direction to closest): 3,000 Fenceline; 5.8 miles Residence; 6,700 Business; 40 miles School		
10. General Nature of Business: Power Generation	11. Principal Product: Electricity	
12. Facility Annual Throughput by Quarters (percent): 25 % Jan-Mar; 25 % Apr-Jun; 25 % Jul-Sep; 25 % Oct-Dec	13. Facility Operating Hours: 24 Hrs/Day; 7 Days/Wk; 52 Wks/Yr; 8760 Total Hrs/Yr	
14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No		
15. Signature of Responsible Official: Randall Hickok	Official Title: SVP--Solar Asset Management	
Typed or Printed Name of Responsible Official: Randall Hickok	Phone Number: 760-710-2210	Date Signed: 3/19/14

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
EXTERNAL COMBUSTION APPLICATION, continued

16. INFORMATION ON EQUIPMENT:

[■] Boiler [ ] Dryer [ ] Furnace [ ] Heater [ ] Kiln [ ] Oven [ ] Other, specify: _____

Manufacturer: Rentech

Model No.: NSX-G-120 Serial No.: _____

Maximum heat input rating (use Higher Heating Value): 249 MMBtu/hr or kW

Burner Manufacturer: Todd-Coen Burner Model No.: _____

Number of burners: _____ Burner max heat input rating: _____ MMBtu/hr or kW

Percent excess air (or n/a): 13.9 Operating temps (C or F): _____ Av. _____ Max

Specify Primary Fuel (*attach fuel analysis for these fuels specifying HHV and sulfur content):

[■] Natural Gas [ ] LPG (Propane) [ ] CARB Diesel [ ] Coal* [ ] Petroleum Coke*

[ ] Digester Gas* [ ] Landfill Gas* [ ] Refinery Gas* [ ] Other,* specify: _____

Max hourly primary fuel usage: 0.24 Fuel units (ft^3, gal, etc.): MMSCF

If secondary fuel is proposed, specify: _____ Max hourly usage: _____

Feedstock type and max process rate (specify units): _____

Unit Lat/Long or UTM Coordinates: UTME 638785 UTMN 3935664

Max annual hours: 8,760 Exhaust Stack Height (feet): 130 Inside Diameter (inches): 60

17. EMISSION CONTROLS: Check all that apply:

[■] Low NOx Burner [ ] Oxygen Trim [■] Flue or Exhaust Gas Recirculation (FGR or EGR)

[ ] Oxidation Catalyst [ ] Selective Catalytic Reduction (SCR) [ ] Selective Non-Catalytic Reduction (SNCR)

[ ] Afterburner [ ] ESP [ ] Baghouse [ ] Other - Please specify: _____

18. MAX EMISSION RATES (CONTROLLED):

Pollutant	Concentration ppmvd or gr/dscf	Mass pounds/hour
Oxides of Nitrogen (NOx)	9	2.7
Oxides of Sulfur (SOx)	1.7	0.7
Carbon Monoxide (CO)	25	4.6
Total Particulates (TSP or PM30)	0.007	1.7
Coarse Respirable Particulates (PM10)	0.007	1.7
Fine Respirable Particulates (PM2.5)	0.007	1.7
Total Organics (TOG)	1.3	1.3
Volatile Organic Compounds (VOC, ROG or NMOG)	1.3	1.3

19. DRYERS ONLY Check one:

[ ] Centrifugal [ ] Chip [ ] Fluidized Bed [ ] Rotary [ ] Spray [ ] Other, specify: _____

20. FURNACE ONLY Check one:

[ ] Annealing [ ] Burnoff [ ] Calcining [ ] Crucible [ ] Cupola [ ] Diffusion [ ] Electric [ ] Forge [ ] Pot

[ ] Holding [ ] Heat Treating [ ] Melting [ ] Reverbatory [ ] Rotary [ ] Sweating [ ] Oxide Growth

21. OVEN ONLY Check one:

[ ] Bakery [ ] Baking [ ] Curing [ ] Drying [ ] Fluidized Bed [ ] Stripping [ ] Solder Reflow

[ ] Roasting, specify type: _____ Firing Method: [ ] Direct [ ] Indirect

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
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APPLICATION FOR EXTERNAL COMBUSTION ENGINE (BOILER, ETC.) ONLY

Page 1 of 2: please type or print

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1. Permit To Be Issued To (company name to receive permit): Solar Partners I, LLC		1a. Federal Tax ID No.: 20-8812461
2. Mailing/Billing Address (for above company name): HCR1 Box 280 Nipton, CA 92364		
3. Facility or Business License Name (for equipment location): Ivanpah 2		
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 100302 Yates Well Road, Nipton, CA 92364		Facility UTM or Lat/Long: 644E/3934N
5. Contact Name/Title: Shankara Babu	Email Address: Shankara.Babu@nrgenergy.com	Phone/Fax Nos.: 702-815-2012
6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Nighttime Preservation Boiler		
7. Application is for: ☐ New Construction ■ Modification* ☐ Change of Owner*		For modification or change of owner: *Current Permit Number: B011572
8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ■ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency		
9. Distances (feet and direction to closest): 3,000 Fenceline; 5.8 miles Residence; 6,700 Business; 40 miles School		
10. General Nature of Business: Power Generation	11. Principal Product: Electricity	
12. Facility Annual Throughput by Quarters (percent): 25 % Jan-Mar; 25 % Apr-Jun; 25 % Jul-Sep; 25 % Oct-Dec	13. Facility Operating Hours: 24 Hrs/Day; 7 Days/Wk; 52 Wks/Yr; 8760 Total Hrs/Yr	
14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ■ No		
15. Signature of Responsible Official: Randall Hickok	Official Title: SVP--Solar Asset Management	
Typed or Printed Name of Responsible Official: Randall Hickok	Phone Number: 760-710-2210	Date Signed: 3/19/14

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Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
EXTERNAL COMBUSTION APPLICATION, continued

16. INFORMATION ON EQUIPMENT:

■ Boiler ☐ Dryer ☐ Furnace ☐ Heater ☐ Kiln ☐ Oven ☐ Other, specify: _____

Manufacturer: Hurst

Model No.: S Serial No.: _____

Maximum heat input rating (use Higher Heating Value): 6.7 MMBtu/hr or kW

Burner Manufacturer: Power Flame Burner Model No.: _____

Number of burners: _____ Burner max heat input rating: _____ MMBtu/hr or kW

Percent excess air (or n/a): 15 Operating temps (C or F): _____ Av. _____ Max

Specify Primary Fuel (*attach fuel analysis for these fuels specifying HHV and sulfur content):

■ Natural Gas ☐ LPG (Propane) ☐ CARB Diesel ☐ Coal* ☐ Petroleum Coke*

☐ Digester Gas* ☐ Landfill Gas* ☐ Refinery Gas* ☐ Other,* specify: _____

Max hourly primary fuel usage: 9,730 Fuel units (ft^3, gal, etc.): SCF

If secondary fuel is proposed, specify: _____ Max hourly usage: _____

Feedstock type and max process rate (specify units): _____

Unit Lat/Long or UTM Coordinates: UTME 640416 UTMN 3933369

Max annual hours: 8,760 Exhaust Stack Height (feet): 22 Inside Diameter (inches): 15.75

17. EMISSION CONTROLS: Check all that apply:

■ Low NOx Burner ☐ Oxygen Trim ■ Flue or Exhaust Gas Recirculation (FGR or EGR)

☐ Oxidation Catalyst ☐ Selective Catalytic Reduction (SCR) ☐ Selective Non-Catalytic Reduction (SNCR)

☐ Afterburner ☐ ESP ☐ Baghouse ☐ Other - Please specify: _____

18. MAX EMISSION RATES (CONTROLLED):

Pollutant	Concentration ppmvd or gr/dscf	Mass pounds/hour
Oxides of Nitrogen (NOx)	9	0.07
Oxides of Sulfur (SOx)	1.7	0.02
Carbon Monoxide (CO)	50	0.11
Total Particulates (TSP or PM30)		0.04
Coarse Respirable Particulates (PM10)		0.04
Fine Respirable Particulates (PM2.5)		0.04
Total Organics (TOG)	10	0.03
Volatile Organic Compounds (VOC, ROG or NMOG)	10	0.03

19. DRYERS ONLY Check one:

☐ Centrifugal ☐ Chip ☐ Fluidized Bed ☐ Rotary ☐ Spray ☐ Other, specify: _____

20. FURNACE ONLY Check one:

☐ Annealing ☐ Burnoff ☐ Calcining ☐ Crucible ☐ Cupola ☐ Diffusion ☐ Electric ☐ Forge ☐ Pot

☐ Holding ☐ Heat Treating ☐ Melting ☐ Reverbatory ☐ Rotary ☐ Sweating ☐ Oxide Growth

21. OVEN ONLY Check one:

☐ Bakery ☐ Baking ☐ Curing ☐ Drying ☐ Fluidized Bed ☐ Stripping ☐ Solder Reflow

☐ Roasting, specify type: _____ Firing Method: ☐ Direct ☐ Indirect

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
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APPLICATION FOR EXTERNAL COMBUSTION ENGINE (BOILER, ETC.) ONLY

Page 1 of 2: please type or print

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1. Permit To Be Issued To (company name to receive permit): Solar Partners VIII, LLC		1a. Federal Tax ID No.: 36-4608159
2. Mailing/Billing Address (for above company name): HCR1 Box 280 Nipton, CA 92364		
3. Facility or Business License Name (for equipment location): Ivanpah 3		
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 100302 Yates Well Road, Nipton, CA 92364		Facility UTM or Lat/Long: 644E/3934N
5. Contact Name/Title: Shankara Babu	Email Address: Shankara.Babu@nrgenergy.com	Phone/Fax Nos.: 702-815-2012

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Auxiliary Boiler

7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*
For modification or change of owner: *Current Permit Number: B010377

8. Type of Organization (check one):
☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. Distances (feet and direction to closest):
3,000 Fenceline | 5.8 miles Residence | 6,700 Business | 40 miles School

10. General Nature of Business: Power Generation	11. Principal Product: Electricity

12. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

13. Facility Operating Hours:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
24	7	52	8760

14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No

15. Signature of Responsible Official: Randall Hickok	Official Title: SVP--Solar Asset Management	
Typed or Printed Name of Responsible Official: Randall Hickok	Phone Number: 760-710-2210	Date Signed: 3/19/14

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
EXTERNAL COMBUSTION APPLICATION, continued

16. INFORMATION ON EQUIPMENT:

■ Boiler ☐ Dryer ☐ Furnace ☐ Heater ☐ Kiln ☐ Oven ☐ Other, specify: _____

Manufacturer: Rentech

Model No.: NSX-G-120 Serial No.: _____

Maximum heat input rating (use Higher Heating Value): 249 MMBtu/hr or kW

Burner Manufacturer: Todd-Coen Burner Model No.: _____

Number of burners: _____ Burner max heat input rating: _____ MMBtu/hr or kW

Percent excess air (or n/a): 13.9 Operating temps (C or F): _____ Av. _____ Max

Specify Primary Fuel (*attach fuel analysis for these fuels specifying HHV and sulfur content):

■ Natural Gas ☐ LPG (Propane) ☐ CARB Diesel ☐ Coal* ☐ Petroleum Coke*

☐ Digester Gas* ☐ Landfill Gas* ☐ Refinery Gas* ☐ Other,* specify: _____

Max hourly primary fuel usage: 0.24 Fuel units (ft^3, gal, etc.): MMSCF

If secondary fuel is proposed, specify: _____ Max hourly usage: _____

Feedstock type and max process rate (specify units): _____

Unit Lat/Long or UTM Coordinates: UTME 637569 UTMN 3937859

Max annual hours: 8,760 Exhaust Stack Height (feet): 130 Inside Diameter (inches): 60

17. EMISSION CONTROLS: Check all that apply:

■ Low NOx Burner ☐ Oxygen Trim ■ Flue or Exhaust Gas Recirculation (FGR or EGR)

☐ Oxidation Catalyst ☐ Selective Catalytic Reduction (SCR) ☐ Selective Non-Catalytic Reduction (SNCR)

☐ Afterburner ☐ ESP ☐ Baghouse ☐ Other - Please specify: _____

18. MAX EMISSION RATES (CONTROLLED):

Pollutant	Concentration ppmvd or gr/dscf	Mass pounds/hour
Oxides of Nitrogen (NOx)	9	2.7
Oxides of Sulfur (SOx)	1.7	0.7
Carbon Monoxide (CO)	25	4.6
Total Particulates (TSP or PM30)	0.007	1.7
Coarse Respirable Particulates (PM10)	0.007	1.7
Fine Respirable Particulates (PM2.5)	0.007	1.7
Total Organics (TOG)	1.3	1.3
Volatile Organic Compounds (VOC, ROG or NMOG)	1.3	1.3

19. DRYERS ONLY Check one:

☐ Centrifugal ☐ Chip ☐ Fluidized Bed ☐ Rotary ☐ Spray ☐ Other, specify: _____

20. FURNACE ONLY Check one:

☐ Annealing ☐ Burnoff ☐ Calcining ☐ Crucible ☐ Cupola ☐ Diffusion ☐ Electric ☐ Forge ☐ Pot

☐ Holding ☐ Heat Treating ☐ Melting ☐ Reverbatory ☐ Rotary ☐ Sweating ☐ Oxide Growth

21. OVEN ONLY Check one:

☐ Bakery ☐ Baking ☐ Curing ☐ Drying ☐ Fluidized Bed ☐ Stripping ☐ Solder Reflow

☐ Roasting, specify type: _____ Firing Method: ☐ Direct ☐ Indirect

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APPLICATION FOR EXTERNAL COMBUSTION ENGINE (BOILER, ETC.) ONLY

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2. Mailing/Billing Address (for above company name): HCR1 Box 280 Nipton, CA 92364		
3. Facility or Business License Name (for equipment location): Ivanpah 3		
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 100302 Yates Well Road, Nipton, CA 92364		Facility UTM or Lat/Long: 644E/3934N
5. Contact Name/Title: Shankara Babu	Email Address: Shankara.Babu@nrgenergy.com	Phone/Fax Nos.: 702-815-2012

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Nighttime Preservation Boiler

7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*
For modification or change of owner: *Current Permit Number: B011573

8. Type of Organization (check one):
☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. Distances (feet and direction to closest):
3,000 Fenceline | 5.8 miles Residence | 6,700 Business | 40 miles School

10. General Nature of Business: Power Generation	11. Principal Product: Electricity

12. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

13. Facility Operating Hours:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
24	7	52	8760

14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No

15. Signature of Responsible Official: Randall Hickok	Official Title: SVP--Solar Asset Management	
Typed or Printed Name of Responsible Official: Randall Hickok	Phone Number: 760-710-2210	Date Signed: 3/19/14

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
EXTERNAL COMBUSTION APPLICATION, continued

16. INFORMATION ON EQUIPMENT:

■ Boiler ☐ Dryer ☐ Furnace ☐ Heater ☐ Kiln ☐ Oven ☐ Other, specify: _____

Manufacturer: Hurst

Model No.: S Serial No.: _____

Maximum heat input rating (use Higher Heating Value): 6.7 MMBtu/hr or kW

Burner Manufacturer: Power Flame Burner Model No.: _____

Number of burners: _____ Burner max heat input rating: _____ MMBtu/hr or kW

Percent excess air (or n/a): 15 Operating temps (C or F): _____ Av. _____ Max

Specify Primary Fuel (*attach fuel analysis for these fuels specifying HHV and sulfur content):

■ Natural Gas ☐ LPG (Propane) ☐ CARB Diesel ☐ Coal* ☐ Petroleum Coke*

☐ Digester Gas* ☐ Landfill Gas* ☐ Refinery Gas* ☐ Other,* specify: _____

Max hourly primary fuel usage: 9,730 Fuel units (ft^3, gal, etc.): SCF

If secondary fuel is proposed, specify: _____ Max hourly usage: _____

Feedstock type and max process rate (specify units): _____

Unit Lat/Long or UTM Coordinates: UTME 640416 UTMN 3933369

Max annual hours: 8,760 Exhaust Stack Height (feet): 22 Inside Diameter (inches): 15.75

17. EMISSION CONTROLS: Check all that apply:

■ Low NOx Burner ☐ Oxygen Trim ■ Flue or Exhaust Gas Recirculation (FGR or EGR)

☐ Oxidation Catalyst ☐ Selective Catalytic Reduction (SCR) ☐ Selective Non-Catalytic Reduction (SNCR)

☐ Afterburner ☐ ESP ☐ Baghouse ☐ Other - Please specify: _____

18. MAX EMISSION RATES (CONTROLLED):

Pollutant	Concentration ppmvd or gr/dscf	Mass pounds/hour
Oxides of Nitrogen (NOx)	9	0.07
Oxides of Sulfur (SOx)	1.7	0.02
Carbon Monoxide (CO)	50	0.11
Total Particulates (TSP or PM30)		0.04
Coarse Respirable Particulates (PM10)		0.04
Fine Respirable Particulates (PM2.5)		0.04
Total Organics (TOG)	10	0.03
Volatile Organic Compounds (VOC, ROG or NMOG)	10	0.03

19. DRYERS ONLY Check one:

☐ Centrifugal ☐ Chip ☐ Fluidized Bed ☐ Rotary ☐ Spray ☐ Other, specify: _____

20. FURNACE ONLY Check one:

☐ Annealing ☐ Burnoff ☐ Calcining ☐ Crucible ☐ Cupola ☐ Diffusion ☐ Electric ☐ Forge ☐ Pot

☐ Holding ☐ Heat Treating ☐ Melting ☐ Reverbatory ☐ Rotary ☐ Sweating ☐ Oxide Growth

21. OVEN ONLY Check one:

☐ Bakery ☐ Baking ☐ Curing ☐ Drying ☐ Fluidized Bed ☐ Stripping ☐ Solder Reflow

☐ Roasting, specify type: _____ Firing Method: ☐ Direct ☐ Indirect

Appendix B

Emission Calculations

Table B-1 Maximum Fuel Usage (per boiler)			
Fuel Use	Hour	Day	Year
MMSCF	0.24	5.86	525
MMBtu	249	5,976	535,500

Table B-2 Emission Calculations (per boiler)					
	Emission Factor, lb/MMBtu	Emissions			
Pollutant		lb/hr	lb/day	Ton/year	Ton/year (all boilers)
NOx	0.0109	2.7	65.3	2.9	8.8
SOx	0.0029	0.7	17.2	0.8	2.3
ROC	0.0053	1.3	31.9	1.4	4.3
PM10	0.0070	1.7	41.8	1.9	5.6
CO	0.0185	4.6	110.4	4.9	14.8
GHGs	118	29,308	703,396	31,515	94,545

Notes:
Pollutant emissions for each time period are calculated by multiplying the emission factor by the fuel use from Table B-1.

Table B-3 Non-Boiler Emissions		
	Emissions	
Pollutant	lb/day	Ton/year
NOx	42.2	2.0
SOx	0	0.0
ROC	1.8	0.1
PM10	1.4	0.1
CO	25	1.1
GHGs	--	204

Note:
Emissions in this table are from testing emergency engines. These emissions are not affected by this permit application, and are taken from Tables 4, 5 and 6 of FDOC Rev. E, and supporting calculation worksheets prepared by the District (Ivanpah Emission Summary Rev B 09-06-12).

Table B-4 Proposed Facility Emissions					
Pollutant	Maximum Auxiliary Boiler Emissions (Lb/day Each)	MDAQMD BACT Threshold Rule 1303 (Lb/Day)	Maximum Facility Emissions (TPY)	Major Source Threshold (TPY)	Facility-Wide BACT Threshold (TPY)
NOx	65	25	10.8	25	25
SOx	17	25	2.3	25	25
ROC	32	25	4.4	25	25
PM10	42	25	5.7	15	25
CO	110	N/A	16.0	100	N/A
GHG	--	N/A	94,749	100,000	N/A

Appendix C

Basis for Requested Fuel Use

Calculations upon which requested allowance is based

Assumptions:

- Normal operating day
  - Auxiliary boiler operates for 4 hours at maximum load before generator has synchronized.
  - Auxiliary boiler operates for 1 hour at maximum load after the generator has synchronized, to provide stabilizing/seal steam.
  - Nighttime preservation boiler 12 hours at maximum load
- Weather day: defined as a day that the maximum hourly average direct normal irradiance does not exceed 800 w/m2 (experience indicates generation cannot occur <800w/m2)
  - Auxiliary boiler operates for 2.5 hours at maximum load and then generation for the day is aborted
  - Nighttime preservation boiler is restored to service for the remaining 9 hours in the operating day (21.5 hours/day total)
- Trip response
  - Auxiliary boiler operates for 5 hours to startup and support restart of the steam turbine following a steam turbine trip.
- Additional daytime operation
  - Auxiliary boiler operates for an additional 300 hours per year in solar boost mode during peak summer period, primarily end-of-day solar boost to extend operations as the sun is setting.
  - Auxiliary boiler operates up to 8 hours per year for emission testing
- Fuel gas heat content = 1020 btu/scf

	Normal Operating Days	Weather Days	Trip Response	Additional Daytime Operation	Nighttime Preservation Boiler	
					Normal days	Weather days
MMBtu/hr	249	249	249	249	6.7	6.7
MMSCF/hr	0.244	0.244	0.244	0.244	0.006	0.006
Hours/day	5	2.5			12	21.5
Days/year	291	54			291	54
Hours/year	1455	135	120	308	3492	1161
MMSCF/year	355	33	29	75	21	7
TOTAL MMSCF/year			520			

Request rounded to 525 MMSCF/year