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October 18, 2013

Mr. John Heiser, Project Manager
California Energy Commission
1516 9th Street, MS-15
Sacramento, CA 95814-5512

Re: Hydrogen Energy California Project (08-AFC-8A): Project Refinements

Dear Mr. Heiser:

During the process of developing the San Joaquin Valley Air Pollution Control District air permit, and in response to Data Requests from the CEC, some Project features have been updated as a result of Project engineering and regulatory feedback received subsequent to the submittal of the permit application. The enclosed report summarizes these Project refinements since the submittal of the Amended AFC to CEC in May 2012. Because some of these changes were made in response to data requests early in the review process, many of these Project refinements are already reflected in the Preliminary Staff Assessment/Draft Environmental Impact Statement issued by the CEC and DOE on June 28, 2013.

Nonetheless, for completeness and to assist in the regulatory review, these refinements are presented as a package. These refinements do not substantially alter the nature of the Project, nor do they affect the proposed capture and sequestration of Project carbon emissions. This submittal describes the Project refinements and assesses whether the refinements result in any environmental consequences not previously analyzed. As demonstrated, the Project refinements will not increase the magnitude of any previously identified environmental impacts, or result in any new significant impacts associated with the Project.

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Project Refinements

Amended Application for Certification for HYDROGEN ENERGY CALIFORNIA (08-AFC-8A) Kern County, California

Prepared for:
Hydrogen Energy California LLC

hydrogen energy california

Submitted to:

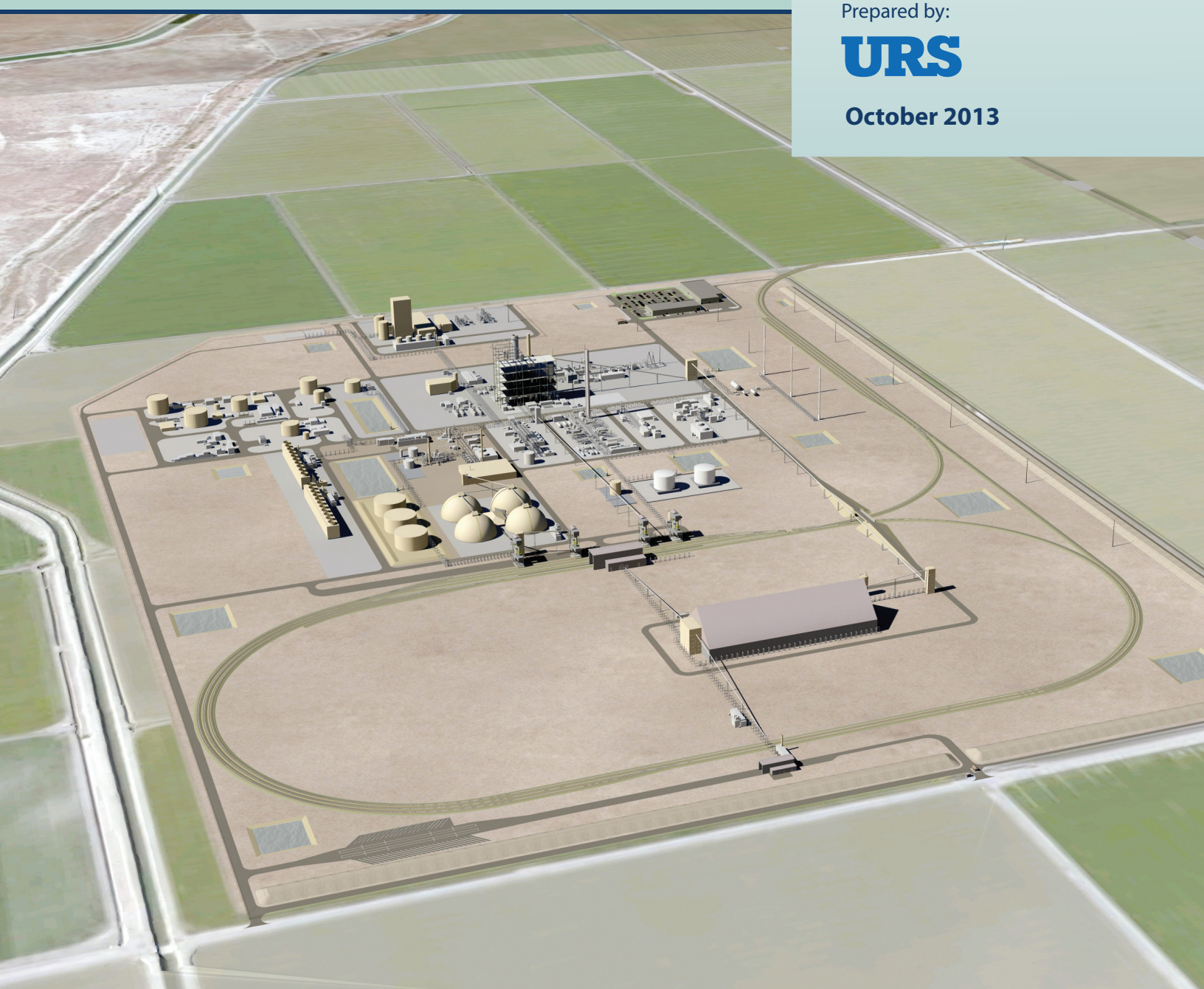
California Energy Commission

U.S Department of Energy

Prepared by:

URS

October 2013



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Acronyms

AFC	Application for Certification
AGR	acid gas removal
AST	aboveground storage tank
ASU	air separation unit
CEC	California Energy Commission
CO_2	carbon dioxide
CTG	combustion turbine generator
DOE	U.S. Department of Energy
EOR	enhanced oil recovery
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
HECA	Hydrogen Energy California
HP	high pressure
HRSG	heat recovery steam generator
kg/s	kilograms per second
K.O.	Knock Out
KOP	Key Observation Point
kpph	thousand pounds per hour
kV	kilovolt
LP	low pressure
LOX	Liquid Oxygen
MMlb/hr	million pounds per hour
MW	megawatt
MWth	megawatt, thermal
OCA	offsite consequences analysis
petcoke	petroleum coke
PSA/DEIS	Preliminary Staff Assessment/Draft Environmental Impact Statement
Roads Department	Kern County Roads Department
SJVAPCD	San Joaquin Valley Air Pollution Control District
SRU	sulfur recovery unit
syngas	synthesis gas
TAC	toxic air contaminant
UAN	Urea Ammonium Nitrate
USEPA	U.S. Environmental Protection Agency
ZLD	zero liquid discharge

1.0 INTRODUCTION

On May 2, 2012, Hydrogen Energy California LLC (HECA, or Applicant) filed an Amended Application for Certification (AFC) with the California Energy Commission (CEC) seeking approval to construct and operate the HECA Project (Docket 08-AFC-8A).

HECA LLC is proposing an Integrated Gasification Combined-Cycle polygeneration project (hereafter referred to as the HECA Project). HECA LLC is owned by SCS Energy California LLC. The HECA Project will gasify a 75 percent coal and 25 percent petroleum coke (petcoke) fuel blend to produce synthesis gas (syngas). Syngas produced via gasification will be purified to hydrogen-rich fuel, which will be used to generate low-carbon baseload electricity in a Combined-Cycle Power Block; low-carbon nitrogen-based fertilizer in an integrated Manufacturing Complex; and carbon dioxide (CO_2) for use in enhanced oil recovery (EOR).

The fertilizer and power produced by the HECA Project have a low-carbon footprint, because more than 90 percent of the CO_2 in the syngas is captured and approximately 3 million tons per year of CO_2 is transported via pipeline for use in EOR, which results in simultaneous sequestration (storage) of the CO_2 in a secure geologic formation. CO_2 will be transported for use in EOR in the adjacent Elk Hills Oil Field, which is owned and operated by Occidental of Elk Hills, Inc.

The U.S. Department of Energy (DOE) is providing financial assistance to the HECA Project under the Clean Coal Power Initiative Round 3 via a cost-sharing agreement with HECA LLC, covering Project construction and a "Demonstration Period" for the first 2 years of Project operations.

During the process of developing the San Joaquin Valley Air Pollution Control District (SJVAPCD) air permit, and in response to Data Requests from the CEC, some Project features have been updated as a result of Project engineering and regulatory feedback received subsequent to the submittal of the permit application. This report summarizes these Project refinements since the submittal of the Amended AFC submitted to CEC in May 2012. Because some of these changes were made in response to data requests early in the review process, many of these Project refinements are already reflected in the Preliminary Staff Assessment/Draft Environmental Impact Statement (PSA/DEIS) issued by the CEC and DOE on June 28, 2013. Nonetheless, for completeness and to assist in the regulatory review, these refinements are presented as a package. These refinements do not substantially alter the nature of the Project, nor do they affect the proposed capture and sequestration of Project carbon emissions.

This submittal describes the Project refinements and assesses whether the refinements result in any environmental consequences not previously analyzed. As demonstrated, the Project refinements will not increase the magnitude of any previously identified environmental impacts, or result in any new significant impacts associated with the Project. Therefore, all impacts are expected to remain less than significant with implementation of Conditions of Certification.

Previously-published tables and figures that have been changed as a result of these modifications are included in this document with the original table number, but prefaced with "Revised". It should also be noted that all air quality–related Project refinements outlined in this document were incorporated into the Updated Emissions and Modeling Report issued to the SJVAPCD on May 17, 2013 and docketed with the CEC on May 17, 2013 (see docket #70895).

2.0 DESCRIPTION OF PROJECT REFINEMENTS

The project refinements described below do not substantially alter the nature of the Project; they are the result of further detailed project design and regulatory feedback received. An updated computer rendering of the Project is shown on Revised Figure 1-4, Project Site – Project Rendering.

The gross power output of the Combined Cycle Power Block is now expected to be up to 431 megawatts (MW) of gross power generation. The additional gross output is the result of efficiency optimization and improvement in heat recovery, and there is no additional fuel input or emissions. The gross power output may range from 405 to 431 MW, with the net power output ranging from 267 to 300 MW. Engineers are designing to optimize to the higher end of these ranges, but for some emission factor calculations it is more conservative to use the low-end value (e.g., for the Mercury and Air Toxics Standards).

Major components located on the Project Site will remain essentially the same as described in the Amended AFC. The locations of some features have been adjusted, including the heat recovery steam generator (HRSG), feedstock dryer, cooling towers, flares, CO_2 vent, Manufacturing Complex features, material handling features, and emergency engines. Several buildings and tanks were moved slightly or have revised dimensions. A few stacks have different heights and parameters. These components are shown on Revised Figure 2-5, Preliminary Plot Plan, Revised Figure 2-6, Project Elevations, and Revised Figure 2-47 Preliminary Emission Sources Plot Plan.

Mitsubishi Heavy Industries completed pilot plant testing on the Project-specific feedstock (coal and petcoke), and determined that a fluxant should be added to the feedstock blend to increase the calcium content. Calcium lowers the ash fusion temperature and promotes a more stable and reliable flow of molten gasification solids along the walls of the gasifier, and down through the water bath and lock hopper valves into the gasification solids removal system. This helps the process achieve the vitreous, "glass like," gasification solids that HECA expects to be able to recycle as a substitute for other raw materials. The fluxant is limestone (calcium carbonate), the same basic material that is used to soften water in the water treatment plant. Additional trucks will be needed to deliver the fluxant and remove the additional gasification solids. However, HECA may be able to recycle the spent water treatment lime for use as a fluxant, which would reduce fluxant deliveries by truck. The fluxant addition is expected to be about 1 percent of total feed rate, but could be up to 3 percent. Thus, it was conservatively assumed that the amount of fluxant required will be 3 percent of total feed without the benefit of recycling water softening solids.

In addition, in response to local input, the Applicant has decided not to sell ammonia; thus, there will not be an ammonia loading area or offsite transportation of ammonia. As a result, total Project-related daily and annual transportation estimates of trucks and trains have been updated, and the emissions from the travel of these associated vehicles have decreased from the information presented in the Amended AFC.

The locations of all three cooling towers moved slightly and the dimensions of the Power Block and Process cooling towers were refined. The air separation unit (ASU) cooling tower is now oriented north-south, but the stack parameters remained the same. The fan height increased from

55 feet to 65 feet for the Power Block and Process cooling towers. The number of cells for the Power Block cooling tower decreased from 12 to 10, and the diameter of the cells decreased from 30 to 25 feet. The number of cells for the Process cooling tower decreased from 13 to 11, and the diameter of the cells decreased from 30 to 29 feet. Due to these changes, the stack exhaust flow rate changed for the Power Block and Process cooling towers.

An additional air emissions mitigation device—a benzene removal section—has been included in the Rectisol® unit to remove and return benzene back into the gasification oxidation zone for destruction. A small amount of residual benzene may partition into the CO_2 stream, where it would be sequestered. HECA has updated the emissions from the CO_2 vent to include the residual benzene. Due to the addition of the benzene removal section to the Rectisol® unit, the height of the methanol wash column has increased from 235 to 330 feet, and the CO_2 vent height has been increased from 260 to 355 feet.

The dimensions and capacity of the methanol aboveground storage tank (AST) have been refined. The size is based on the capacity needed to hold the entire solvent inventory from the unit. The tank has a 600,000-gallon capacity and a fixed roof, is 55 feet tall above grade (with 48-foot-high sides), and is 46 feet in diameter. The methanol AST is surrounded by a concrete sump that has an area of 20,000 square feet and a height of 4 feet. The location of the methanol AST remains the same as described in the Amended AFC, and as shown on Revised Figure 2.5.

The height of the gasification structure remains 305 feet tall, but the top portion is relatively "open" so that wind can pass through, as compared to the remainder of the structure which contains major equipment on every level. Therefore, for the purpose of calculating building downwash, the height of the gasification structure was revised to 260 feet to reflect downwash from the lower more "solid" portion of the structure.

In the Amended AFC, the Urea Unit had two separate absorber stacks. The high pressure (HP) absorber vent was 130 feet tall and the low pressure (LP) absorber vent was 50 feet tall. The HP and LP absorbers now vent to the same 170-foot-tall stack, referred to as the urea absorber stack. There is no change in emissions; the emissions represent the sum of the previous HP and LP emissions. Only ammonia is emitted from this source. There were no changes to the Urea Pastillation vent.

For the Nitric Acid Unit, the stack parameters were modified. The stack height was reduced from 145 feet to 120 feet. Modifications to the parameters include increased temperature, decreased flow, and decreased exit velocity.

The stack for the Ammonia Nitrate Unit was modified. The stack height was raised from 40 to 55 feet.

Minor modifications were made to the feedstock handling system, including switching the locations of the feedstock crusher vent and feedstock transfer tower; now the crusher station is closer to the feedstock barn, and the fluxant handling system has been added, where a baghouse will service the fluxant unloading and storage silo. The fluxant will be blended with the feedstock when it leaves the northern side of the feedstock barn.

The coordinates of the fence around the Controlled Area along Tupman, Adohr, and Dairy roads were moved slightly in towards the center of the Project Site to ensure adequate roadway easement. Additional retention basins have been added to the site plan; the overall conceptual designs of the retention basins have not changed. All retention basins are still within the 453-acre Project Site.

3.0 ENVIRONMENTAL CONSEQUENCES

This section discusses potential environmental impacts associated with the project refinements.

3.1 AIR QUALITY

Project refinements modify some emissions rates, stack parameters, and stack and building locations. All changes to operational emissions and modeling results were presented in the "Updated Emissions and Modeling Report," docketed with the CEC on May 20, 2013.

3.1.1 Construction

The Project refinements would not result in the disturbance of areas not previously evaluated in the Amended AFC. The refinements would not result in an increase in the expected construction workforce, the quantity of equipment or equipment type, or a difference in the equipment schedule that was presented in the Amended AFC. Since the Amended AFC, certain emission factors and other items affecting construction emission rates (e.g., equipment travel distances) have been updated in response to CEC Data Requests. Updated modeling of construction emissions was presented in the "Responses to CEC Workshop Requests: Nos. A1 through A32," docketed with the CEC on November 5, 2012. This modeling showed that the Project would not cause exceedances of any ambient air quality standards. The majority of changes to construction emissions were also discussed in "Responses to CEC Workshop Requests: Nos. A1 through A32." The slight change to scraper emissions was presented in the response to CEC Workshop Request A36 on December 20, 2012.

Therefore, the construction emissions calculated and modeled in Section 5.1.2 of the Amended AFC and in the subsequent responses to CEC Data Requests still conservatively characterize the potential construction-related air quality impacts. The Project refinements would not change the conclusions in Section 5.1 of the Amended AFC, and potential air quality impacts during construction are expected to remain less than significant.

3.1.2 Operations

The "Updated Emissions and Modeling Report" describes the Project refinements that impact operational emissions, and analyzes potential air quality impacts. The emissions of operational criteria pollutants, toxic air contaminants (TACs), and greenhouse gases changed as a result of Project refinements; all of these changes are shown in the updated emission spreadsheets included as appendices to that report. The American Meteorological Society/U.S. Environmental Protection Agency (USEPA) Regulatory Model modeling results demonstrate that the Project impacts remain less than significant, and these refinements do not change the conclusions of the criteria pollutant or greenhouse gas Best Available Control Technology determinations.

3.2 BIOLOGICAL RESOURCES

3.2.1 Construction

The Project refinements are within the 453-acre Project Site and would not result in disturbance of areas that were not previously evaluated in the Amended AFC. Therefore, the refinements would not change the analysis of potential impacts to biological resources described in Amended AFC

Section 5.2, Responses to CEC Data Requests, Responses to CEC Workshop Requests, and Responses to PSA/DEIS Information Requests.

3.2.2 Operations

With the Project design refinements, the heights for two of the nine structures greater than 200 feet have increased:

- The CO_2 vent is now 355 feet instead of 260 feet; and
- The acid gas removal (AGR) Methanol Wash Column is now 330 feet instead of 235 feet.

Therefore, the tallest structure is now 355 feet. In addition, the location of the three flares has changed. All of these structures are still within the 453-acre Project Site.

Bird strike hazards for the HECA Project Site are not expected to increase due to the increased height of the stacks, or the slight change in location on the Project Site. As noted in the PSA/DEIS (page 4.2-86):

> Bird collisions with power lines and structures generally occur when a power line or other structure transects a daily flight path used by a concentration of birds and these birds are traveling at reduced altitudes and encounter tall structures in their path. Collision rates generally increase in low light conditions, during inclement weather, during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing danger.

Bird strike hazards associated with the proposed stacks would be minimal because they are not located in a daily flight path, and they are not located in close proximity with wetlands or other important foraging habitats. The Project refinements would not alter the analysis of potential collision impacts for avian species presented in the PSA/DEIS or in the Amended AFC Section 5.2.

The Project refinements would not result in impacts to biological resources during operations that have not been previously evaluated in the Amended AFC, Responses to CEC Data Requests, Responses to CEC Workshop Requests, and Responses to PSA/DEIS Information Requests.

3.3 CULTURAL RESOURCES

The Project refinements are within the 453-acre Project Site and would not result in disturbance of areas not previously evaluated in the Amended AFC. Therefore, the refinements would not change the analysis of potential impacts to cultural resources described in Amended AFC Section 5.3, Responses to CEC Data Requests, Responses to CEC Workshop Requests, and Responses to PSA/DEIS Information Requests.

3.4 LAND USE AND AGRICULTURE

3.4.1 Construction

The Project refinements are within the 453-acre Project Site and would not result in disturbance of areas not previously evaluated in the Amended AFC. Therefore, the refinements would not result in disturbance of areas not previously evaluated in the Amended AFC, or affect distances to nearby sensitive land uses. Therefore, the refinements would not change the analysis of potential impacts to land use described in Amended AFC Section 5.4, Responses to CEC Data Requests, Responses to CEC Workshop Requests, and Responses to PSA/DEIS Information Requests.

3.4.2 Operations

The Project refinements would not alter the analysis of potential impacts to land use and agriculture presented in Amended AFC Section 5.4, Responses to CEC Data Requests, Responses to CEC Workshop Requests, and Responses to PSA/DEIS Information Requests for operations.

3.5 NOISE

The Project refinements include minor modifications to the locations and dimensions of stacks, buildings, tanks, and cooling towers. All of these refinements are within the 453-acre Project Site and do not substantially alter the nature of the Project.

3.5.1 Construction

The Project refinements would not result in disturbance of areas not previously evaluated in the Amended AFC or affect distances to the nearest sensitive noise receptors. The design modifications are not expected to substantially alter the Project's construction equipment use, construction hours, or construction traffic, and would not result in significant changes to potential noise emissions during construction that were modeled and presented in Amended AFC Section 5.5.2.1 and 5.5.2.6. Therefore, the modifications would not change the analysis presented in Amended AFC Section 5.5 for construction.

3.5.2 Operations

The Project refinements would not introduce new operational noise sources on the Project Site, and will not result in significant changes to the noise emissions that were modeled and presented in Section 5.5.2.3 of the Amended AFC. Therefore, with respect to Project operations, the modifications would not change the analysis presented in Section 5.5 of the Amended AFC.

3.6 PUBLIC HEALTH

Please refer to the "Updated Emissions and Modeling Report" submitted to the SJVAPCD and docketed with the CEC on May 20, 2013, for information regarding all changes to TAC emissions and health risk assessment modeling results. The operational TAC emissions are presented in the updated emission spreadsheets included as appendices to that report. The California Air Resources Board Hotspots Analysis and Reporting Program modeling results

demonstrate that the Project impacts remain less than significant. These refinements do not change the conclusions of the Amended AFC.

3.7 WORKER SAFETY AND HEALTH

The Project refinements would not change the anticipated workplace hazards or require changes to the safety programs presented in Section 5.7 of the Amended AFC. Therefore, the refinements would not change the analysis of impacts to worker safety and health during construction and operation.

3.8 SOCIOECONOMICS/ENVIRONMENTAL JUSTICE

The Project refinements are not expected to substantially affect the Project's costs or work force for construction or operations. Therefore, the modifications would not change the analysis presented in Section 5.8 of the Amended AFC. Economic benefits previously identified related to payroll, purchasing, and tax revenues would be comparable to those identified in the Amended AFC, and these refinements are not expected to change the conclusions in Section 5.8 of the Amended AFC.

3.9 SOILS

The Project refinements are within the 453-acre Project Site and do not result in disturbance of areas not previously evaluated in the Amended AFC. The refinements are primarily slight changes in the locations of some project features. There would be no substantial change to the grading plan, paving plan, or preliminary drainage plan presented in the Amended AFC and subsequent documents such as responses to Data Requests. Therefore, the refinements would not change the analysis presented in Amended AFC Section 5.9.

3.10 TRAFFIC AND TRANSPORTATION

Based on requests and comments from the Kern County Roads Department (Roads Department) and Caltrans, URS Corporation conducted additional traffic analyses to supplement and update the traffic data presented in the Amended AFC. The results of these analyses were submitted to the Roads Department in the "Traffic Study Technical Memorandum (Revision 2)" dated July 2013 (Traffic Study). This report was docketed with the CEC on August 1, 2013 (see docket #200107).

3.10.1 Construction

The Project design refinements have not changed the Project construction traffic volumes or construction trip generation information presented in the Amended AFC. The Roads Department requested roadway segment analyses and additional autoturn analysis related to Project construction traffic. The results of those analyses are presented in Section 5.3 and Section 8.0, respectively, of the Traffic Study. Section 10.1 of the Traffic Study summarizes mitigation measures that would reduce Project construction traffic impacts to less-than-significant levels.

3.10.2 Operations

Project operations trip generation data for Alternative 1 (Train Option) and Alternative 2 (Truck Option) have been updated and are summarized in the Traffic Study. The update resulted in revision of the TRAFFIX modeling analysis for intersections previously presented in the Amended AFC; the revised analysis for operations is presented in Section 6.0 of the Traffic Study. As discussed in Section 10.2 of the Traffic Study, study intersections are not significantly impacted during operations because relevant Project construction mitigation measures will continue to be in place for the life of the Project, and therefore also apply to Project operations. Therefore, no additional mitigation is required to reduce operations traffic impacts to less-than-significant levels.

3.11 VISUAL RESOURCES

The Project refinements consist of changes to various components within the 453-acre HECA Project Site. These changes include adjusting the location of some features, including the HRSG, feedstock dryer, cooling towers, flares, CO_2 vent, Manufacturing Complex features, material handling features, and emergency engines. Several buildings and tanks were moved slightly or have revised dimensions. A few stacks have different heights and parameters. These components are shown on Revised Figure 2-5, Preliminary Plot Plan; Revised Figure 2-6, Project Elevations; and Revised Figure 2-47, Preliminary Emission Sources Plot Plan; and are listed on Revised Table 5.11-2, Major Component Design Characteristics.

3.11.1 Construction

The Project refinements would not change the construction visual profile, and thus would not change the construction impact analysis previously presented in Section 5.11 of the Amended AFC for visual resources.

3.11.2 Operations

The Project refinements would have the potential to affect views from Key Observation Point (KOP) 1 (an unobstructed residential view toward the west from a residence along Station Road).

The visual simulation from KOP 1 has been updated to reflect the Project design refinements. The updated visual simulations incorporate new photographs taken of the Project Site in August 2013 from each of the two residences at KOP 1. Because the previous photographs provided in the Amended AFC for KOP 1 were taken from the roadway, these new photographs were taken to better represent actual views of the Project Site from both residences at KOP 1. The updated visual simulation from KOP 1 is provided in Appendix A, and replaces Figure 5.11-16 in the Amended AFC.

If not mitigated, KOP 1 would have a direct, unobstructed view of the Project. The view to the west includes the feedstock barn, which remains the same as presented on Figure 5.11-16 of the Amended AFC. The height of the CO_2 vent and the AGR Methanol Wash Column have increased, and would be visible as narrow, vertical columns extending slightly above the roof of the feedstock barn. Likewise, because the nitric acid absorber vent and urea unloading station were relocated, these features would also be visible from KOP 1.

To mitigate potentially significant visual impacts at KOP 1, the Applicant will provide visual screening offsite at the residences located at KOP 1. The Applicant prepared a conceptual offsite landscape plan to provide screening for the residences located at KOP 1. This landscape plan is provided in Appendix A. The type of plants shown on the plan were selected in consultation with the KOP 1 residents; Eucalyptus are proposed at the northern residence, and Italian cypress are proposed at the southern residence

The Applicant also prepared visual simulations of the landscape plan showing the new plantings at 5-year growth and at maturity at each of the residences (i.e., four visual simulations total). These visual simulations are provided in Appendix A, and reflect the Project design refinements.

Based on review of the landscape plan and the visual simulations, the residents at each location approved the landscape plan. See Appendix A for copies of the agreements between the landowners at KOP 1 and HECA, LLC.

This offsite landscaping is expected to reduce visual impacts at KOP 1 to less-than-significant levels.

Project refinements could also be visible from other KOPs; however, changes are not expected to be detectable. Anticipated changes in views from project KOPs are described below:

- KOP 2 (View from Stockdale Highway) and KOP 6 (View from Brite Road, heading eastbound) – With the design refinements, the Project would appear similar to what is shown on Figure 5.11-18 and Figure 5.11-26 of the Amended AFC, respectively. Potentially visible design refinements include the increase in height of several stacks (i.e., methanol wash column, CO_2 vent, urea absorber stack), and reconfiguration of certain Project components. The casual observer would not detect these changes. Impacts to visual resources at KOP 2 would be substantially similar to the analysis provided in the Amended AFC.

- KOP 3 (View from Elk Hills Elementary School) – With the design refinements, the Project would appear similar to what is shown on Figure 5.11-20 of the Amended AFC. Potentially visible design refinements include: the reduction of the number of cells for the power block and process cooling towers; the increased height of these structures; and the relocation of the nitric absorber vent and urea transfer station to the southwest of the feedstock barn. The casual observer would not detect these changes. Impacts to visual resources at KOP 3 would be substantially similar to the analysis provided in the Amended AFC.

- KOP 4 (View from Stockdale Highway and Interstate 5) and KOP 5 (View from Interstate 5, heading southbound) – With the design refinements, the Project would appear similar to what is shown on Figure 5.11-22 and Figure 5.11-24 of the Amended AFC, respectively. Potentially visible design refinements include the increase in height of several stacks (i.e., methanol wash column, CO_2 vent, urea absorber stack), and reconfiguring of certain Project components. The increased height of Project components would not result in skylining against the horizon; consequently, the casual observer would not detect these changes. Impacts to visual resources at KOP 4 would be substantially similar to the analysis provided in the Amended AFC.

Lighting Related to Airfield Operations

Federal Aviation Administration (FAA) Advisory Circular 70/7460-1K requires that all airspace obstructions over 200 feet high or in close proximity to an airfield have obstruction lighting (FAA, 2000). Based on the Project design refinements, the tallest structure on site (CO_2 vent) is now 355 feet high. In the Amended AFC, the tallest structure was 305 feet high (the feedstock dryer stack and gasification structure). There is one airport within the identified visual sphere of influence (see Amended AFC Figure 5.11-1): the Elk Hills–Buttonwillow Airport, approximately 5 miles northwest of the Project Site.

In May 2012, the Project notified FAA that there would be nine structures above 200 feet. With the Project design refinements, the same nine structures will be above 200 feet. Heights for only two of the nine structures have increased: the CO_2 vent (now 355 feet instead of 260 feet) and the AGR Methanol Wash Column (now 330 feet instead of 235 feet). In addition, the location of the three flares has changed. New notifications were filed with FAA on July 24, 2013 for these modified structures.

The FAA concluded that the structures do not exceed obstruction standards and none would be a hazard to air navigation provided that the structures are marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, red lights – Chapters 4, 5 (Red), and 12. For additional information, see Appendix B.

Obstruction lighting is designed primarily to be visible to aviation; it does not produce significant down lighting or backscatter, and is not anticipated to adversely or significantly add to the night lighting levels, or adversely affect any of the six identified KOPs. Stacks and other tall Project elements will be lit in accordance with FAA guidelines.

With proper installation of markings and obstruction lighting on structures as required by FAA, no impacts to aircraft operation are expected with construction, operation, and maintenance of the Project.

Visual Plume Analysis

Due to the refinements for the HRSG stack and the cooling towers, the information for the visual plume analysis has been updated for CEC Staff's use.

The updated combustion turbine generator (CTG)/HRSG and feedstock dryer exhaust temperatures, exhaust flow rates, and exhaust moisture contents for cold weather, average annual and hot weather temperature conditions are provided in Revised Table 5.11-6.

The updated exhaust air flows and temperatures and heat rejection loads for the Power Block and Process cooling towers are included in Revised Table 5.11-7 and Revised Table 5.11-8, respectively. Information for the ASU cooling tower presented in Amended AFC Table 5.11-9 has not changed.

Potential plume emissions from Project cooling towers will be visible from KOP 5; however, plumes are anticipated to occur only occasionally from November to April. New lighting and flaring activities of the Project are not considered to adversely affect the views from this location (see Lighting/Glare/Flare of the Project Site). Visual impact susceptibility from this location is

characterized as low (see Amended AFC Table 5.11-1). Visual impact severity from this location is characterized as low (see Amended AFC Table 5.11-4). Therefore, aesthetic impacts associated with the Project from this location are anticipated to be low and there is no significant impact.

3.12 HAZARDOUS MATERIALS

The Project refinements consist of changes to various components within the 453-acre HECA Project Site. These changes include refinements to the design of the Rectisol® unit, which affects the amount of methanol used and stored on site by the Project. The Project will continue to store anhydrous ammonia in double-integrity steel, refrigerated storage tanks for maximum safety, but will not sell ammonia. There are no other refinements with respect to the type or quantity of hazardous materials that will be stored or used on the Project Site during construction or operations.

3.12.1 Construction

The Project refinements would not result in increases to the hazardous materials that would be used during construction of the Project. Therefore, the refinements would not change the analysis of potential hazardous materials handling impacts during construction described in Amended AFC Section 5.12.

3.12.2 Operations

Methanol

HECA has refined the design of the Rectisol® unit, and will use up to 600,000 gallons of methanol in the unit. The methanol will be stored in an AST at atmospheric pressure and temperature conditions. The methanol tank has a 600,000-gallon capacity and a fixed roof. It is 55 feet tall above grade (with 48-foot-high sides) and is 46 feet in diameter. The methanol AST will be surrounded by a concrete sump that has an area of 20,000 square feet and a height of 4 feet.

The methanol AST is in the same location as the previous 300,000 gallon AST. The location of the methanol AST is shown on Revised Figure 2-5 and Revised Figure 2-47. A pump and an isolation valve are placed on the piping between the storage tank and the AGR unit, physically isolating the AST and AGR units.

The previous offsite consequences analysis (OCA) presented in Appendix K of the Amended AFC assumed that the Project would store methanol in a 300,000-gallon AST at atmospheric temperature and pressure, and that 250,000 gallons would reside within process vessels, equipment, and piping during operating conditions. The tank was considered as the worst-case release source because it would have contained the largest amount of methanol at the Project Site, and therefore the worst-case release would be the complete emptying of the methanol tank.

Based on the Project design refinements, an updated OCA was conducted to ensure that the larger tank would not affect any offsite sensitive receptors. Although the maximum storage capacity of the methanol AST is 600,000 gallons, the actual amount of methanol that would be on the Project Site is estimated to be 535,000 gallons. An initial volume of 535,000 gallons will

be charged into the 600,000 AST. Prior to facility start-up and during normal operations, most of the methanol will be in process vessels, equipment, and piping. During typical operations, 63,600 gallons or less of methanol will remain in the AST. The total inventory of methanol would only be transferred back to the AST if the Rectisol® unit needs to be emptied for maintenance reasons. Therefore, a release scenario involving a release of the entire methanol inventory from a completely full 600,000-gallon AST is considered to be the absolute worst case. Two worst case release scenarios were analyzed with respect to the redesigned methanol storage tank. The first scenario is the immediate release of the entire contents of the 600,000-gallon tank into the concrete containment sump. This scenario includes an ignition source that would ignite the methanol, creating a burning pool. The second scenario is the instant release and vaporization of the methanol, forming a gaseous cloud even though the physical properties of methanol make this impossible.

A brief description of the two scenarios is provided below, with the results summarized in Amended AFC Table 3.12-1. Additional details regarding the methanol OCA are provided in Appendix C (which supersedes the methanol OCA presented in Appendix K of the Amended AFC).

Release Scenario 1: For the methanol pool fire scenario, it was conservatively assumed that the entire contents of the methanol AST (600,000 gallons) are released, forming a burning pool of liquid. The modeling results showed that for a potential methanol pool fire, the potential impact distance could reach a distance of approximately 162 feet (0.03 mile) from the center of the methanol pool, and would not extend outside of the Project Site. Even using the conservative USEPA methodology, the potential impact distance (estimated to be 0.05 mile) would remain onsite.

Release Scenario 2: For the vapor release scenario, it was conservatively assumed that the entire contents of the methanol AST (600,000 gallons) are released and then vaporized instantaneously. The modeling of the worst-case 1-pound-per-square-inch pressure-wave scenario showed that the potential impact distance from a worst-case methanol vapor cloud release after the complete release of the tank may be up to approximately 519 feet (0.1 mile), and would not extend outside of the Project Site. Using the conservative USEPA methodology USEPA, 1999), the potential impact for this highly unlikely scenario could extend up to 2,425 feet (0.5 mile) from the methanol tank located near the center of the Project Site. Although it could extend into a portion of the Controlled Area south and north of the site, the release would not extend off site.

Table 3.12-1
Summary of Methanol Offsite Consequences Analysis

Release Scenario	Estimated Impact Distance from Methanol AST[1]
Release Scenario 1	162 feet
Release Scenario 2	519 feet

Note:

[1] See Appendix C for details. Estimated impact distance based on ALOHA 5.4.3 model results.

Based on the results of the updated OCA, the potential impact from the use and storage of methanol by the Project would be less than significant.

Ammonia

There are no changes with respect to the storage of anhydrous ammonia. As stated in the Applicant's Response to Sierra Club's Data Request 85 docketed in November 2012, offsite transport and sale of ammonia has been eliminated from the Project. In response to local input, the Applicant has decided not to sell ammonia; therefore, there will not be an ammonia loading area or offsite transportation of ammonia.

Therefore, there is no change in the analysis of potential impacts associated with the storage and use of anhydrous ammonia on the Project Site presented in Amended AFC Section 5.12 and Responses to CEC Data Requests.

Other Hazardous Materials

There are no other refinements with respect to the type or quantity of hazardous materials that will be stored on the Project Site.

The Project refinements would not result in increases to the other hazardous materials that would be used during operation of the Project. Because the refinements would not result in increases to the use of other hazardous materials during operation, there is no change in the analysis presented in Section 5.12 of the Amended AFC and Responses to CEC Data Requests.

3.13 WASTE MANAGEMENT

3.13.1 Construction

The Project refinements would not result in increases to the amount of wastes generated during construction of the Project. Therefore, the analysis of potential construction-related waste management impacts identified in Section 5.13 of the Amended AFC remains the same.

3.13.2 Operations

The Project refinements would not result in increases to the amount of wastes generated during operation of the Project. Consequently, no potential waste impacts are associated with these refinements.

The amount of gasification solids has increased from approximately 850 to 940 tons per year due to the addition of fluxant needed to provide for a more stable operation of the gasifier, and discharge of the gasification solids. The Applicant provided additional information related to the gasification solids in the Responses to PSA/DEIS Information Requests, Set 1, docketed on August 9, 2013 (see docket #200144). As described in the response to WM-2, the gasification solids are expected to pass all California waste criteria tests, and would not be considered hazardous waste. Furthermore, the Applicant has confirmed the suitability of the gasification solids for beneficial use. Because the Project's primary intent is to make beneficial reuse of the HECA gasification solids and not dispose of them, there are no potential waste impacts associated with the gasification solids.

Operation waste streams would remain as described in Section 5.13 of the Amended AFC, and the conclusions presented in Section 5.13 of the Amended AFC would not change as a result of the Project refinements.

3.14 WATER RESOURCES

3.14.1 Construction

The Project refinements are within the 453-acre Project Site, and would not result in disturbance of areas that were not previously evaluated in the Amended AFC. The Project refinements would not change the analysis of construction water use or impacts to water resources presented in Section 5.14 of the Amended AFC.

3.14.2 Operation

The Project refinements include modifications to features within the 453-acre Project Site. This includes slight location adjustments to some features, but there would be no substantial rearrangement or new major Project components. As part of engineering design refinements, which included refinements to site grading and drainage, additional stormwater detention basins are now included, as shown on Revised Figure 2-5. The Project will still collect onsite stormwater runoff for reuse; and the Project's overall approach for the drainage system and stormwater management strategy remains the same as described in Section 5.14 of the Amended AFC, Responses to Data Requests, including the preliminary drainage calculations that were prepared and included in the Draft Drainage, Erosion, and Sediment Control Plan prepared in response to CEC Data Requests A115 and A116, and Responses to PSA/DEIS Information Requests.

The Project refinements would not affect the water needs during Project operation, because the water supply plan would remain as described in Section 5.14 of the Amended AFC. The Project would use a maximum of approximately 6.6 million gallons per day (mgd) of water on a calendar year average basis, or approximately 7,427 acre-feet per year, assuming peak power operation and operation 100 percent of the time. The anticipated annual water usage is about 5,900 acre-feet per year for mature operation; with 16 hours per day at peak power output, and 8 hours per day at off-peak power output, and an 85 percent capacity factor. Approximately one-third of the raw water used by the Project would be for power block cooling purposes, which equates to approximately 0.25 gallon per minute per kilowatt-hour.

Operation of the Project would not result in changes to the analysis of groundwater, surface water, or flood hazards, presented in Section 5.14 of the Amended AFC and Responses to Data Requests.

3.15 GEOLOGIC HAZARDS AND RESOURCES

The Project refinements are within the 453-acre Project Site and would not result in disturbance of areas not previously evaluated in the Amended AFC. The refinements would not result in increased impacts to geologic or mineral resources during construction or operation, and the analysis presented in Amended AFC Section 5.15 would not change.

3.16 PALEONTOLOGICAL RESOURCES

The Project refinements are within the 453-acre Project Site and would not result in disturbance of areas not previously evaluated in the Amended AFC. Therefore, the refinements would not change the analysis of potential impacts to paleontological resources described in Amended AFC Section 5.16 for construction or operations.

4.0 REFERENCES

FAA (Federal Aviation Administration), 2000. *Advisory Circular for Obstruction Marking and Lighting Guidelines, AC 70/7460-IK*. Federal Aviation Administration. April 2000.

URS Corporation, 2012. Amended Application for Certification for Hydrogen Energy California, Kern County, California. Prepared for Hydrogen Energy International LLC. May 2012.

USEPA (U.S. Environmental Protection Agency), 1999. USEPA's Risk Management Program Guidance for Offsite Consequence Analysis.

TABLES

Revised Table 5.11-2
Major Component Design Characteristics

Component	Height[1] (feet)	Diameter[1] (feet)	Color/ Materials[2]
Gasification Structure	~~305~~ 260	270 × 125	Steel; Gray
Feedstock Dryer Stack	305	17	Steel; Gray
CO_2 Vent	~~260~~ 355	~~4~~ 5.3	Steel; Gray
Gasification Flare	250	~~10~~ 5	Steel; Gray
Rectisol® Flare	250	~~2~~ 3	Steel; Gray
SRU Flare	250	~~2~~ 2.5	Steel; Gray
AGR Methanol Wash Column	~~235~~ 330	~~20~~ 16	Steel; Gray
HRSG Stack/HRSG	213	~~24~~ 23	Steel; Gray
Air Separation Column Can ASU Column (Cold Box)	200 205	110 × 40 30	Steel; Tan
Tail Gas Thermal Oxidizer	165	3	Steel; Gray
Feedstock Barn	160	250 × 650	Steel; Slate Gray
Sour Water Stripper	150	8	Steel; Gray
Nitric Acid Absorber Vent	~~145~~ 120	4	Steel; Gray
Additional AGR Columns	75 – 140	12 – 18	Steel; Gray
Urea Plant Absorbers ~~(HP/LP)~~	~~130/50~~ 170	~~26/30~~ 1	Steel; Tan
Urea Transfer Towers (5)	100	28 × 30	Steel; Tan
Wastewater ZLD Evaporator A	100	12	Steel; Gray
Wastewater ZLD Evaporator B	100	12	Steel; Gray
Feedstock Transfer Tower/Tower B/ Crusher Vent	100	35 × 45	Steel; Tan
Heat Recovery Steam Generator Structure	90	122 × 115	Steel; Slate Gray
LOX Storage Tank	90	42	Steel; Gray
Process Wastewater ZLD Evaporator	80	5	Steel; Gray

Revised Table 5.11-2
Major Component Design Characteristics (Continued)

Component	Height (feet)	Diameter (feet)	Color/ Materials[1]
Auxiliary Boiler Stack/Auxiliary Boiler	80/80	6	Steel; Gray
Ammonia Unit Startup Heater	80	21 × 81	Steel; Gray
Ammonia Storage Tanks (2)	70	90	White
Urea Reclaim Loadout Building	~~70~~ 30	135 × 20	Steel; Slate Gray
Urea Storage (4 Domes)	~~70~~ 85	~~162~~ 170	Steel; Tan
Tail Gas Treating Unit Columns	60 – 70	4 – 6	Steel; Gray
Feedstock Truck Unloading Vent	60	5	Steel; Tan
Power Block Cooling Tower	~~55~~ 65	~~850 × 120~~ 600 × 60	Steel; Gray
Process Cooling Tower	~~55~~ 65	~~850 × 120~~ 650 × 60	Steel; Gray
ASU Cooling Tower	55	~~205 × 120~~ 200 × 60	Steel; Gray
Combustion Turbine Generator Structure	50	12	Steel; Gray
CO_2 Compressor Enclosure	50	110 × 110	Steel; Gray
CTG Air Inlet Filter	50	–	Steel; Gray
Sour Shift/Low Temp Gas Cooling Unit	50	235 × 40	Steel; Gray
Urea Pastillation Vent	50	1.5	Steel; Tan
Urea Bucket Elevator	50	20 × 20	Steel; Slate Gray
230-kilovolt Switchyard	–	–	Steel; Gray
Wastewater ZLD Feed Tank A	48	120	Steel; Gray
Wastewater ZLD Feed Tank B	48	120	Steel; Gray
UAN Storage (3 Tanks)	~~48~~ 65	~~120~~ 130	Steel; Tan
Firewater Storage Tank	~~48~~ 50	~~110~~ 74	Steel; Gray
Water Treatment Plant Tanks (Raw, Treated, Purified, Backwash, Utility, Demineralized)	~~32 – 48~~ 55 – 70	~~50 – 100~~ 50-105	Steel; Gray
Feedstock Truck Unloading Building	44	82 × 36	Steel; Gray

Revised Table 5.11-2
Major Component Design Characteristics (Continued)

Component	Height (feet)	Diameter (feet)	Color/ Materials[1]
Methanol Storage Tank	~~40~~ 55	~~40~~ 46	Steel; Tan
ASU Main Air Compressor Enclosure	40	46 × 119	Steel; Gray
AGR Refrigeration Compressor Structure	40	180 × 80	Steel; Gray
Process Wastewater Treatment Feed Tank	40	60	Steel; Tan
Flare K.O. Drums (3)	~~35~~ 40	35	Steel; Gray
Fluxant Silo Vent	90		
Fluxant Silo	80	30	
Power Distribution Centers	25	120 × 15	Steel; Tan
230-kV Transmission Line	110	2.1 miles	Steel; Gray
Railroad Spur	Raised Bed	5.3 miles	Steel; Gray
CO_2 Line	Buried	3.4 miles	NA
Natural Gas Line	Buried	13 miles	NA
Process Water Line	Buried	14.4 miles	NA
Potable Water Line	Buried	1.2 miles	NA

Source: HECA Project.

Notes:

[1] Strikeout indicates that dimension has changed to new dimension shown.
[2] Steel will be treated to minimize glare

AGR = acid gas removal
ASU = air separation unit
CO_2 = carbon dioxide
CTG = combustion turbine generator
HP = high pressure
HRSG = heat recovery steam generator
K.O. = Knock Out
kV = kilovolt
LP = low pressure
LOX = Liquid Oxygen
SRU = sulfur recovery unit
UAN = Urea Ammonium Nitrate
ZLD = zero liquid discharge

Revised Table 5.11-6
Summary of CTG/HRSG Exhaust Conditions

Parameter	CTG/HRSG Exhaust					
Stack Height	65 meters (213 feet)					
Stack Diameter	~~7.0~~ 7.3 meters (~~23~~ 24 feet)					
Ambient Temperature	39°F		65°F		97°F	
	HRSG Stack[1]					
	On Peak	**Off Peak**	**On Peak**	**Off Peak**	**On Peak**	**Off Peak**
Full Load Exhaust Temperature (°F)	200	200	200	200	200	200
Full Load Exhaust Flow Rate (kpph)	~~4,876~~ 4,879	~~3,956~~ 3,959	~~4,712~~ 4,716	~~3,747~~ 3,751	~~4,575~~ 4,578	~~3,496~~ 3,497
Full Load Exhaust Moisture Content (wt%)	~~7.2~~ 7.3	6.4	~~7.8~~ 7.9	7.0	~~8.3~~ 8.5	~~7.5~~ 7.6
	Feedstock Drying Stack					
	On Peak	**Off Peak**	**On Peak**	**Off Peak**	**On Peak**	**Off Peak**
Full Load Exhaust Temperature (°F)	200	200	200	200	200	200
Full Load Exhaust Flow Rate (kpph)	800	800	800	800	800	800
Full Load Exhaust Moisture Content (wt%)	14	14	14	14	14	14

Notes:

[1] Strikeout indicates that value has changed to new value shown.

The 20°F ambient temperature is an extreme minimum, while 39°F ambient is more representative of minimum monthly average winter conditions.

CTG = combustion turbine generator
°F = degrees Fahrenheit
HRSG = heat recovery steam generator
kpph = thousand pounds per hour
wt% = percent weight

Revised Table 5.11-7
Power Block Cooling Tower Heat Rejection and Exhaust Air Flow Totals

Parameter	Power Block Cooling Tower Exhausts[1]					
Number of Cells	~~12~~ 10 cells (1 by ~~12~~ 10)					
Cell Height	~~16.76~~ 19.8 meters (~~55~~ 65 feet)					
Cell Diameter	~~9.14~~ 7.62 meters (~~30~~ 25 feet)					
Tower Housing Length	~~183~~ 153 meters (~~600~~ 500 feet)					
Tower Housing Width	~~18.29~~ 15.24 meters (~~60~~ 50 feet)					
Ambient Dry Bulb Temperature	39°F		65°F		97°F	
Ambient Wet Bulb Temperature	36.8°F		55.5°F		67.6°F	
Ambient Relative Humidity	82%		55%		20%	
Fuel Type	**H_2 Rich Fuel Gas**					
	On Peak	**Off Peak**	**On Peak**	**Off Peak**	**On Peak**	**Off Peak**
Number of Cells in Operation	~~12~~10	~~12~~10	~~12~~10	~~12~~10	~~12~~10	~~12~~10
Heat Rejection (MWth)	269.5	248.1	271.1	253.8	271.8	260.9
Exhaust Air Dry Bulb Temperature (°F)	~~82.8~~ 75	~~80.3~~ 75	~~84.1~~ 75	~~82.6~~ 75	~~90.8~~ 75	~~90.0~~ 75
Exhaust Air Wet Bulb Temperature (°F)	~~82.8~~ 75	~~80.3~~ 75	~~84.1~~ 75	~~82.6~~ 75	~~90.8~~ 75	~~90.0~~ 75
Exhaust Air Flow Rate (MMlb/hr)	~~28.8~~ 39.1	~~29.0~~ 39.1	~~38.7~~ 39.1	~~38.8~~ 39.1	~~38.1~~ 39.1	~~38.1~~ 39.1
Air Flow/Heat Rejection (kg/s per MWth)	~~13.5~~ 18.3	~~14.7~~ 19.9	~~18.0~~ 18.2	~~19.3~~ 19.5	~~17.7~~ 18.2	~~18.4~~ 18.9
Fuel Type	**Natural Gas**					
Load					**80%**	**40%**
Number of Cells in Operation					~~12~~10	~~12~~10
Heat Rejection (MWth)					195.3	149.0
Exhaust Air Dry Bulb Temperature (°F)					~~85.1~~ 75	~~81.4~~ 75
Exhaust Air Wet Bulb Temperature (°F)					~~85.1~~ 75	~~81.4~~ 75
Exhaust Air Flow Rate (MMlb/hr)					~~38.6~~ 39.1	~~38.9~~ 39.1
Air Flow/Heat Rejection (kg/s per MWth)					~~24.9~~ 25.3	~~32.9~~ 33.1

Notes:

[1] Strikeout indicates that value has changed to new value shown.

°F = degrees Fahrenheit
H_2 = hydrogen
HRSG = heat recovery steam generator
kg/s = kilograms per second
MMlb/hr = million pounds per hour
MWth = megawatt, thermal
% = percent

Revised Table 5.11-8
Process Cooling Tower Exhaust Air Flows and Temperatures and Heat Rejection Loads

Parameter	Process Cooling Tower Exhausts[1]		
Number of Cells	~~13~~ 11 cells (1 by ~~13~~ 11)		
Cell Height	~~16.76~~ 19.8 meters (~~55~~ 65 feet)		
Cell Diameter	~~9.14~~ 8.84 meters (~~30~~ 29 feet)		
Tower Housing Length	~~198~~ 168 meters (~~650~~ 550 feet)		
Tower Housing Width	~~18.29~~ 17.68 meters (~~60~~ 58 feet)		
Ambient Dry Bulb Temperature	39°F	65°F	97°F
Ambient Wet Bulb Temperature	36.8°F	55.5°F	67.6°F
Ambient Relative Humidity	82%	55%	20%
Number of Cells in Operation	~~13~~11	~~13~~11	~~13~~11
Heat Rejection (MWth)	292.0	293.7	294.5
Exhaust Air Dry Bulb Temp (°F)	~~82.8~~ 75	~~84.1~~ 75	~~90.8~~ 75
Exhaust Air Wet Bulb Temp (°F)	~~82.8~~ 75	~~84.1~~ 75	~~90.8~~ 75
Exhaust Air Flow Rate (MMlb/hr)	~~31.2~~ 55.9	~~41.9~~ 55.9	~~41.3~~ 55.9
Air Flow/Heat Rejection (kg/s per MWth)	~~13.5~~ 24.2	~~18.0~~ 24.0	~~17.7~~ 24.0

Notes:

[1] Strikeout indicates that dimension has changed to new dimension shown.

°F = degrees Fahrenheit
kg/s = kilograms per second
MMlb/hr = million pounds per hour
MWth = megawatt, thermal
% = percent

FIGURES

PROJECT SITE – PROJECT RENDERING

October 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

REVISED FIGURE 1-4

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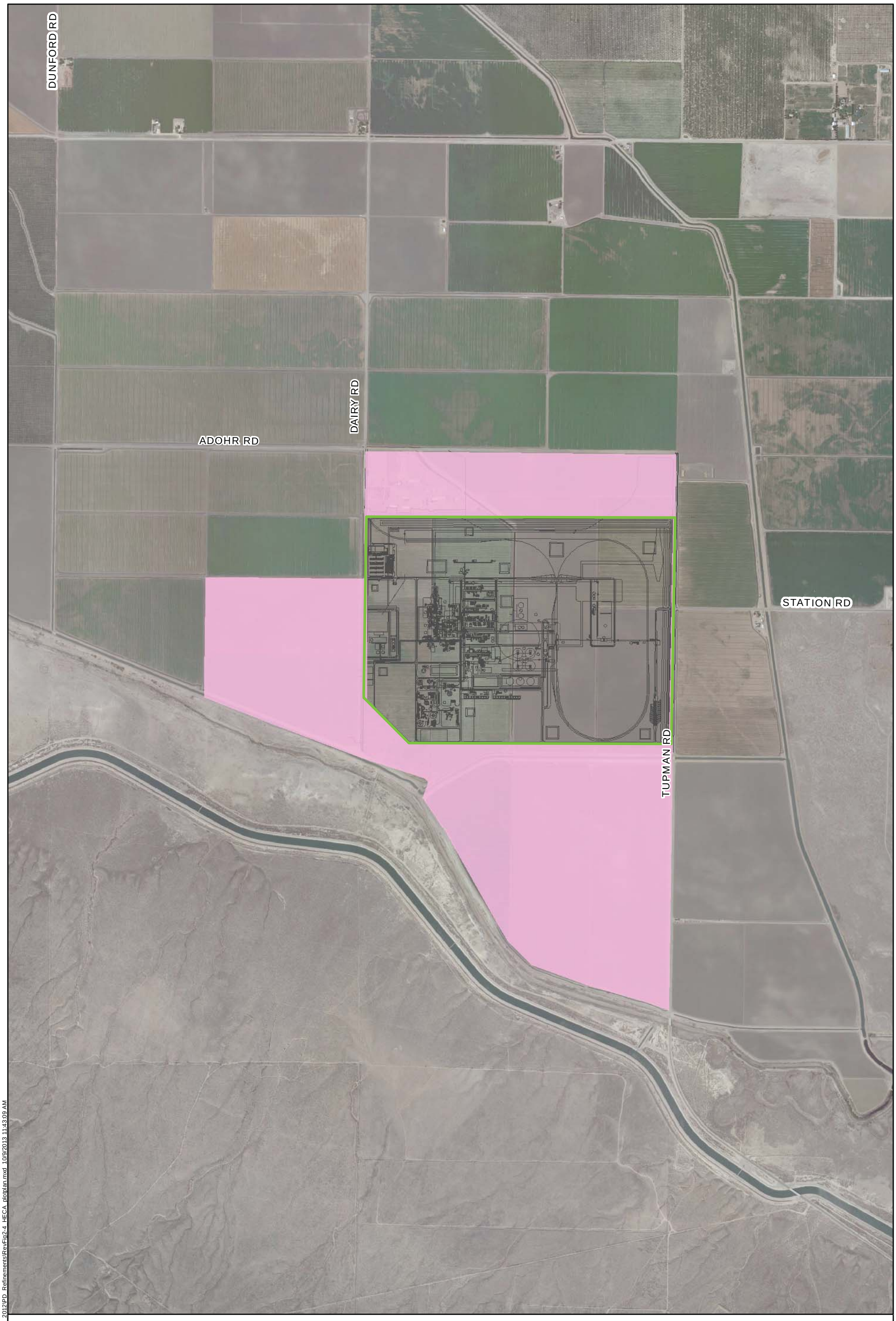

Project Site

Controlled Area

N

0 750 1,500 FEET

SITE PLAN

October 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

REVISED FIGURE 2-4

Source: Aerial Photo, Digital Globe, 2008.

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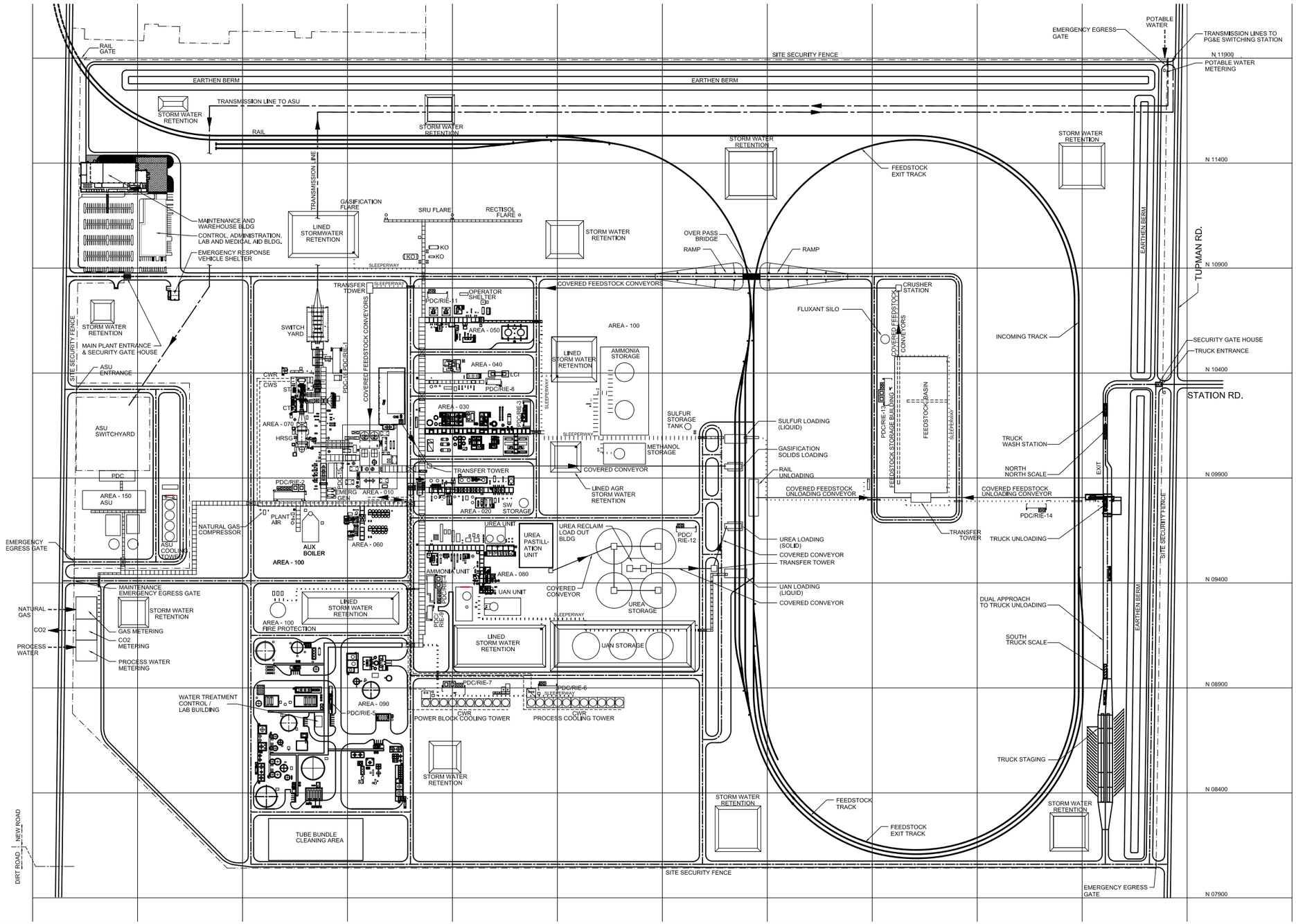

PLANT COORDINATE AND DATUM NOTES

1. PLANT COORDINATES IN FEET EQUATE TO E. 61XXXXX AND N. 23YYYYY OF CALIFORNIA STATE PLANE COORDINATE SYSTEM (NAD 83 ZONE V.)
2. PLANT ELEVATION 100.00' EQUATES TO 288.50' ABOVE MSL (NAVD88.)

AREA / UNIT INDEX

AREA	UNIT	DESCRIPTION
000	000	COMMON
010	010	GASIFICATION
020	020	GAS TREATING
030	030	ACID GAS REMOVAL & REFRIGERATION
040	040	CO2 COMPRESSION / PURIFICATION
050	050	SULFUR RECOVERY & DEGASSING
060	060	PSA & OFF-GAS COMPRESSION
070	070	POWER BLOCK
080	080	FERTILIZER COMPLEX
090	090	WATER TREATMENT PLANT
100	100	OSBL (UTILITIES & OFF-SITES)
150	150	INTERFACES TO SITE

Source:
Fluor; HECA-SCS, 2012 AFC Update; Preliminary Plot Plan;
Drawing No: A4UV-000-50-SK-0001, Rev. D (4/25/13)

PRELIMINARY PLOT PLAN

October 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

REVISED FIGURE 2-5

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Notes:
1) Identifiers are same as shown in Figure 2-36,
Preliminary Emissions Sources Plot Plan

COORDINATE AND DATUM NOTES

1. COORDINATES IN FEET EQUATE TO PLANT CORDINATES SHOWN ON FIGURE 2-36 PRELIMINARY EMMISIONS SOURCES PLOT PLAN
2. PLANT ELEVATION 100.00' EQUATE TO 288.50' ABOVE MSL (NAVD88.)
3. ACCURACY/TOLERANCE OF EMISSION POINT(S) COORDINATES ARE WITHIN A 50 FOOT RADIUS OF SOURCE POINT NOTED.
4. LOCATION OF EMISSION POINTS ARE SUBJECT TO COMPLETION OF DETAILED DESIGN BY LICENSORS AND EQUIPMENT SUPPLIERS.
5. SEE SHEETS 2 THROUGH 9 FOR INFORMATION ON COMPOSITION AND FLOW RATE FROM EACH SOURCE.
6. EMISSION POINT IS SHOWN FOR INFORMATION ONLY. ZERO EMISSIONS ARE EXPECTED DURING STEADY STATE OPERATION.

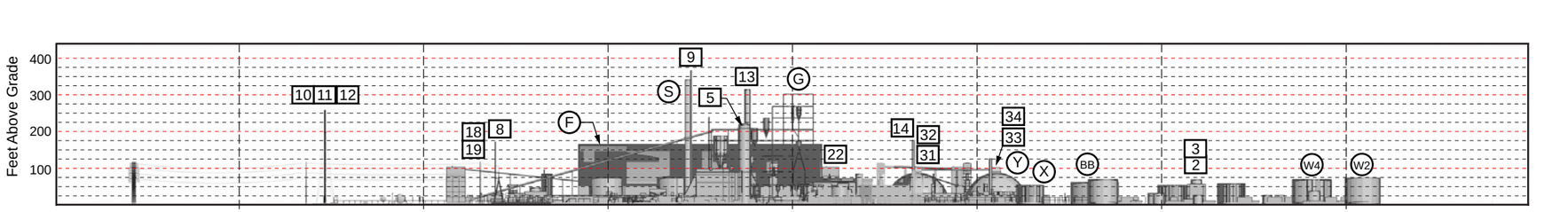
EMISSIONS SOURCES

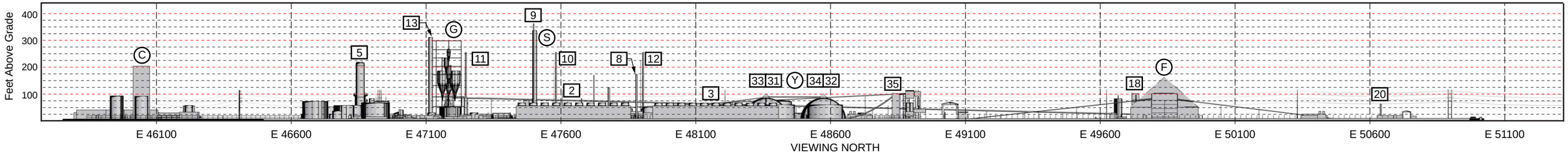
ID	SOURCE	STATE PLANE COOR. (ROUNDED) EAST	NORTH	APPX. ELEVATIONS FROM GRADE (FT)
1	ASU COOLING TOWER	46253'–0"	9672'–0"	55'
2	POWER BLOCK COOLING TOWER	47684'–7"	8830'–0"	65'
3	PROCESS COOLING TOWER	48185'–6"	8830'–0"	65'
4	EMERGENCY ENGINES (GENERATORS)	47023'–6"	9828'–4"	20'
5	HRSG STACK	46882'–6"	10036'–0"	213'
6	EMERGENCY ENGINE (FIRE WATER PUMP)	46789'–0"	9348'–0"	20'
7	AUXILIARY BOILER (NOTE 5)	46924'–0"	9730'–0"	80'
8	TAIL GAS THERMAL OXIDIZER	47746'–4"	10697'–0"	165'
9	CO2 VENT (NOTE 5)	47521'–6"	10187'–4"	355'
10	SRU FLARE	47599'–8"	11153'–2"	250'
11	GASIFICATION FLARE	47284'–8"	11153'–2"	250'
12	RECTISOL FLARE	47919'–9"	11153'–2"	250'
13	FEEDSTOCK DRYER	47134'–10"	10021'–2"	305'
14	UREA PLANT ABSORBER	47893'–0"	9580'–0"	170'
16	UREA PASTILLATION VENT	47998'–6"	9498'–2"	50'
17	FEEDSTOCK RAIL UNLOADING VENT	49035'–0"	9804'–0"	30'
18	FEEDSTOCK CRUSHER VENT	49726'–0"	10805'–0"	100'
19	FEEDSTOCK TRANSFER TOWER 2	47206'–0"	10805'–0"	100'
20	FEEDSTOCK TRUCK UNLOADING VENT	50631'–0"	9810'–0"	60'
21	GASIFIER FEED BUILDING VENT	47186'–0"	10122–0"	230'
22	FEEDSTOCK TRANSFER TOWER 1	49833'–0"	9806'–0"	100'
23	UREA LOADING VENT	48902'–0"	9667'–0"	110'
25	GASIFICATION SOLIDS PAD	47330'–6"	10306'–4"	N/A
27	NITRIC ACID ABSORBER VENT	47797'–0"	9373'–0"	120'
27A	AMMONIUM NITRATE SCRUBBER VENT	47767'–0"	9392'–0"	55'
28	GASIFICATION SOLIDS BUCKET ELEVATOR	47355'–6"	10169'–2"	30'
29	GASIFICATION SOLIDS LOADING VENT	48936'–10"	9954'–9"	110'
30	UREA BUCKET ELEVATOR	48068'–5"	9458'–8"	50'
31	UREA TRANSFER TOWER 1	48370'–0"	9574'–0"	100'
32	UREA TRANSFER TOWER 2	48580'–0"	9574'–0"	100'
33	UREA TRANSFER TOWER 3	48370'–0"	9364'–0"	100'
34	UREA TRANSFER TOWER 4	48580'–0"	9364'–0"	100'
35	UREA TRANSFER TOWER 5	48846'–3"	9469'–0"	100'
36	AMMONIA UNIT STARTUP HEATER	47697'–0"	9527'–7"	80'
37	GASIFICATION SOLIDS TRANSFER TOWER	47490'–0"	9957'–0"	75'
38	FLUXANT SILO VENT	49661'–8"	10561'–4"	90'

MAJOR STRUCTURES/ EQUIPMENT AND TANKS

ID	DESCRIPTION	APPX. ELEVATIONS FROM GRADE (FT)
A	ASU MAIN AIR COMPRESSOR ENCLOSURE	40
B	LIQUID OXYGEN STORAGE (LOX) TANK	90
C	AIR SEPARATION COLUMN CAN	200
F	FEEDSTOCK BARN	160
G	GASIFICATION STRUCTURE	260
O	COMBUSTION TURBINE GENERATOR STRUCTURE	50
P	HEAT RECOVERY STEAM GENERATOR STRUCTURE	90
Q	FLARE K.O. DRUMS (QTY 3)	40
R	POWER DISTRIBUTION CENTERS	25
S	AGR METHANOL WASH COLUMN	330
T	PSA OFFGAS COMPRESSOR	35
W1	RAW WATER TANK	95'DIA X 70'H
W2	TREATED WATER TANK	105'DIA X 65'H
W3	FILTERED WATER TANK	75'DIA X 55'H
W4	WASTE WATER ZLD FEED TANK	80'DIA X 50'H
W5	UTILITY WATER TANK	50'DIA X 55'H
W6	DEMINERALIZED WATER STORAGE TANK	80'DIA X 65'H
X	FIREWATER STORAGE TANK	74'DIA X 50'H
Y	UREA STORAGE (4 DOMES)	170'DIA X 85'H
Z	METHANOL STORAGE TANK	46'DIA X 55'H
AA	AMMONIA STORAGE (2 TANKS)	90'DIA X 70'H
BB	UAN STORAGE (3 TANKS)	130'DIA X 65'H
CC	UREA RECLAIM LOADOUT BUILDING	30
DD	SULFUR STORAGE TANK	30'DIA X 28'H
EE	SOUR WATER STORAGE TANK	45'DIA X 50'H
FF	FLUXANT SILO	30'DIA X 80'H

TANKS SET AT GRADE ELEVATION





10/9/13 vsa...T:\HECA-SCS 2012\GRAPHICS 2013\PD Refinement\RevPFig2-6_project_elevations.ai

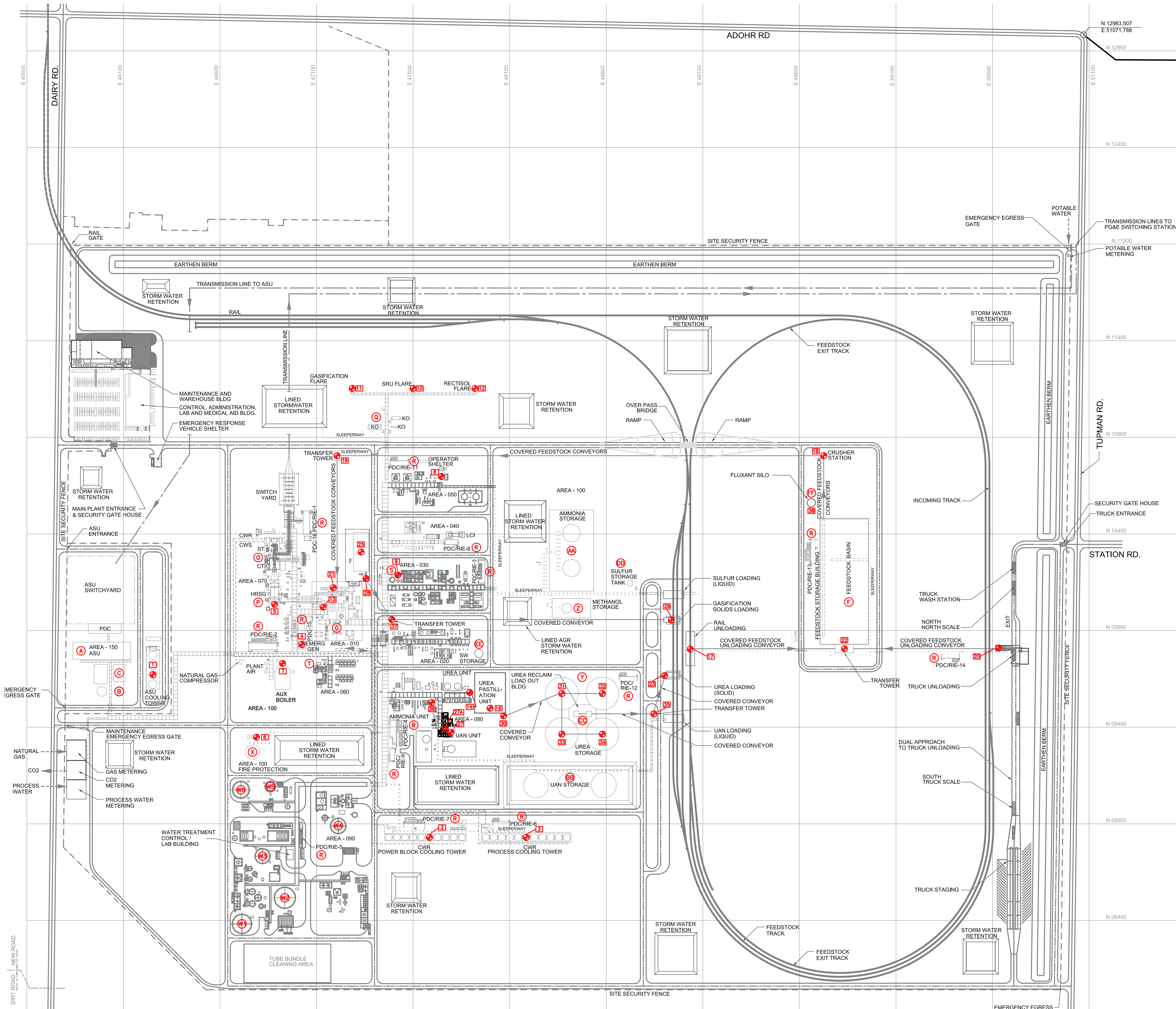
PROJECT ELEVATIONS

October 2013
28068052

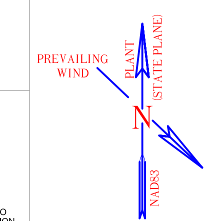
Hydrogen Energy California (HECA)
Kern County, California

URS

REVISED FIGURE 2-6



DWA #20001: (CALCULATED)	NORTHING	EASTING
STATE PLANE COORD.	2312983.507	6151071.788
NAD83 ZONE V (U.S. FEET)		
LATITUDE: 35°20'25.11201"	LONGITUDE: 119°22'36.22853"	
LATITUDE: 35.340308891°	LONGITUDE: 119.376730147°	



PLANT COORDINATE AND DATUM NOTES

1. PLANT COORDINATES IN FEET EQUATE TO E. 61XXXXX AND N. 23YYYYY OF CALIFORNIA STATE PLANE COORDINATE SYSTEM (NAD 83 ZONE V.)
2. PLANT ELEVATION 100.00' EQUATES TO 288.50' ABOVE MSL (NAVD88.)
3. ACCURACY/TOLERANCE OF EMISSION POINT(S) COORDINATES ARE WITHIN A 50 FOOT RADIUS OF SOURCE POINT NOTED.
4. LOCATION OF EMISSION POINTS IS SUBJECT TO COMPLETION OF DETAILED DESIGN BY LICENSORS AND EQUIPMENT SUPPLIERS.
5. EMISSION POINT IS SHOWN FOR INFORMATION ONLY. ZERO EMISSIONS ARE EXPECTED DURING STEADY STATE OPERATION.

EMISSIONS SOURCES

ID	SOURCE	STATE PLANE COOR. (ROUNDED) EAST	NORTH	APPX. ELEVATIONS FROM GRADE (FT)
1	ASU COOLING TOWER	46253'-0"	9672'-0"	55'
2	POWER BLOCK COOLING TOWER	47684'-7"	8830'-0"	65'
3	PROCESS COOLING TOWER	48185'-6"	8830'-0"	65'
4	EMERGENCY ENGINES (GENERATORS)	47023'-6"	9828'-4"	20'
5	HRSG STACK	46882'-6"	10036'-0"	213'
6	EMERGENCY ENGINE (FIRE WATER PUMP)	46789'-0"	9348'-0"	20'
7	AUXILIARY BOILER (NOTE 5)	46924'-0"	9730'-0"	80'
8	TAIL GAS THERMAL OXIDIZER	47746'-4"	10697'-0"	165'
9	CO2 VENT (NOTE 5)	47521'-6"	10187'-4"	355'
10	SRU FLARE	47599'-8"	11153'-2"	250'
11	GASIFICATION FLARE	47284'-8"	11153'-2"	250'
12	RECTISOL FLARE	47919'-9"	11153'-2"	250'
13	FEEDSTOCK DRYER	47134'-10"	10021'-2"	305'
14	UREA PLANT ABSORBER	47893'-0"	9580'-0"	170'
16	UREA PASTILLATION VENT	47998'-6"	9498'-2"	50'
17	FEEDSTOCK RAIL UNLOADING VENT	49035'-0"	9804'-0"	30'
18	FEEDSTOCK CRUSHER VENT	49726'-0"	10805'-0"	100'
19	FEEDSTOCK TRANSFER TOWER 2	47206'-0"	10805'-0"	100'
20	FEEDSTOCK TRUCK UNLOADING VENT	50631'-0"	9810'-0"	60'
21	GASIFIER FEED BUILDING VENT	47186'-0"	10122-0"	230'
22	FEEDSTOCK TRANSFER TOWER 1	49833'-0"	9806'-0"	100'
23	UREA LOADING VENT	48902'-0"	9667'-0"	110'
25	GASIFICATION SOLIDS PAD	47330'-6"	10306'-4"	N/A
27	NITRIC ACID ABSORBER VENT	47797'-0"	9373'-0"	120'
27A	AMMONIUM NITRATE SCRUBBER VENT	47767'-0"	9392'-0"	55'
28	GASIFICATION SOLIDS BUCKET ELEVATOR	47355'-6"	10169'-2"	30'
29	GASIFICATION SOLIDS LOADING VENT	48936'-10"	9954'-9"	110'
30	UREA BUCKET ELEVATOR	48068'-5"	9458'-8"	50'
31	UREA TRANSFER TOWER 1	48370'-0"	9574'-0"	100'
32	UREA TRANSFER TOWER 2	48580'-0"	9574'-0"	100'
33	UREA TRANSFER TOWER 3	48370'-0"	9364'-0"	100'
34	UREA TRANSFER TOWER 4	48580'-0"	9364'-0"	100'
35	UREA TRANSFER TOWER 5	48846'-3"	9469'-0"	100'
36	AMMONIA UNIT STARTUP HEATER	47697'-0"	9527'-7"	80'
37	GASIFICATION SOLIDS TRANSFER TOWER	47490'-0"	9957'-0"	75'
38	FLUXANT SILO VENT	49661'-8"	10561'-4"	90'

MAJOR STRUCTURES/ EQUIPMENT AND TANKS

ID	DESCRIPTION	APPX. ELEVATIONS FROM GRADE (FT)
A	ASU MAIN AIR COMPRESSOR ENCLOSURE	40
B	LIQUID OXYGEN STORAGE (LOX) TANK	90
C	AIR SEPARATION COLUMN CAN	200
F	FEEDSTOCK BARN	160
G	GASIFICATION STRUCTURE	260
O	COMBUSTION TURBINE GENERATOR STRUCTURE	50
P	HEAT RECOVERY STEAM GENERATOR STRUCTURE	90
Q	FLARE K.O. DRUMS (QTY 3)	40
R	POWER DISTRIBUTION CENTERS	25
S	AGR METHANOL WASH COLUMN	330
T	PSA OFFGAS COMPRESSOR	35
W1	RAW WATER TANK	95'DIA X 70'H
W2	TREATED WATER TANK	105'DIA X 65'H
W3	FILTERED WATER TANK	75'DIA X 55'H
W4	WASTE WATER ZLD FEED TANK	80'DIA X 50'H
W5	UTILITY WATER TANK	50'DIA X 55'H
W6	DEMINERALIZED WATER STORAGE TANK	80'DIA X 65'H
X	FIREWATER STORAGE TANK	74'DIA X 50'H
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AA	AMMONIA STORAGE (2 TANKS)	90'DIA X 70'H
BB	UAN STORAGE (3 TANKS)	130'DIA X 65'H
CC	UREA RECLAIM LOADOUT BUILDING	30
DD	SULFUR STORAGE TANK	30'DIA X 28'H
EE	SOUR WATER STORAGE TANK	45'DIA X 50'H
FF	FLUXANT SILO	30'DIA X 80'H

TANKS SET AT GRADE ELEVATION (W1 through BB)

0 100' 200' 400' 600' 800' 1000'

Source:
Fluor; HECA-SCS, 2012 AFC Update; Preliminary Emissions Sources Plot Plan;
Drawing No: A4UV-000-50-SK-0002, Rev. G (16/04/13)

PRELIMINARY EMISSIONS SOURCES PLOT PLAN

October 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

REVISED FIGURE 2-47

10/9/13 vsa..T:\HECA-SCS 2012\GRAPHICS 2013\PD Refinement\RevFig2-47_prelim_emissions_plotplan_G.ai

APPENDICES

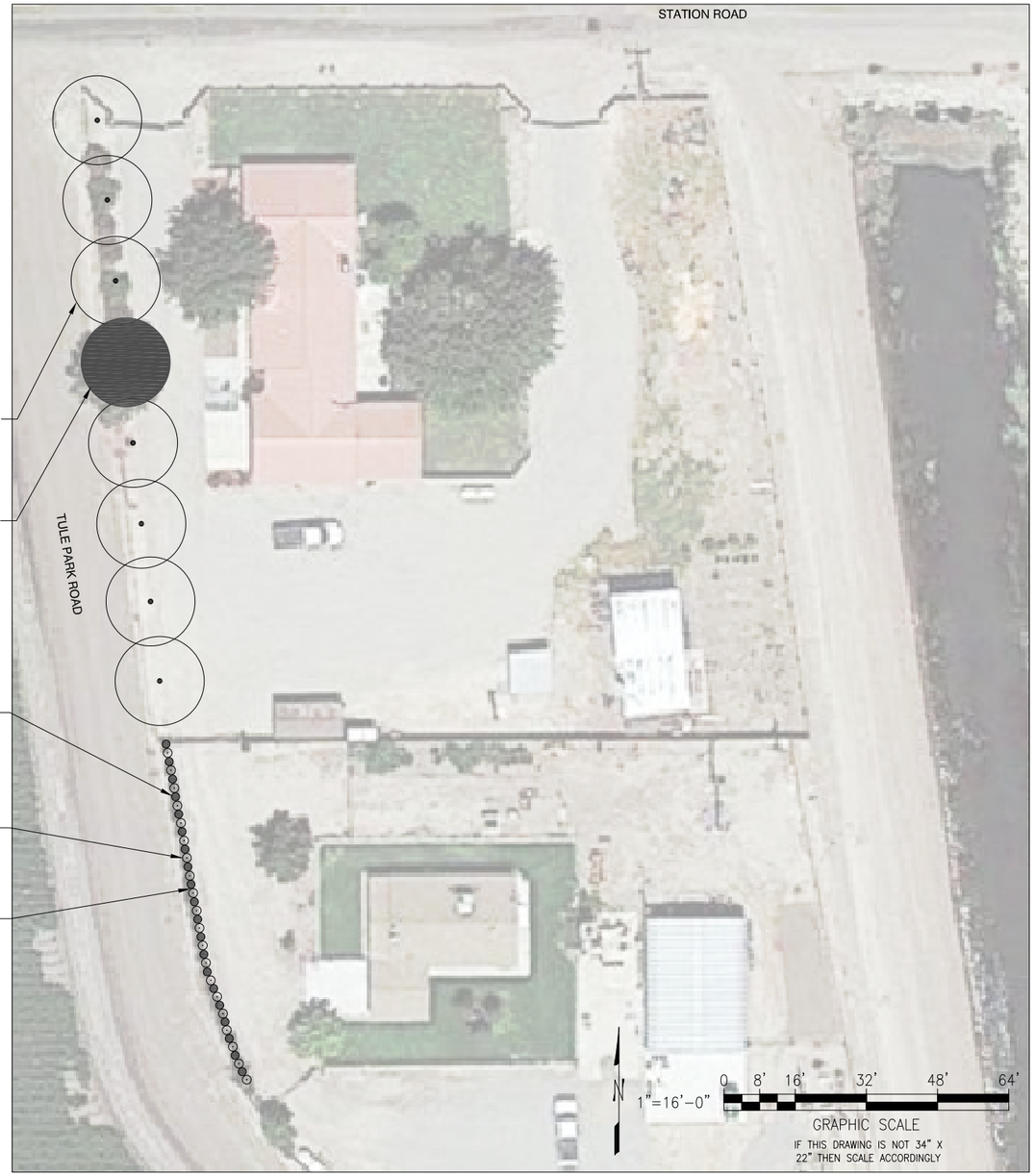
APPENDIX A

VISUAL RESOURCES: KOP1

Contents

PLANT LIST

SYMBOL	BOTANICAL NAME	COMMON NAME	GROWTH RATE /YEAR	HEIGHT @ 5YRS	HEIGHT @ MATURITY	CROWN WIDTH @ MATURITY	EXPECTED TIME TO MATURITY (YEARS)	SPACING AT PLANTING	SIZE	QUANTITY EACH	REMARK
TREES											
•	EUCALYPTUS POLYANTHEMOS	SILVER DOLLAR GUM	4–6'	29–40'	50–65'	25–40'	20 YEARS	20' O.C.	24" BOX	7	ASSUMED 10' TALL TREE AT PLANTING. ASSUME LOW END OF GROWTH RANGE DUE TO HARSH DESERT ENVIRONMENT.
⊙	CUPRESSUS SEMPERVIRENS	ITALIAN CYPRESS	1–2'	11'–16'	25–40'	3–5'	10–20 YEARS	PLANT AT MIDPOINT BETWEEN EXISTING ITALIAN CYPRESS TREES	15 GAL	20	ASSUMED 6' TALL TREE AT PLANTING. ASSUME LOW END OF GROWTH RANGE DUE TO HARSH DESERT ENVIRONMENT.



LICENSED LANDSCAPE ARCHITECT — GEORGE STRNAD, NO. LA 4286 — SIGNATURE — 12-31-14 EXPIRATION DATE — DATE — STATE OF CALIFORNIA

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
0	8/28/13	FOR CLIENT REVIEW	CH	GS	GS

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV

REFERENCE DWG NUMBER	REFERENCE DRAWINGS

URS

CONTRACT		
DESIGNED BY	CH	
CHECKED BY	GS	
SUPERVISOR	APP DATE	–
LEAD ENGR/SPEC.	APP DATE	–
URS	APP DATE	–
CLIENT	APP DATE	–

HYDROGEN ENERGY CALIFORNIA
KERN COUNTY POWER PROJECT

LANDSCAPE SCREENING PLAN

SCALE	DRAWING NUMBER	REV
1"=16'-0"	L-101	0

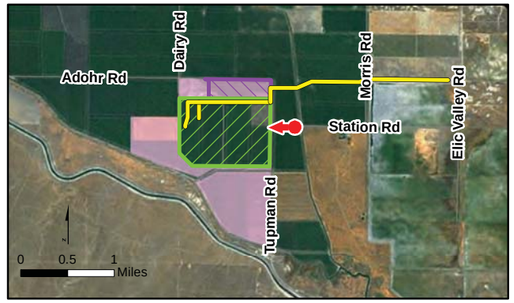
SAP NWA

DIST CODE

PLOT DATE:

XREF ATTACHED – YES ☐ NO ☐ MANUAL CHANGES MADE – YES ☐ NO ☐ DWG FILE UPDATED – YES ☐ NO ☐ MODEL UPDATED – YES ☐ NO ☐

CAD FILE NAME LANDSCAPE SCREENING PLANT.DWG



Key Observation Point
Transmission
Project Site
Construction Staging Area
Controlled Area

Photograph is intended to be viewed 10 inches from viewer's eyes when printed on 11x17 paper. The photograph below has been cropped top and bottom to show a wide angle of view with the above photograph's area shown in yellow.

Photograph Information

Time of photograph:	12:45 PM
Date of photograph:	August 22, 2013
Distance to project:	0.25 mile
Weather condition:	Clear
Viewing direction:	West
Latitude:	35°19'58.25"N
Longitude:	119°22'20.10"W

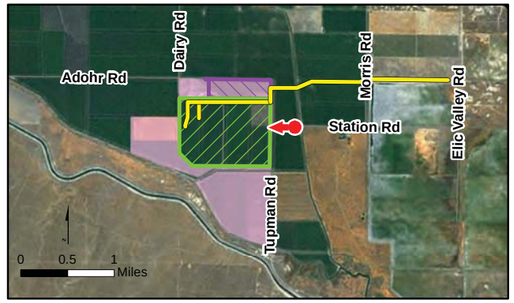
EXISTING CONDITIONS
VIEW FROM NORTH RESIDENCE
NEAR KOP 1

September 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 1



Key Observation Point
Transmission
Project Site
Construction Staging Area
Controlled Area

10/16/13 vsa...T:\HECA-SCS 2012\GRAPHICS 2013\PD Refine Appx A\Fig2_north view sim proposed trees 5yr.ai

Photograph is intended to be viewed 10 inches from viewer's eyes when printed on 11x17 paper. The photograph below has been cropped top and bottom to show a wide angle of view with the above photograph's area shown in yellow.

Photograph Information

Time of photograph:	12:45 PM
Date of photograph:	August 22, 2013
Distance to project:	0.25 mile
Weather condition:	Clear
Viewing direction:	West
Latitude:	35°19'58.25"N
Longitude:	119°22'20.10"W

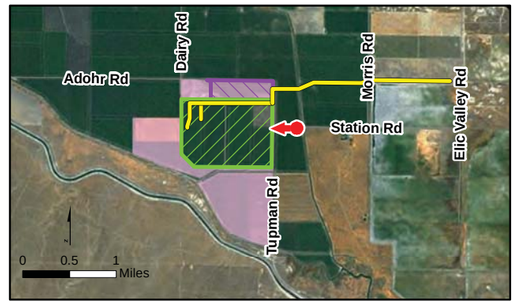
SIMULATED CONDITIONS
VIEW FROM NORTH RESIDENCE
NEAR KOP 1 SHOWING 5 YEAR GROWTH
OF PROPOSED TREES

September 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 2



Key Observation Point
Transmission
Project Site
Construction Staging Area
Controlled Area

Photograph is intended to be viewed 10 inches from viewer's eyes when printed on 11x17 paper. The photograph below has been cropped top and bottom to show a wide angle of view with the above photograph's area shown in yellow.

Photograph Information

Time of photograph:	12:45 PM
Date of photograph:	August 22, 2013
Distance to project:	0.25 mile
Weather condition:	Clear
Viewing direction:	West
Latitude:	35°19'58.25"N
Longitude:	119°22'20.10"W

SIMULATED CONDITIONS
VIEW FROM NORTH RESIDENCE
NEAR KOP 1 SHOWING MATURE GROWTH
OF PROPOSED TREES

September 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3

10/16/13 vsa...T:\HECA-SCS 2012\GRAPHICS 2013\PD Refine Appx AlFig3_north view sim proposed trees mature.ai

Key Observation Point

Transmission

Project Site

Construction Staging Area

Controlled Area

Photograph Information

Time of photograph:	12:56 PM
Date of photograph:	August 22, 2013
Distance to project:	0.25 mile
Weather condition:	Clear
Viewing direction:	West
Latitude:	35°19’56.24”N
Longitude:	119°22’19.67”W

Photograph is intended to be viewed 10 inches from viewer’s eyes when printed on 11x17 paper. The photograph below has been cropped top and bottom to show a wide angle of view with the above photograph’s area shown in yellow.

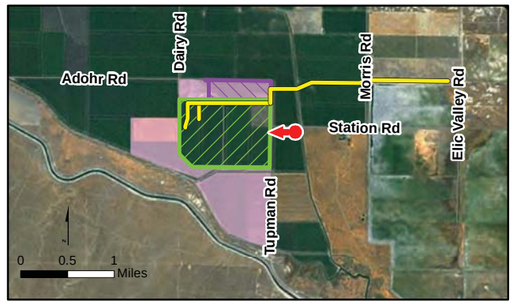
EXISTING CONDITIONS
VIEW FROM SOUTH RESIDENCE
NEAR KOP 1

September 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4



Key Observation Point
Transmission
Project Site
Construction Staging Area
Controlled Area

Photograph is intended to be viewed 10 inches from viewer's eyes when printed on 11x17 paper. The photograph below has been cropped top and bottom to show a wide angle of view with the above photograph's area shown in yellow.

Photograph Information

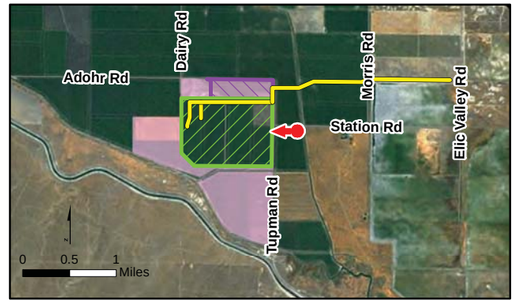
Time of photograph:	12:56 PM
Date of photograph:	August 22, 2013
Distance to project:	0.25 mile
Weather condition:	Clear
Viewing direction:	West
Latitude:	35°19'56.24"N
Longitude:	119°22'19.67"W

SIMULATED CONDITIONS
VIEW FROM SOUTH RESIDENCE
NEAR KOP 1 SHOWING 5 YEAR GROWTH
OF EXISTING AND PROPOSED TREES

September 2013 Hydrogen Energy California (HECA)
28068052 Kern County, California

URS

FIGURE 5



Key Observation Point
Transmission
Project Site
Construction Staging Area
Controlled Area

Photograph is intended to be viewed 10 inches from viewer's eyes when printed on 11x17 paper. The photograph below has been cropped top and bottom to show a wide angle of view with the above photograph's area shown in yellow.

Photograph Information

Time of photograph:	12:56 PM
Date of photograph:	August 22, 2013
Distance to project:	0.25 mile
Weather condition:	Clear
Viewing direction:	West
Latitude:	35°19'56.24"N
Longitude:	119°22'19.67"W

SIMULATED CONDITIONS
VIEW FROM SOUTH RESIDENCE
NEAR KOP 1 SHOWING MATURE GROWTH
OF EXISTING AND PROPOSED TREES

September 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 6

hydrogen energy california

September 12, 2013

Dave and Judy Tanner
8229 Station Rd.
Buttonwillow, CA 93206-9724

Re: Hydrogen Energy California Project

Dear Mr. and Mrs. Tanner:

As you know, Hydrogen Energy California, LLC (HECA) wishes to construct and operate the Hydrogen Energy California Project (HECA Project) to produce and sell electricity, carbon dioxide, and fertilizer on a 453-acre site located at 7361 Adohr Road in Buttonwillow, California. The location and planned layout of the HECA Project is shown on the map attached as Exhibit A of this letter agreement.

The California Energy Commission (CEC) staff has determined that the HECA Project may have visual impacts at your residence and has requested that we enter into an agreement with you regarding mitigation of those potential impacts. We do not necessarily agree that there will be significant visual impacts at your residence, but we want to mitigate to the extent possible potential visual impacts that may result from construction and operation of the HECA Project. This letter agreement documents the agreement that we have reached with you regarding installation and maintenance of landscaping at your residence to mitigate visual impacts caused by the HECA Project.

If HECA proceeds to construct the HECA Project, we will provide and install at no cost to you the landscaping described in the conceptual landscape plan attached as Exhibit B of this letter agreement. The landscaping will be installed at a mutually agreeable time within twelve months of commencement of construction of the HECA Project. In addition to the landscaping, HECA will install and maintain an irrigation system as necessary to ensure the viability of the installed landscaping for a period of 25 years from the date of installation. HECA will replace any landscaping that dies during this period. HECA will reimburse you on an annual basis for the cost of water necessary to irrigate the landscaping. If HECA does not proceed with construction of the HECA Project, or if the CEC does not approve the proposed landscaping, it will have no obligation to install the landscaping or irrigation.

You agree to allow installation of the landscaping described in Exhibit B on your property and to provide necessary access to HECA and its contractors for the purpose of installing the landscaping and necessary irrigation. You agree not to remove or significantly alter the landscaping for a period of 25 years from the date of installation. You agree to operate the irrigation system over this period in a manner to ensure the viability of the installed

landscaping, and to notify HECA of any problems with the operation of the irrigation system that might affect the viability of the landscaping. You agree to provide access to HECA and its contractors over this period for the purpose of maintaining or replacing the landscaping and the irrigation system. In the event that the CEC requires modifications to the proposed landscaping, you agree to cooperate with HECA in developing an alternative landscape plan that meets the requirements of the CEC.

If you agree to the terms of this letter agreement, please confirm your agreement by signing in the space provided below. We appreciate your cooperation in this matter and look forward to working with you to implement this agreement.

DATED: Sept. 12, 2013

HYDROGEN ENERGY CALIFORNIA, LLC

By: _____

Print name: James L. Croyle

Title: CEO

DATED: Sept. 12, 2013

DAVE AND JUDY TANNER

By: _____

Print name: DAVID N. TANNER

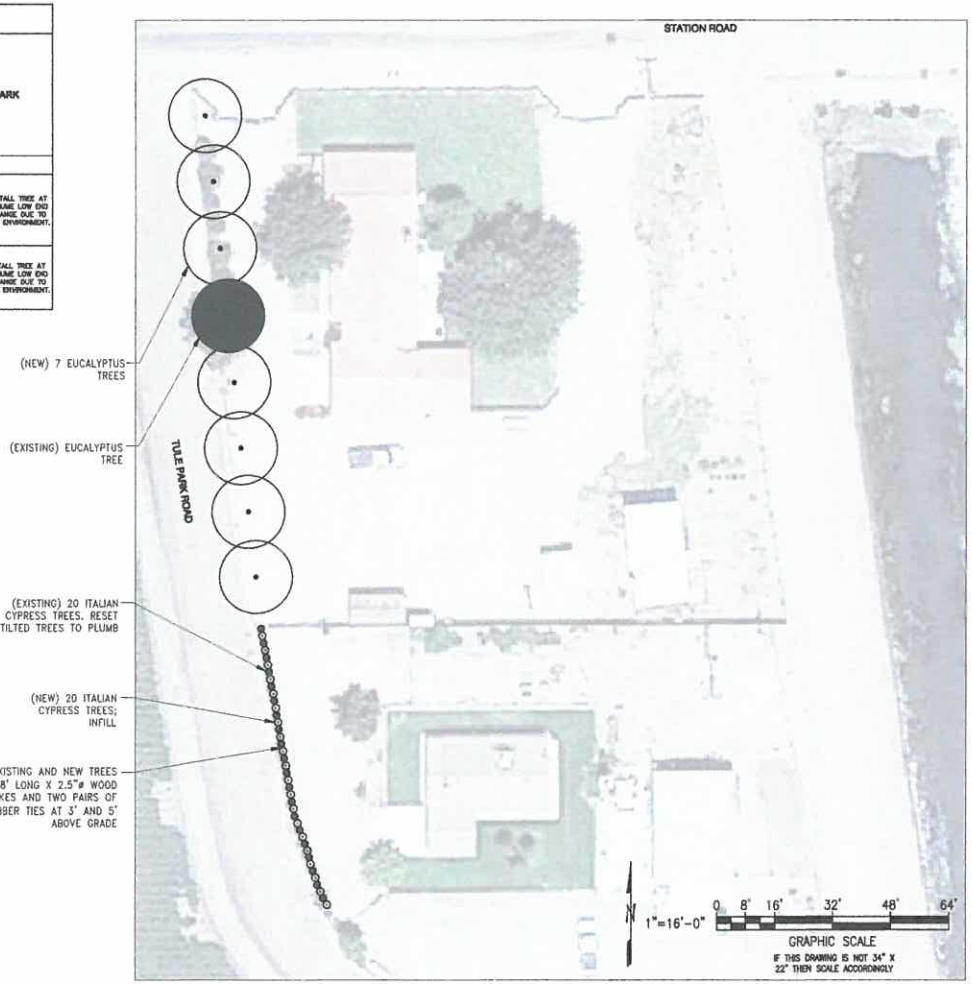
Attachments:

Exhibit A – HECA Project Map

Exhibit B – Landscape Plan

PLANT LIST

SYMBOL	BOTANICAL NAME	COMMON NAME	GROWTH RATE /YEAR	HEIGHT @ 5YRS	HEIGHT @ MATURITY	CROWN WIDTH @ MATURITY	EXPECTED TIME TO MATURITY (YEARS)	SPACING AT PLANTING	SIZE	QUANTITY EACH	REMARK
TREES											
•	EUCALYPTUS POLYANTHEMOS	SILVER DOLLAR GUM	4–6'	29–40'	50–65'	25–40'	20 YEARS	20' O.C.	24" BOX	7	ASSUMED 15' TALL TREE AT PLANTING. ASSUME LOW END OF GROWTH RANGE DUE TO HARSH DESERT ENVIRONMENT.
⊙	CUPRESSUS SEMPERVIRENS	ITALIAN CYPRESS	1–2'	11'–16'	25–40'	3–5'	10–20 YEARS	PLANT AT MIDPOINT BETWEEN EXISTING ITALIAN CYPRESS TREES	15 GAL	20	ASSUMED 6' TALL TREE AT PLANTING. ASSUME LOW END OF GROWTH RANGE DUE TO HARSH DESERT ENVIRONMENT.



LICENSED LANDSCAPE ARCHITECT — GEORGE SUTHERS — No. 5143 — 12-31-14 — STATE OF CALIFORNIA

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
0	8/28/13	FOR CLIENT REVIEW	CH	GS	GS

URS

CONTRACT		
DESIGNED BY	CH	
CHECKED BY	GS	
SUPERVISOR		APP DATE –
LEAD ENGR/SPEC.		APP DATE –
URS		APP DATE –
CLIENT		APP DATE –

HYDROGEN ENERGY CALIFORNIA
KERN COUNTY POWER PROJECT

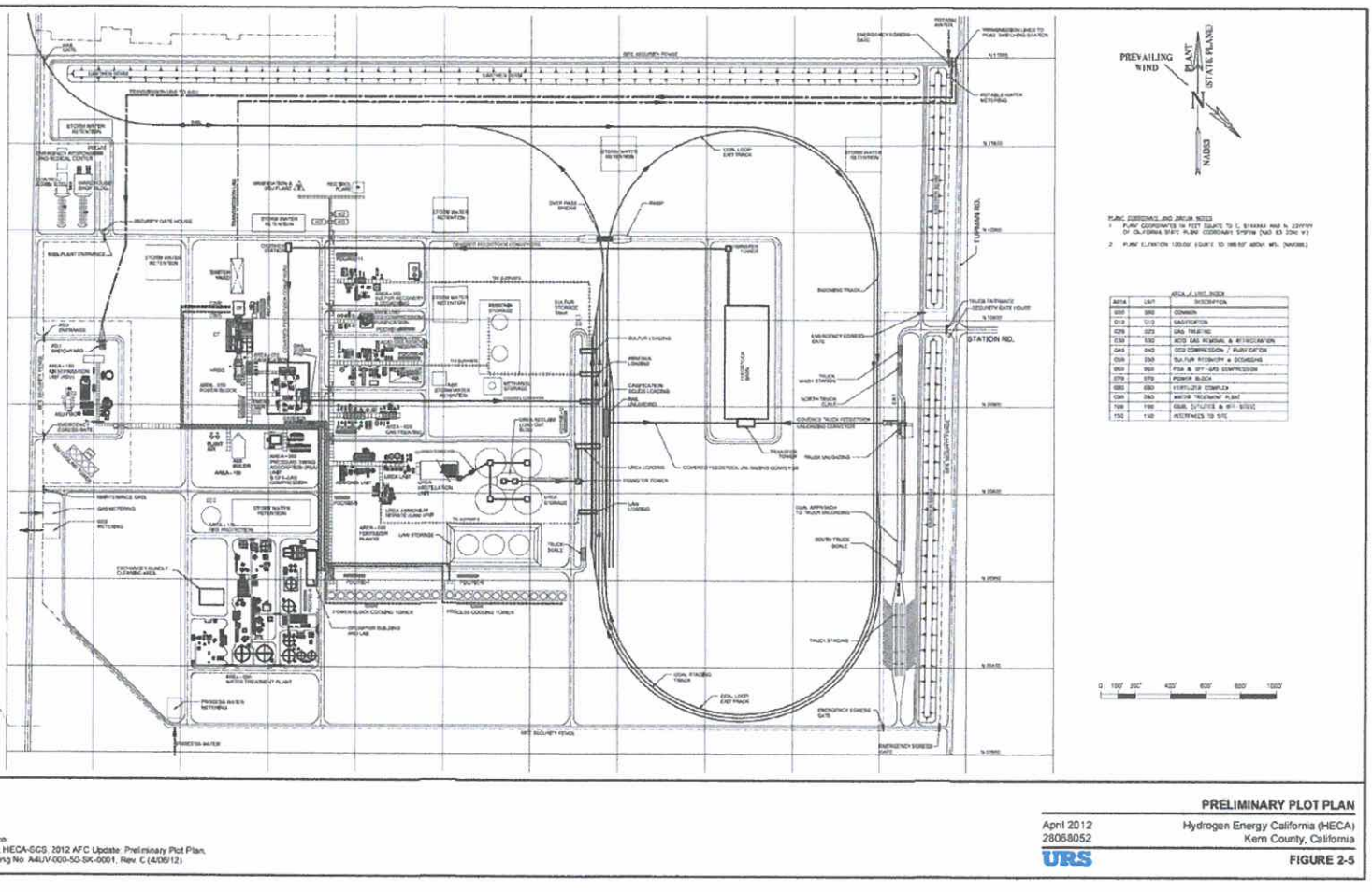
LANDSCAPE SCREENING PLAN

SCALE 1"=16'-0" | DRAWING NUMBER L-101 | REV 0

XREF ATTACHED – YES ☐ NO ☐ | MANUAL CHANGES MADE – YES ☐ NO ☐ | DWG FILE UPDATED – YES ☐ NO ☐ | MODEL UPDATED – YES ☐ NO ☐

CAD FILE NAME: LANDSCAPE SCREENING PLANT.DWG

PLOT DATE:



PRELIMINARY PLOT PLAN

April 2012
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 2-5

Source:
Plan: HECA-SGS. 2012 AFC Update. Preliminary Plot Plan.
Drawing No. A4UV-000-50-SK-0001, Rev. C (4/05/12)

hydrogen energy california

September 12, 2013

Nick and Lynette Adams
6122 Tule Park Rd.
Buttonwillow, CA 93206-9724

Re: Hydrogen Energy California Project

Dear Mr. and Mrs. Adams:

As you know, Hydrogen Energy California, LLC (HECA) wishes to construct and operate the Hydrogen Energy California Project (HECA Project) to produce and sell electricity, carbon dioxide, and fertilizer on a 453-acre site located at 7361 Adohr Road in Buttonwillow, California. The location and planned layout of the HECA Project is shown on the map attached as Exhibit A of this letter agreement.

The California Energy Commission (CEC) staff has determined that the HECA Project may have visual impacts at your residence and has requested that we enter into an agreement with you regarding mitigation of those potential impacts. We do not necessarily agree that there will be significant visual impacts at your residence, but we want to mitigate to the extent possible potential visual impacts that may result from construction and operation of the HECA Project. This letter agreement documents the agreement that we have reached with you regarding installation and maintenance of landscaping at your residence to mitigate visual impacts caused by the HECA Project.

If HECA proceeds to construct the HECA Project, we will provide and install at no cost to you the landscaping described in the conceptual landscape plan attached as Exhibit B of this letter agreement. The landscaping will be installed at a mutually agreeable time within twelve months of commencement of construction of the HECA Project. In addition to the landscaping, HECA will install and maintain an irrigation system as necessary to ensure the viability of the installed landscaping for a period of 25 years from the date of installation. HECA will replace any landscaping that dies during this period. HECA will reimburse you on an annual basis for the cost of water necessary to irrigate the landscaping. If HECA does not proceed with construction of the HECA Project, or if the CEC does not approve the proposed landscaping, it will have no obligation to install the landscaping or irrigation.

You agree to allow installation of the landscaping described in Exhibit B on your property and to provide necessary access to HECA and its contractors for the purpose of installing the landscaping and necessary irrigation. You agree not to remove or significantly alter the landscaping for a period of 25 years from the date of installation. You agree to operate the irrigation system over this period in a manner to ensure the viability of the installed landscaping, and to notify HECA of any problems with the operation of the irrigation system that

might affect the viability of the landscaping. You agree to provide access to HECA and its contractors over this period for the purpose of maintaining or replacing the landscaping and the irrigation system. In the event that the CEC requires modifications to the proposed landscaping, you agree to cooperate with HECA in developing an alternative landscape plan that meets the requirements of the CEC.

If you agree to the terms of this letter agreement, please confirm your agreement by signing in the space provided below. We appreciate your cooperation in this matter and look forward to working with you to implement this agreement.

DATED: 9/12/13

HYDROGEN ENERGY CALIFORNIA, LLC

By: _____

Print name: James L. Croyle

Title: CEO

DATED: 9/12/13

NICK AND LYNETTE ADAMS

By: _____

Print name: Nick Adams

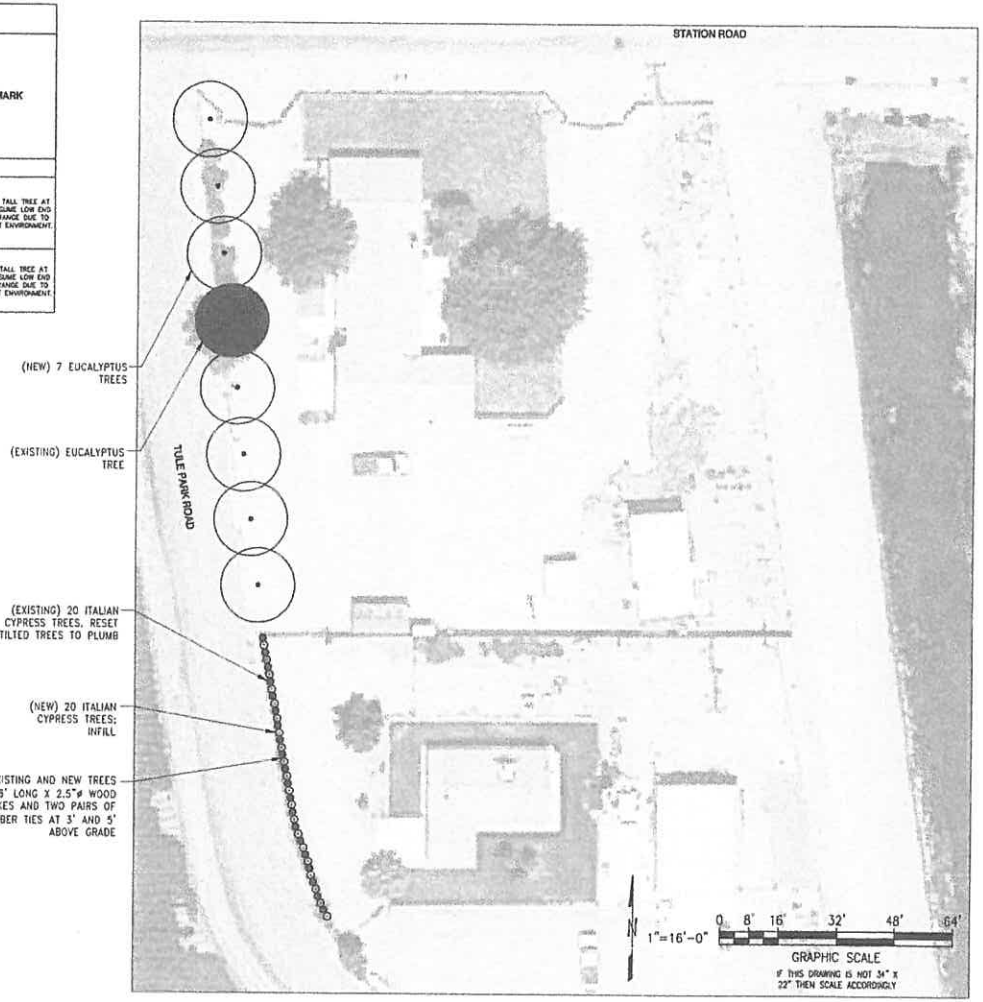
Attachments:

Exhibit A – HECA Project Map

Exhibit B – Landscape Plan

PLANT LIST

SYMBOL	BOTANICAL NAME	COMMON NAME	GROWTH RATE /YEAR	HEIGHT @ 5YRS	HEIGHT @ MATURITY	CROWN WIDTH @ MATURITY	EXPECTED TIME TO MATURITY (YEARS)	SPACING AT PLANTING	SIZE	QUANTITY EACH	REMARK
TREES											
•	EUCALYPTUS POLYANTHEMOS	SILVER DOLLAR GUM	4-6'	29-40'	50-65'	25-40'	20 YEARS	20' O.C.	24" BOX	7	ASSUMED 10' TALL TREE AT PLANTING. ASSUME LOW END OF GROWTH RANGE DUE TO HARSH DESERT ENVIRONMENT.
O	CUPRESSUS SEMPERVIRENS	ITALIAN CYPRESS	1-2'	11'-16'	25-40'	3-5'	10-20 YEARS	PLANT AT MIDPOINT BETWEEN EXISTING ITALIAN CYPRESS TREES	15 GAL	20	ASSUMED 8' TALL TREE AT PLANTING. ASSUME LOW END OF GROWTH RANGE DUE TO HARSH DESERT ENVIRONMENT.



12-31-14

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
0	8/28/13	FOR CLIENT REVIEW	CH	GS	GS

REFERENCE DWG NUMBER | REFERENCE DRAWINGS

PLOT DATE:

URS

CONTRACT
DESIGNED BY CH
CHECKED BY GS
SUPERVISOR APP DATE –
LEAD ENGR/SPEC. APP DATE –
URS APP DATE –
CLIENT APP DATE –

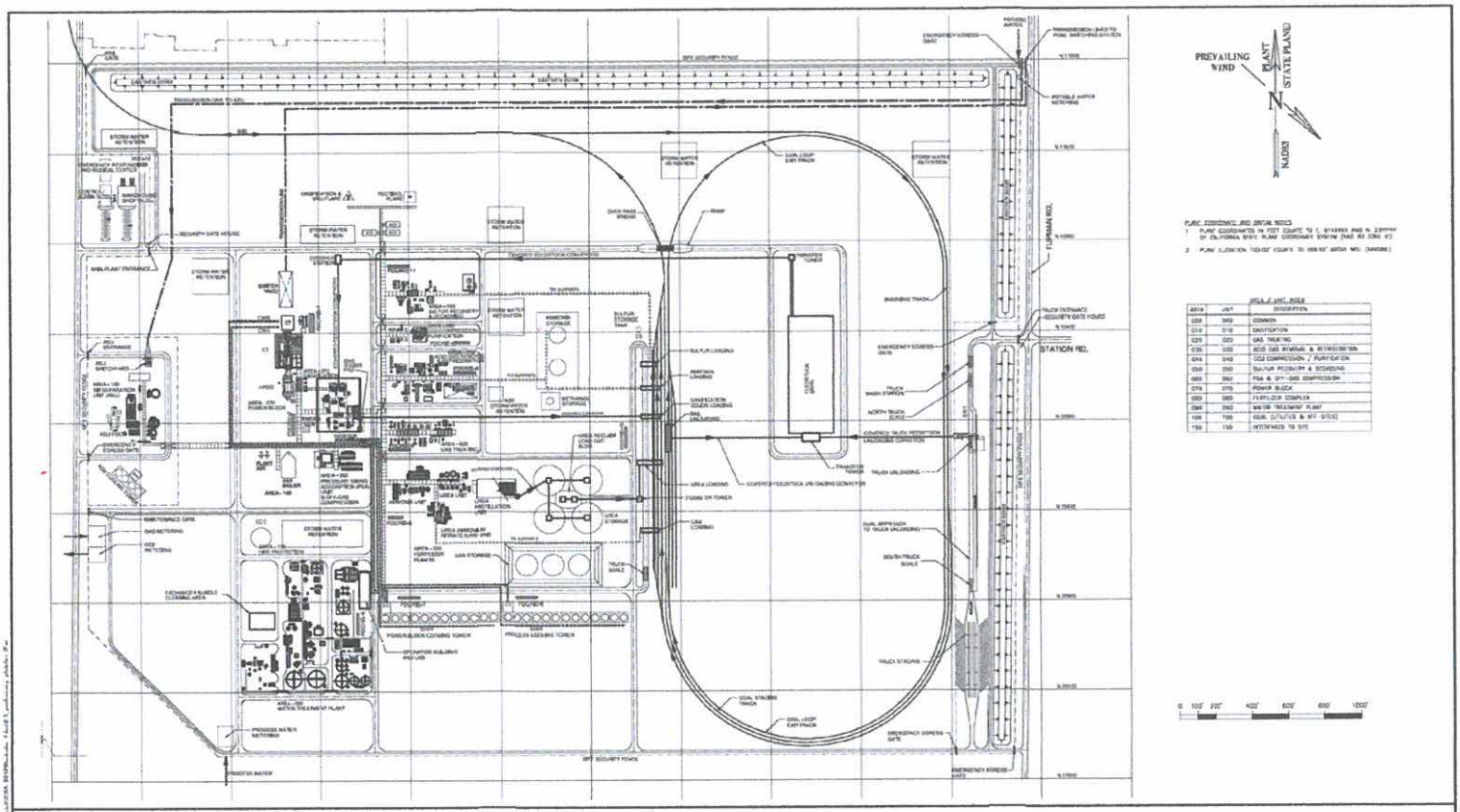
HYDROGEN ENERGY CALIFORNIA
KERN COUNTY POWER PROJECT

LANDSCAPE SCREENING PLAN

SCALE 1"=16'-0" | DRAWING NUMBER L-101 | REV 0

XREF ATTACHED – YES ☐ NO ☐ | MANUAL CHANGES MADE – YES ☐ NO ☐ | DWG FILE UPDATED – YES ☐ NO ☐ | MODEL UPDATED – YES ☐ NO ☐

CAD FILE NAME: LANDSCAPE SCREENING PLAN.DWG



PRELIMINARY PLOT PLAN

April 2012
28058052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 2-5

Source:
Filer: HECA-SCS, 2012 AFC Update Preliminary Plot Plan;
Drawing No. A4LIV-009-50-SK-0001, Rev. C (4/09/12)

APPENDIX B

FAA DETERMINATION

HECA Project
July 23, 2013

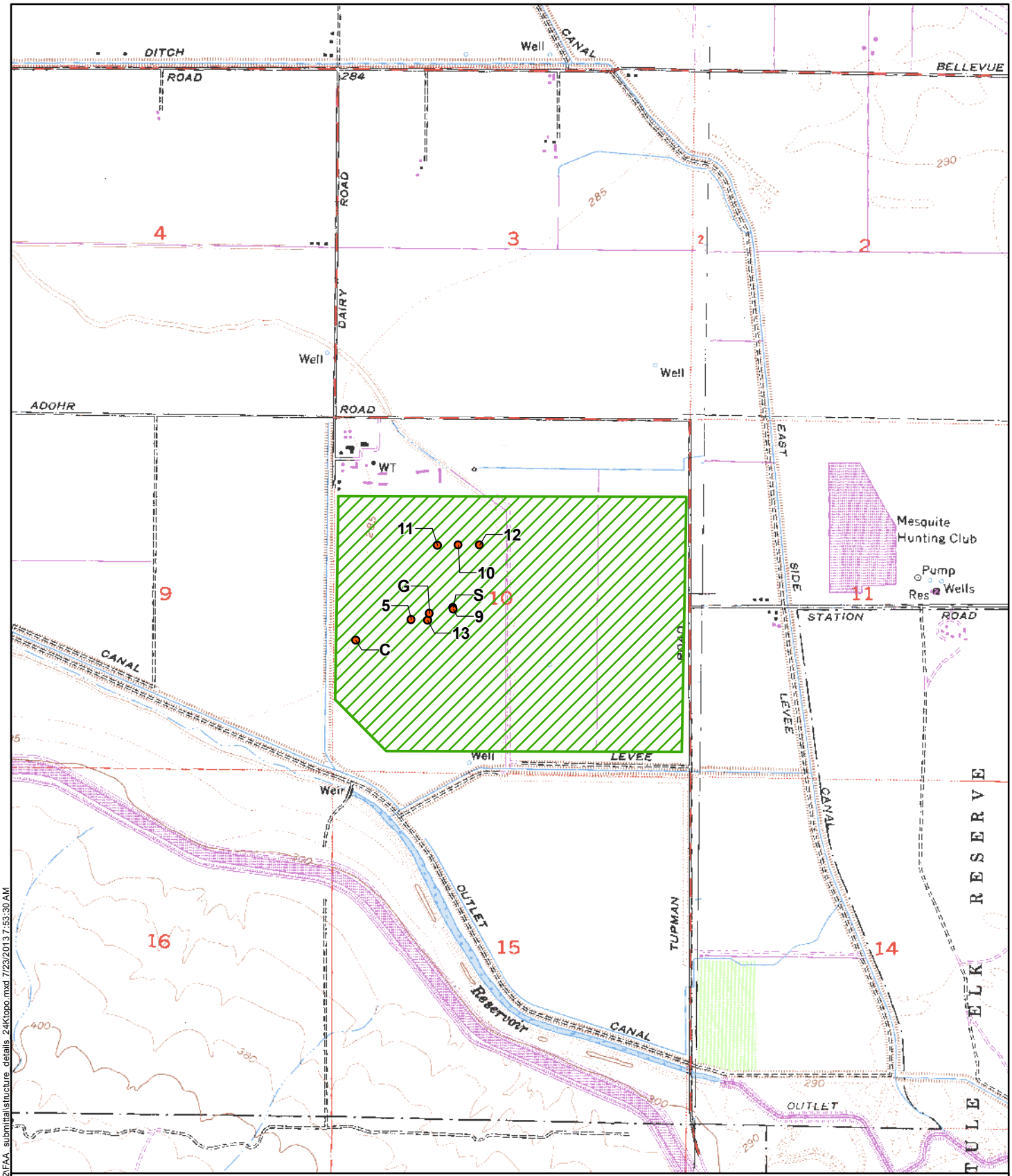
Details of HECA Project Structures
Exceeding 200 Feet Above Ground Level

URS

Map ID	Prior FAA Aeronautical Study Nos.	FAA Project Name	Description of Proposed Structure	Structure Type	Site Elevation AMSL (Feet)	Total Structure Height AGL (Feet)	Overall Structure Height AMSL (Feet)	Latitude			Longitude		
								Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
5	2012-AWP-4418-OE; 2010-AWP-1092-OE	HYDRO-000245564-13	Heat Recovery Steam Generator Stack	Stack	289	213	502	35	19	55.396	-119	23	26.142
9	2012-AWP-4419-OE; 2010-AWP-1091-OE	HYDRO-000245602-13	CO_2 Vent	Stack	289	355	644	35	19	56.998	-119	23	18.481
10	2012-AWP-4420-OE; 2010-AWP-1097-OE	HYDRO-000245603-13	Sulfur Recovery Unit Flare	Stack	289	250	539	35	20	6.537	-119	23	17.739
11	2012-AWP-4421-OE; 2010-AWP-1088-OE	HYDRO-000245605-13	Gasification Flare	Stack	289	250	539	35	20	6.487	-119	23	21.536
12	2012-AWP-4422-OE; 2010-AWP-1087-OE	HYDRO-000245607-13	Rectisol Flare	Stack	289	250	539	35	20	6.593	-119	23	13.89
13	2012-AWP-4423-OE	HYDRO-000245610-13	Feedstock Dryer	Building	289	305	594	35	19	55.293	-119	23	23.1
C	2012-AWP-4417-OE; 2010-AWP-1090-OE	HYDRO-000245611-13	Air Separation Column Can	Building	289	200	489	35	19	52.187	-119	23	36.127
G	2012-AWP-4424-OE; 2010-AWP-1096-OE	HYDRO-000245615-13	Gasification Structure	Building	289	305	594	35	19	56.323	-119	23	22.83
S	2012-AWP-4425-OE; 2010-AWP-1089-OE	HYDRO-000245616-13	Acid Gas Removal Methanol Wash Column	Building	289	330	619	35	19	56.998	-119	23	18.481

Notes:
1. FAA project names of prior aeronautical studies completed for the HECA Project was HYDRO-000138467-10 & HYDRO-000206286-12 (Project refinements resulting from slight adjustments in location of all structures. Additionally, modifications have been made to the structure height for Map IDs 9 and S.)
2. Horizontal datum of latitude and longitude is NAD 83
3. Latitude and longitude data represents the nearest point of the proposed structure to the nearest runway (approach end of Runway 29 at Elk Hills-Buttonwillow Airport [L62])
4. The highest site (ground) elevation is 289 feet AMSL
5. Total structure height includes all appurtenances

AGL = Above ground level
AMSL = Above mean sea level
CO_2 = Carbon dioxide
FAA = Federal Aviation Administration



Project Site

5 Map ID/Proposed Structure

N

0 1,000 2,000 FEET

FAA NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

July 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 1

KL: U:\GIS\HECA\Projects\HECA_2012\FAA_submittal\structure_details_24Ktopo.mxd 7/23/2013 7:55:30 AM

USGS 7.5-minute quadrangles: Buttonwillow, published 1973 (rev 1976), East Elk Hills, published 1973 (rev 1977).

Federal Aviation Administration

« OE/AAA

My Cases in ACCEPTED Status

Please refer to the assigned ASN on all inquiries to the FAA

All Cases	Filter by Case Status	Cases Requiring Action
Show All Cases (33)	Draft (0) | Accepted (9) | Work in Progress (0) Interim (0) | Determined (10) | Circularized (0) | Terminated (14)	7460-2 Required (9) | Add Letter (0) Cases Due to Expire (0)

Records 1 to 9 of 9 Page 1 of 1

View Folder | Create Folder | Manage Folders | Transfer Cases

	ASN	Folder Name	Project Name	Structure Name	Status	Date Accepted	Date Determined	7460-2 Received	City	State
☐	2013-AWP-4550-OE		HYDRO-000245564-13	#5 - Heat Recovery S...	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4551-OE		HYDRO-000245602-13	#9 - CO2 Vent	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4552-OE		HYDRO-000245603-13	#10 - Sulfur Recover...	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4553-OE		HYDRO-000245605-13	#11 - Gasification F...	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4554-OE		HYDRO-000245607-13	#12 - Rectisol Flare	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4555-OE		HYDRO-000245610-13	#13 - Feedstock Dryer	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4556-OE		HYDRO-000245611-13	#C - Air Separation ...	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4557-OE		HYDRO-000245615-13	#G - Gasification St...	Accepted	07/24/2013			Bakersfield	CA
☐	2013-AWP-4558-OE		HYDRO-000245616-13	#S - Acid Gas Remova...	Accepted	07/24/2013			Bakersfield	CA

Move To | Archive

Rows per Page: 20

Records 1 to 9 of 9 **Page: 1** Page 1 of 1

Draft: Cases that have been saved by the user but have not been submitted to the FAA.
Accepted: Cases that have been submitted to the FAA.
Add Letter: Cases that have been reviewed by the FAA and require additional information from the user.
Work in Progress: Cases that are being evaluated by the FAA.
Interim: Cases that have been reviewed by the FAA and require resolution from the user.
Determined: Cases that have a completed aeronautical study and an FAA determination.
Terminated: Cases that are no longer valid.
Please allow the FAA a minimum of 45 days to complete a study.
Case Transfer:
- **Use the check box(es) to select the case(s) you want to transfer.**
- **Select the "Transfer Cases button" to open the "Manage Transfer Cases" screen.**

Note: Drafts and cases in Add and Terminated status can not be transferred.
Click here to contact the appropriate representative.

HECA Applications for
Notice of Proposed Construction or Alteration (Off Airport)

Submitted July 24, 2013

Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245602-13

Project HYDRO-000245602-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4551-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
State Aviation Contacts

To ensure e-mail notifications are delivered to your inbox please add noreply@faa.gov to your address book. Notifications sent from this address are system generated FAA e-mails and replies to this address will NOT be read or forwarded for review. Each system generated e-mail will contain specific FAA contact information in the text of the message.

Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245564-13

Project HYDRO-000245564-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4550-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
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Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245616-13

Project HYDRO-000245616-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4558-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

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Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245615-13

Project HYDRO-000245615-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4557-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
State Aviation Contacts

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Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245611-13

Project HYDRO-000245611-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4556-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
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Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245610-13

Project HYDRO-000245610-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4555-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
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Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245607-13

Project HYDRO-000245607-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4554-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
State Aviation Contacts

To ensure e-mail notifications are delivered to your inbox please add noreply@faa.gov to your address book. Notifications sent from this address are system generated FAA e-mails and replies to this address will NOT be read or forwarded for review. Each system generated e-mail will contain specific FAA contact information in the text of the message.

Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245605-13

Project HYDRO-000245605-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4553-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

It is the responsibility of each e-filer to exercise due diligence to determine if coordination of the proposed construction or alteration is necessary with their state aviation department. Please use the link below to contact your state aviation department to determine their requirements:
State Aviation Contacts

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Federal Aviation Administration

« OE/AAA

Project Submission Success
Project Name: HYDRO-000245603-13

Project HYDRO-000245603-13 has been submitted successfully to the FAA.

Your filing is assigned Aeronautical Study Number (ASN):
2013-AWP-4552-OE

Please refer to the assigned ASN on all future inquiries regarding this filing.

Please return to the system at a later date for status updates.

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State Aviation Contacts

To ensure e-mail notifications are delivered to your inbox please add noreply@faa.gov to your address book. Notifications sent from this address are system generated FAA e-mails and replies to this address will NOT be read or forwarded for review. Each system generated e-mail will contain specific FAA contact information in the text of the message.

Federal Aviation Administration
Determinations of No Hazard to Air Navigation

Received September 9, 2013

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4555-OE
Prior Study No.
2012-AWP-4423-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building #13 - Feedstock Dryer
Location:	Bakersfield, CA
Latitude:	35-19-55.29N NAD 83
Longitude:	119-23-23.10W
Heights:	289 feet site elevation (SE)
	305 feet above ground level (AGL)
	594 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, red lights - Chapters 4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4555-OE.

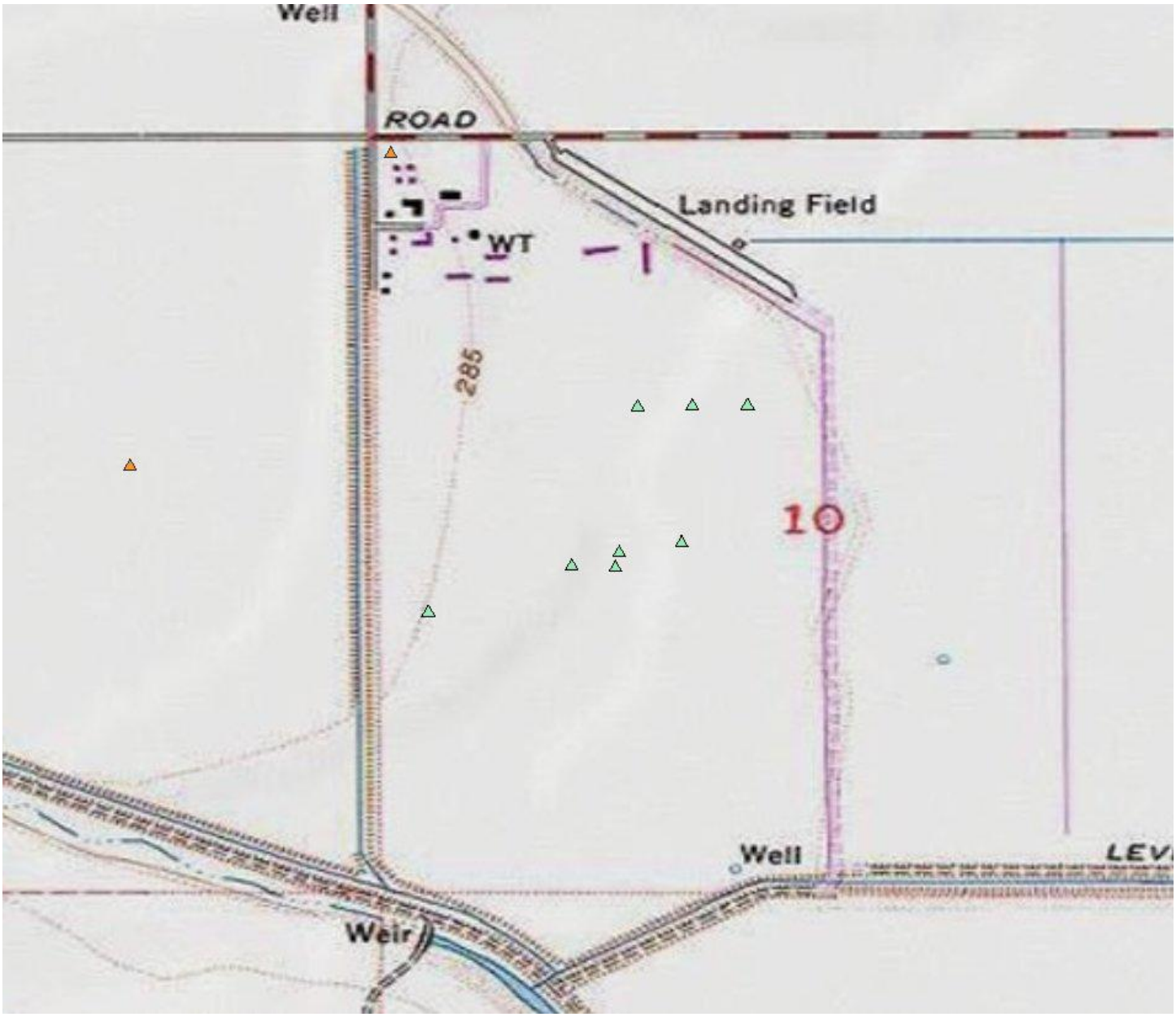
Signature Control No: 194784970-197747111 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

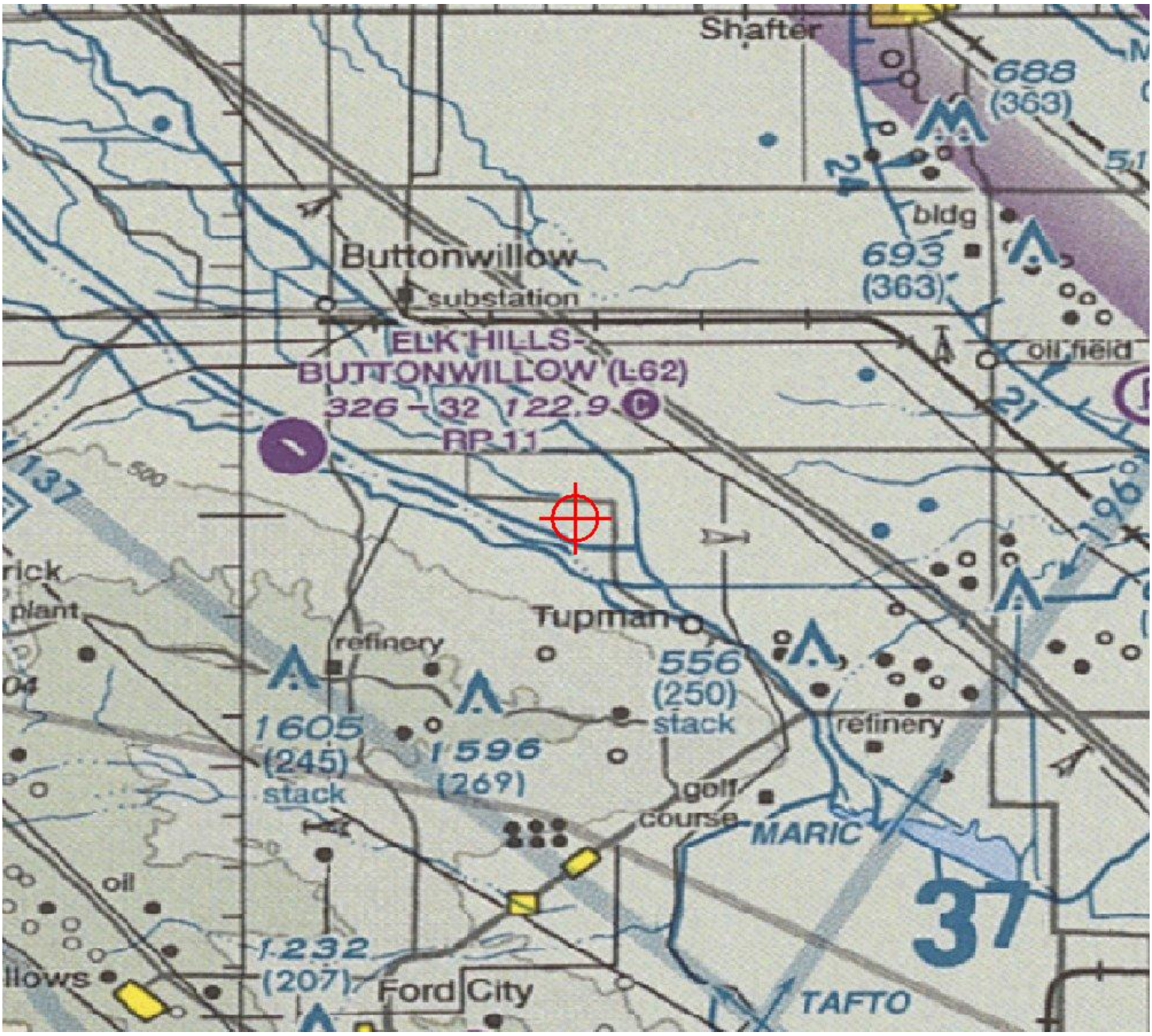
Case Description for ASN 2013-AWP-4555-OE

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4555-OE



Sectional Map for ASN 2013-AWP-4555-OE



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4554-OE
Prior Study No.
2012-AWP-4422-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack #12 - Rectisol Flare
Location:	Bakersfield, CA
Latitude:	35-20-06.59N NAD 83
Longitude:	119-23-13.89W
Heights:	289 feet site elevation (SE)
	250 feet above ground level (AGL)
	539 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, paint/red lights - Chapters 3(Marked),4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4554-OE.

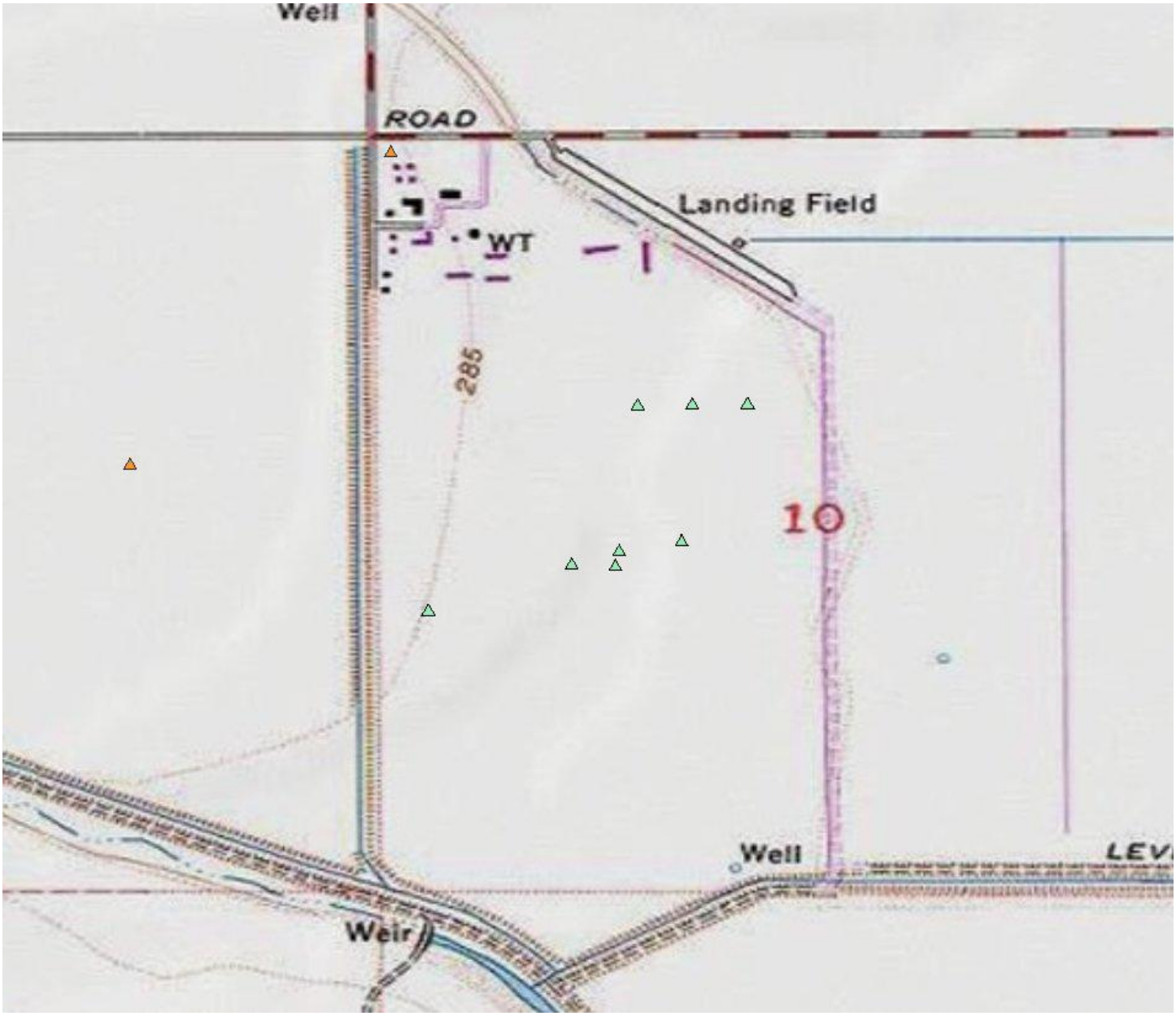
Signature Control No: 194784957-197738552 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

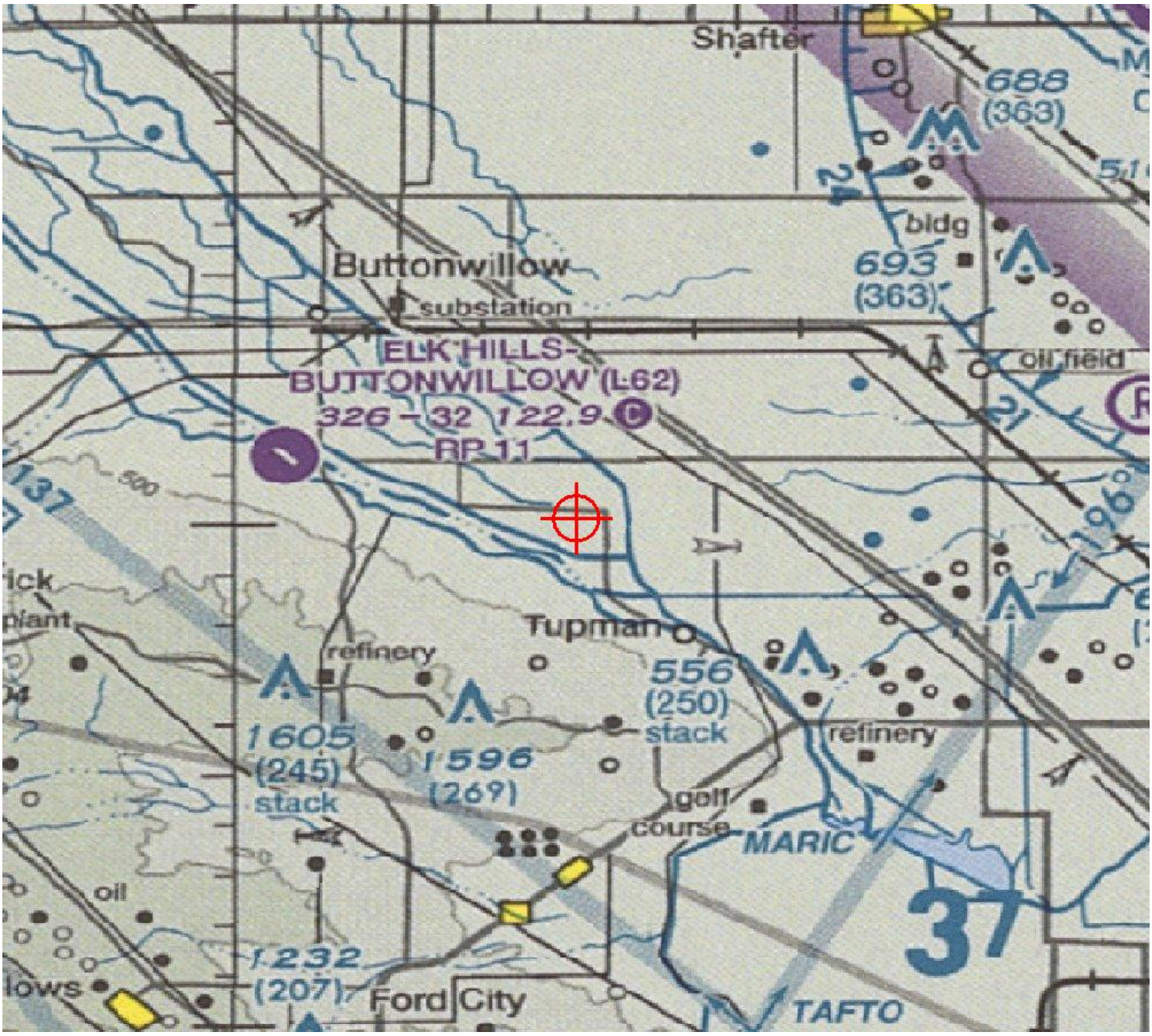
Case Description for ASN 2013-AWP-4554-OE

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4554-OE



Sectional Map for ASN 2013-AWP-4554-OE



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Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4553-OE
Prior Study No.
2012-AWP-4421-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack #11 - Gasification Flare
Location:	Bakersfield, CA
Latitude:	35-20-06.49N NAD 83
Longitude:	119-23-21.54W
Heights:	289 feet site elevation (SE)
	250 feet above ground level (AGL)
	539 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, paint/red lights - Chapters 3(Marked),4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4553-OE.

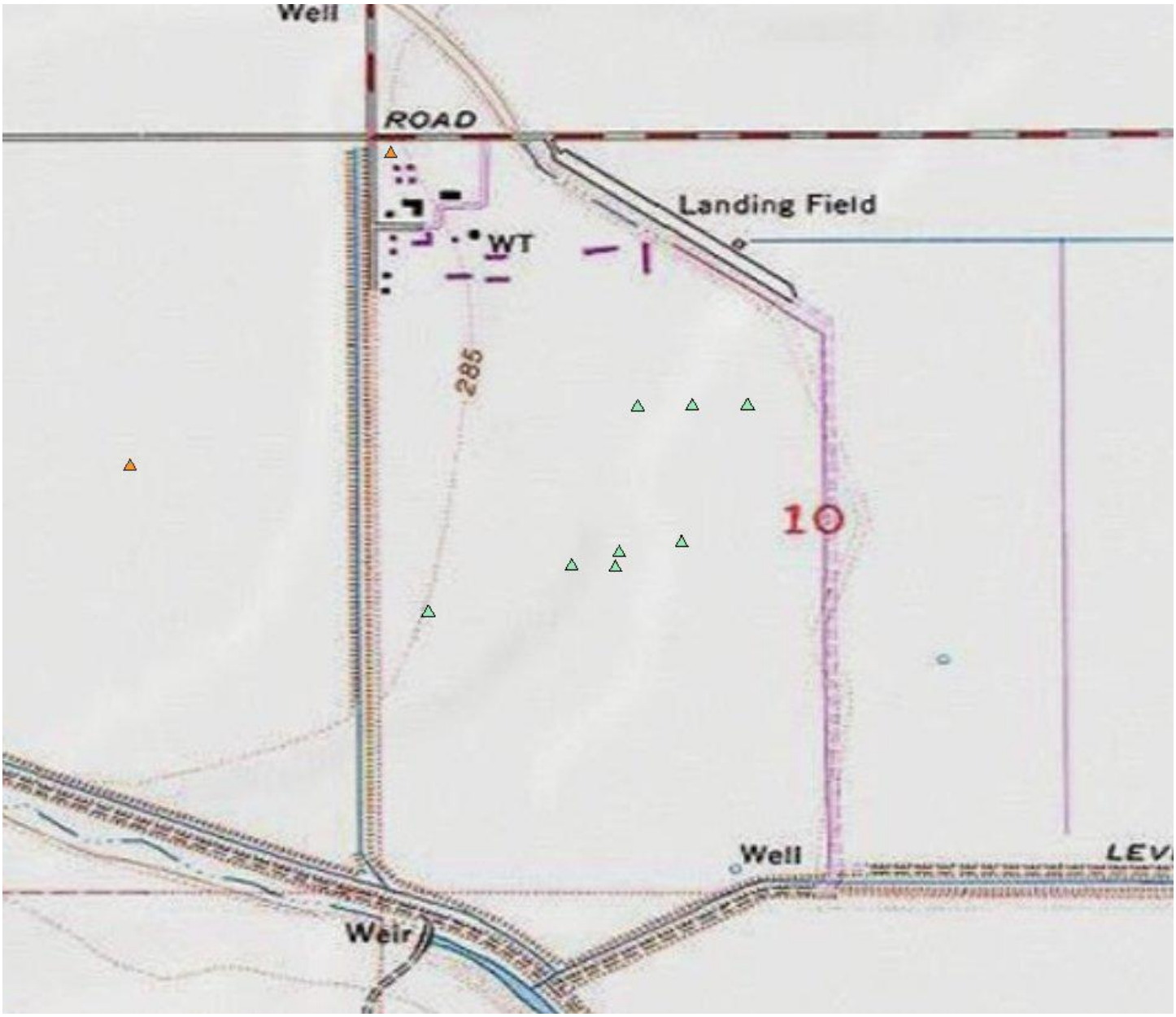
Signature Control No: 194784952-197738553 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

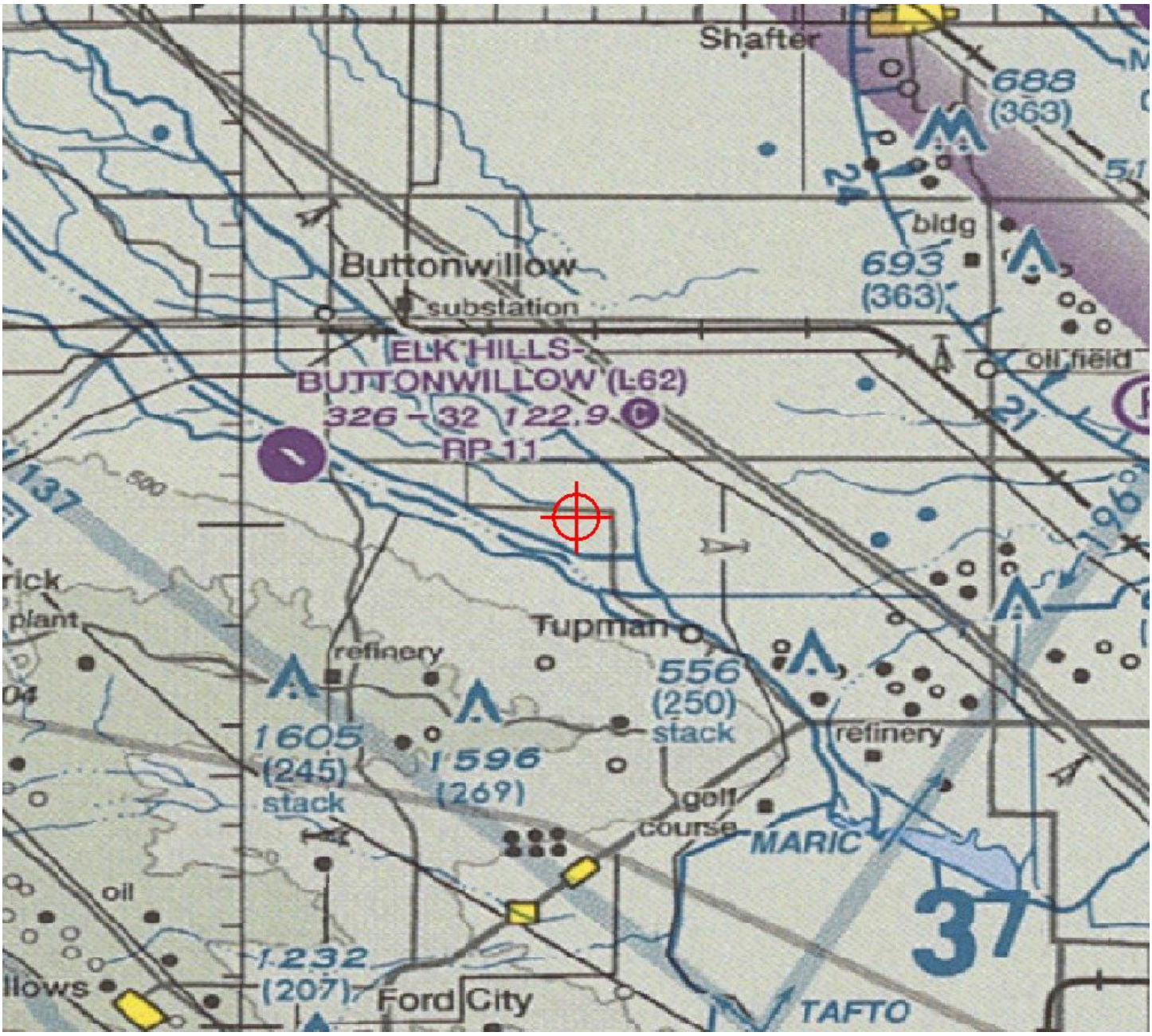
Case Description for ASN 2013-AWP-4553-OE

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4553-OE



Sectional Map for ASN 2013-AWP-4553-OE



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Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4552-OE
Prior Study No.
2012-AWP-4420-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack #10 - Sulfur Recovery Unit Flare
Location:	Bakersfield, CA
Latitude:	35-20-06.54N NAD 83
Longitude:	119-23-17.74W
Heights:	289 feet site elevation (SE)
	250 feet above ground level (AGL)
	539 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, paint/red lights - Chapters 3(Marked),4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination cancels and supersedes prior determinations issued for this structure.

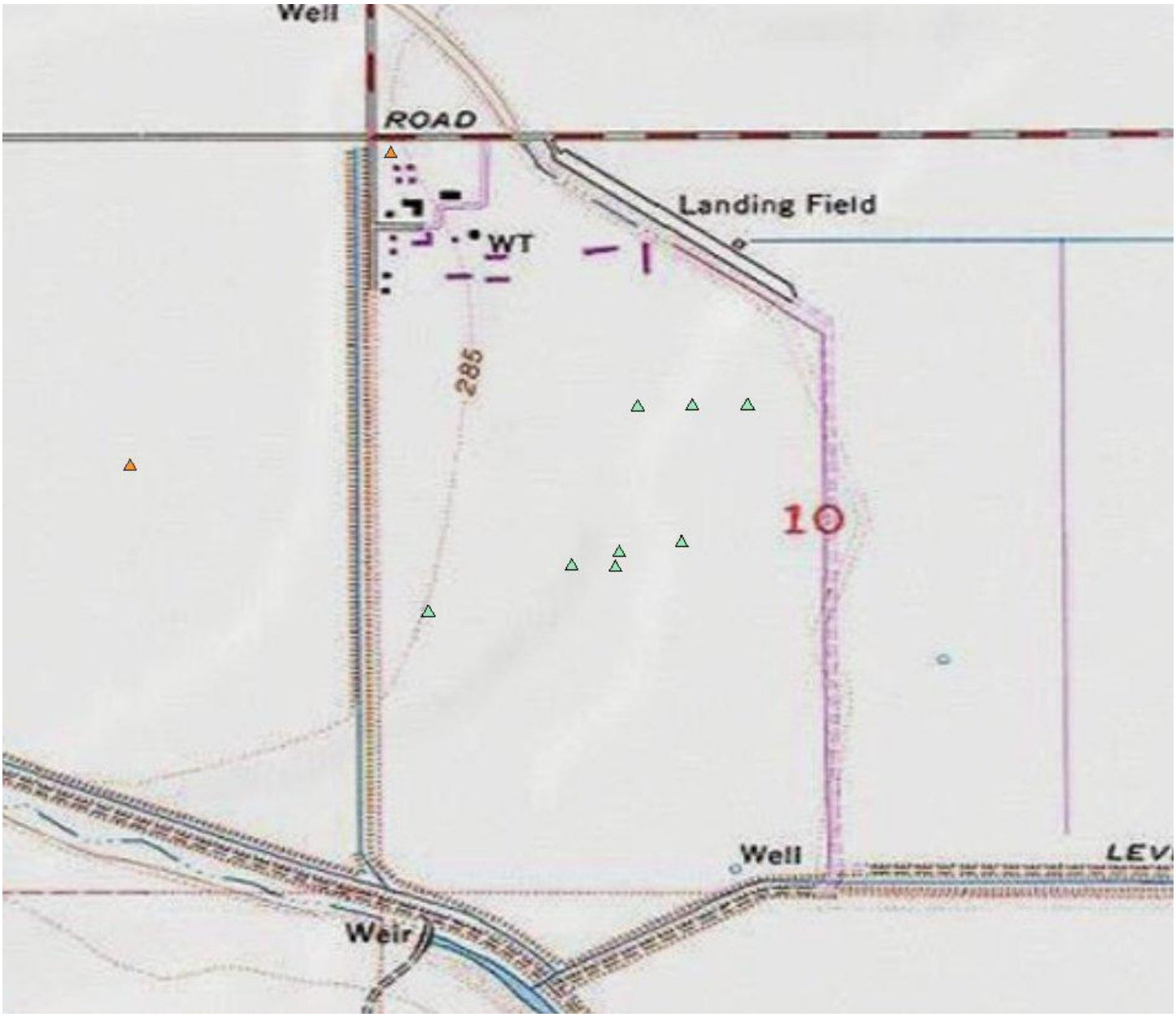
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4552-OE.

Signature Control No: 194784752-197738554 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4552-OE



Sectional Map for ASN 2013-AWP-4552-OE

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2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4551-OE
Prior Study No.
2012-AWP-4419-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack #9 - CO2 Vent
Location:	Bakersfield, CA
Latitude:	35-19-57.00N NAD 83
Longitude:	119-23-18.48W
Heights:	289 feet site elevation (SE)
	355 feet above ground level (AGL)
	644 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, paint/red lights - Chapters 3(Marked),4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4551-OE.

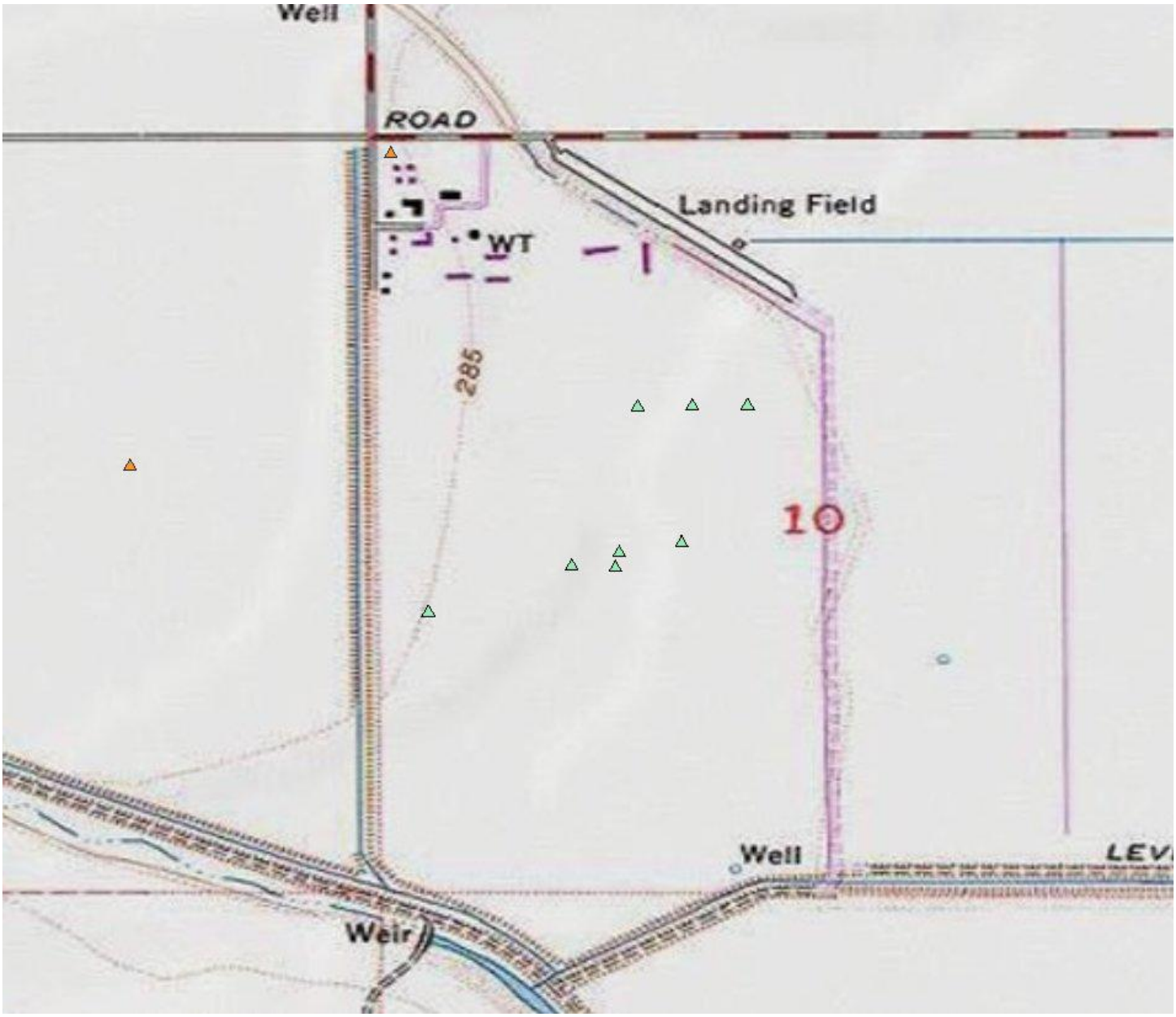
Signature Control No: 194784656-197738551 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

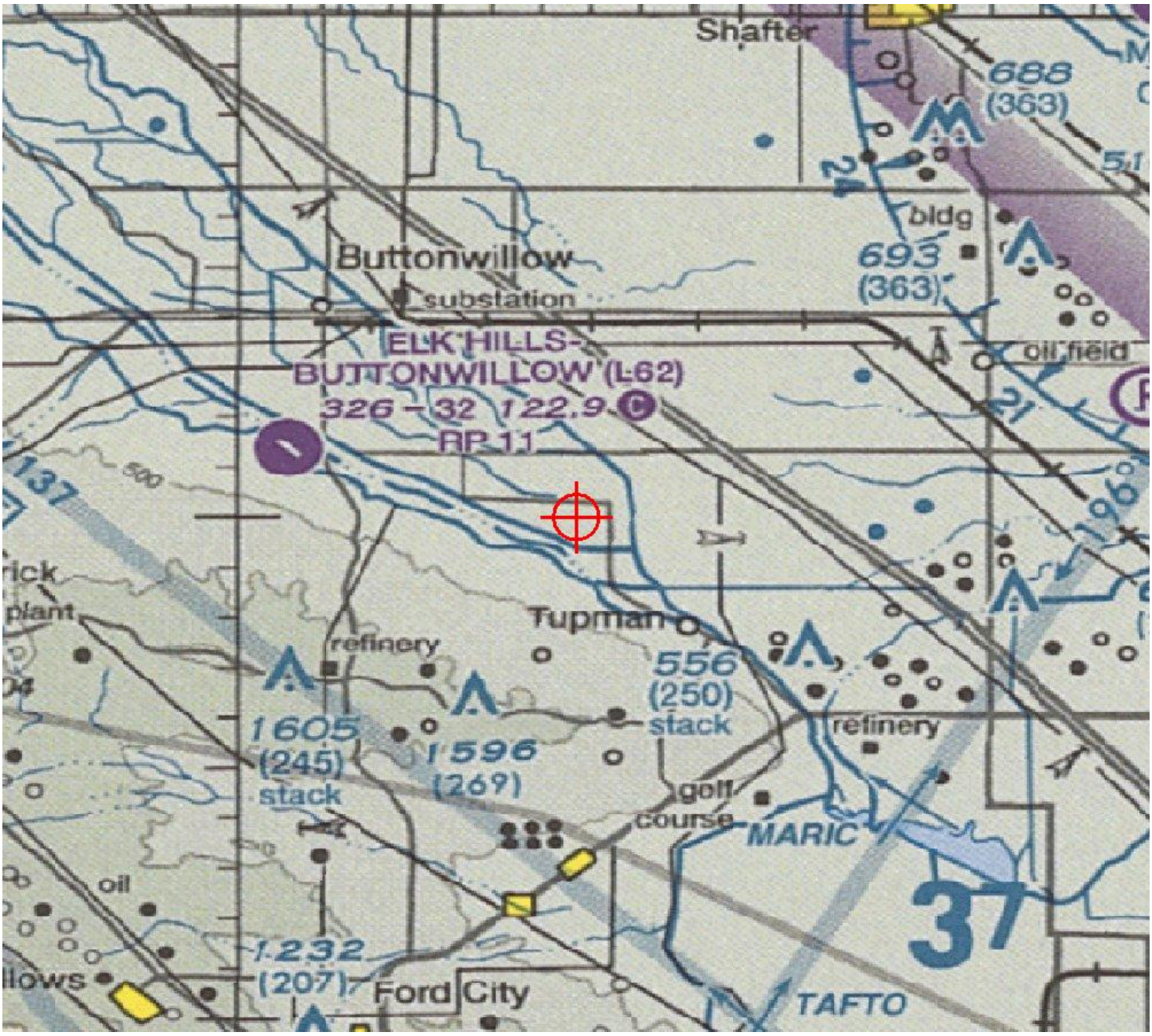
Case Description for ASN 2013-AWP-4551-OE

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4551-OE



Sectional Map for ASN 2013-AWP-4551-OE



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Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4550-OE
Prior Study No.
2012-AWP-4418-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Stack #5 - Heat Recovery Steam Generator Stack
Location:	Bakersfield, CA
Latitude:	35-19-55.40N NAD 83
Longitude:	119-23-26.14W
Heights:	289 feet site elevation (SE)
	213 feet above ground level (AGL)
	502 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, paint/red lights - Chapters 3(Marked),4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination cancels and supersedes prior determinations issued for this structure.

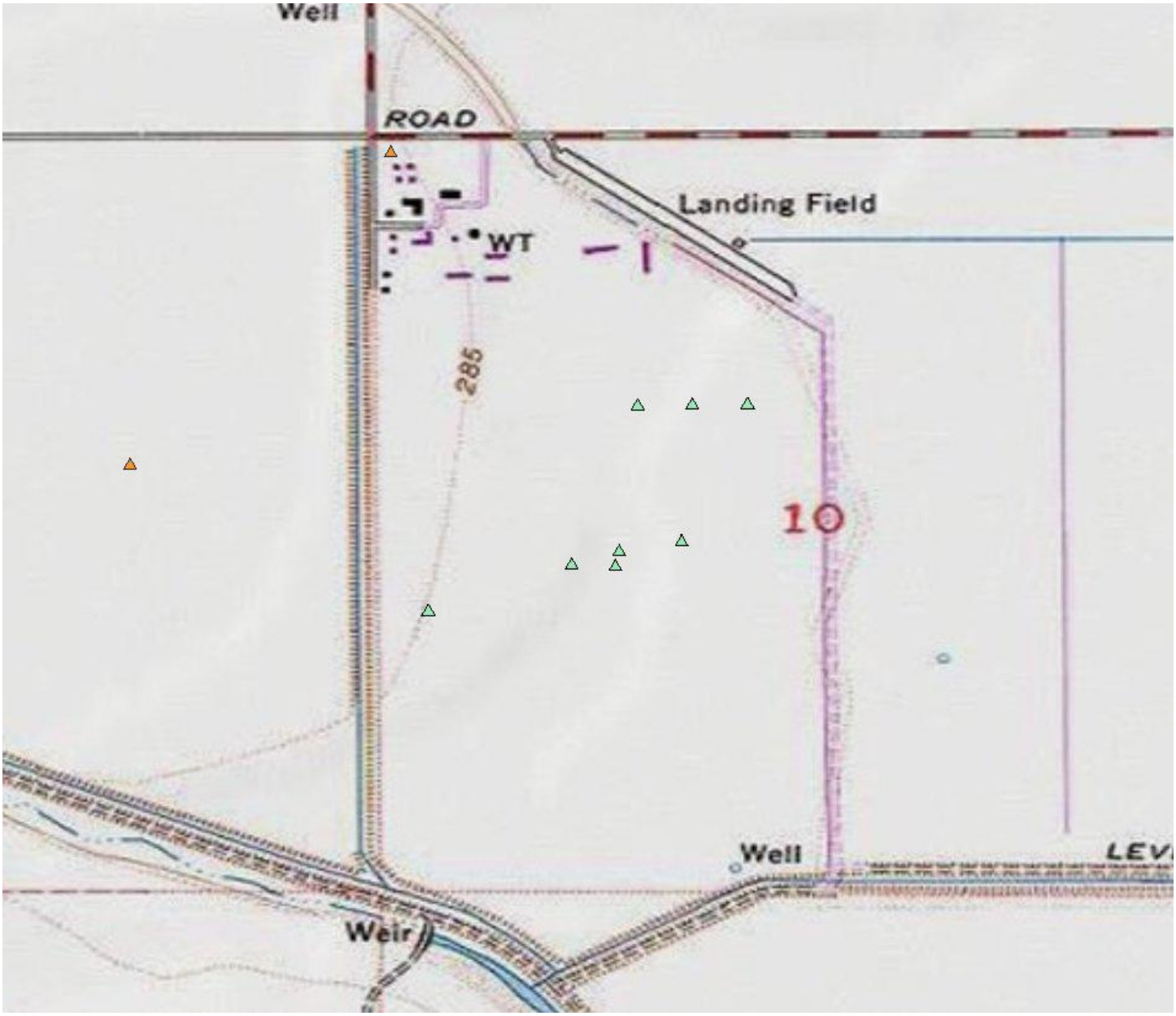
If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4550-OE.

Signature Control No: 194784452-197738550 (DNE)
Karen McDonald
Specialist

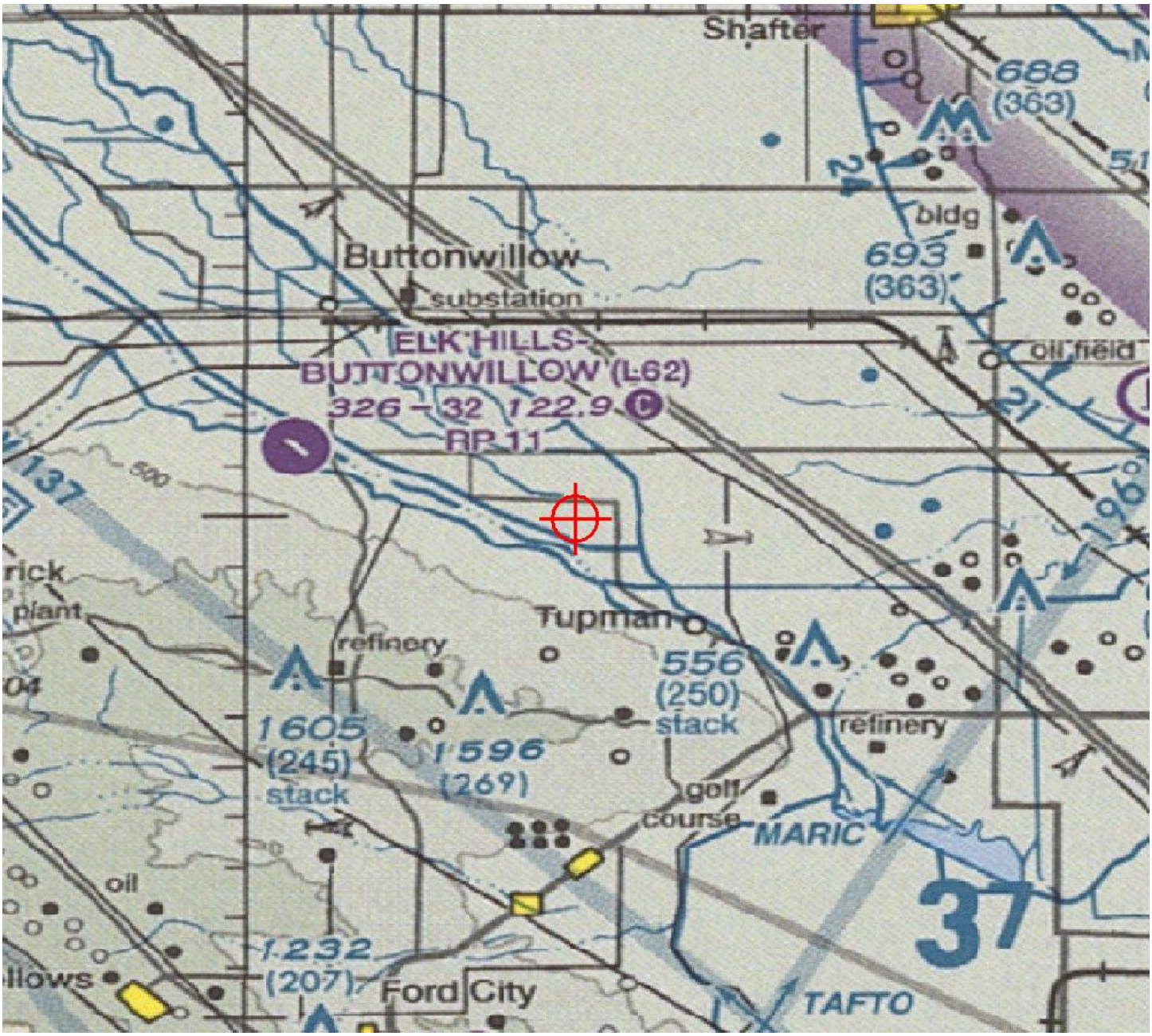
Attachment(s)
Case Description
Map(s)

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4550-OE



Sectional Map for ASN 2013-AWP-4550-OE



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Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4558-OE
Prior Study No.
2012-AWP-4425-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building #S - Acid Gas Removal Methanol Wash Column
Location:	Bakersfield, CA
Latitude:	35-19-56.99N NAD 83
Longitude:	119-23-18.48W
Heights:	289 feet site elevation (SE)
	330 feet above ground level (AGL)
	619 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, red lights - Chapters 4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

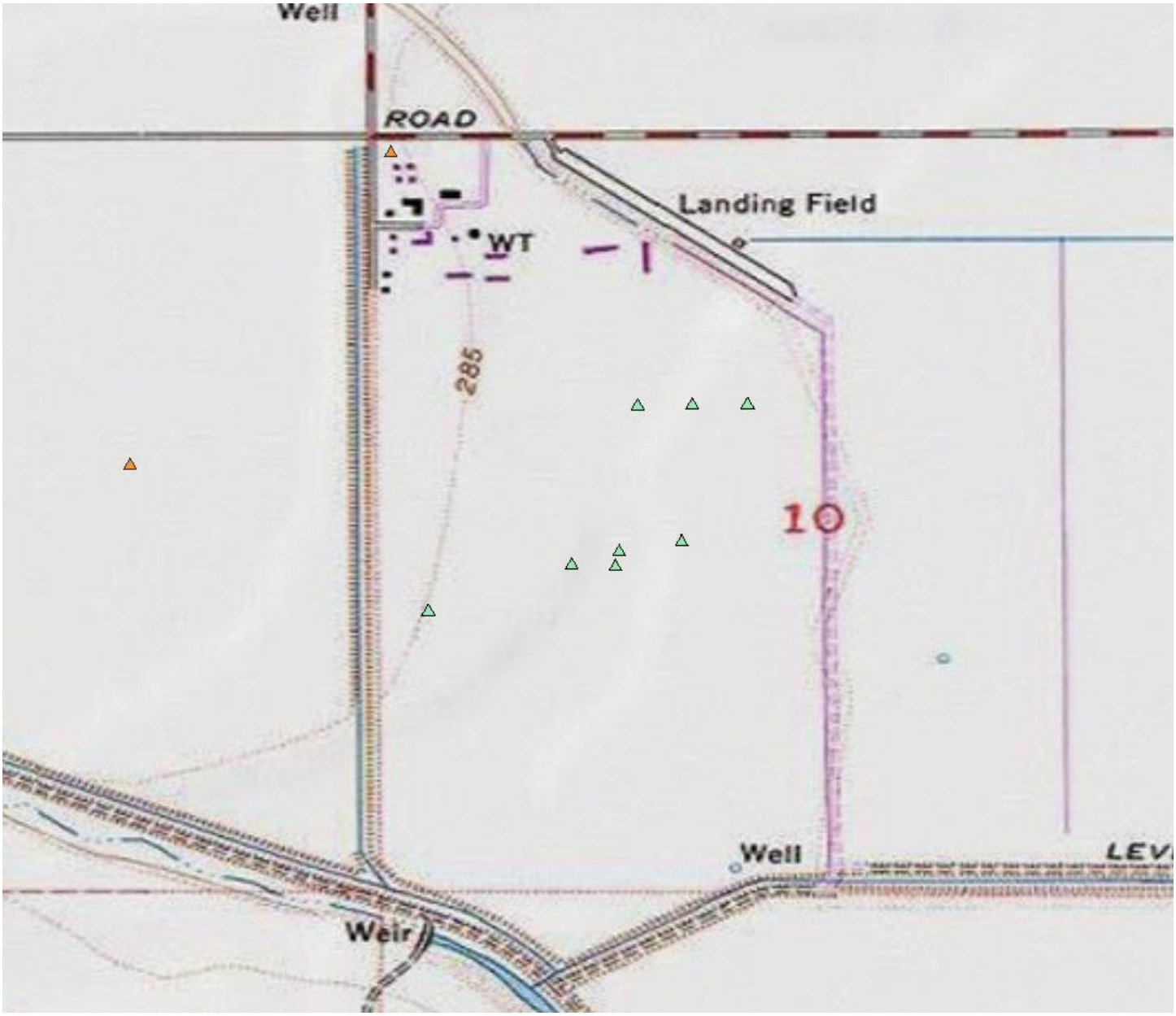
This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4558-OE.

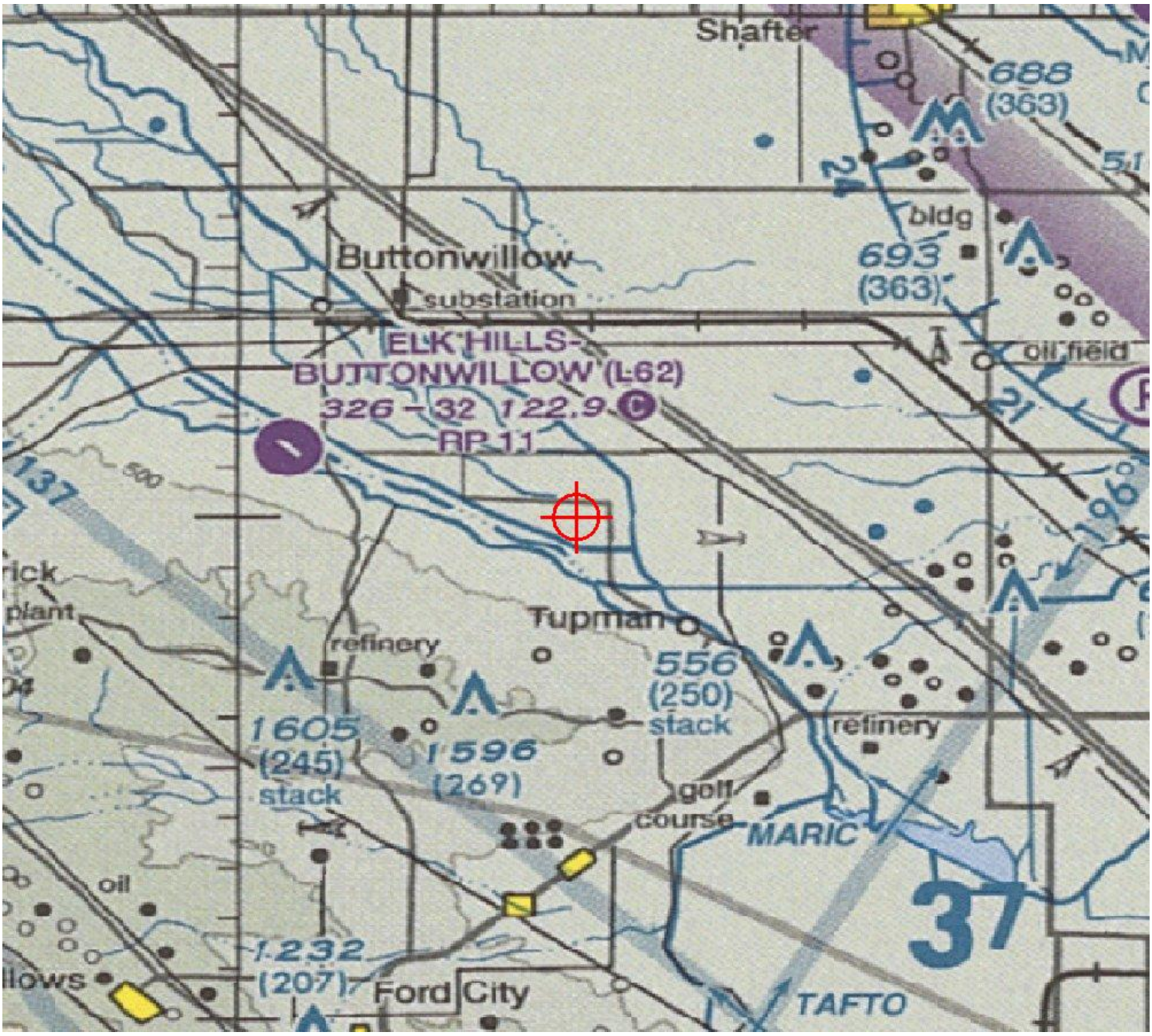
Signature Control No: 194785006-197747112 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.


Well
ROAD
Landing Field
WT
285
10
Well
Weir

Sectional Map for ASN 2013-AWP-4558-OE



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Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4557-OE
Prior Study No.
2012-AWP-4424-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building #G - Gasification Structure
Location:	Bakersfield, CA
Latitude:	35-19-56.32N NAD 83
Longitude:	119-23-22.83W
Heights:	289 feet site elevation (SE)
	305 feet above ground level (AGL)
	594 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, red lights - Chapters 4,5(Red),&12.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4557-OE.

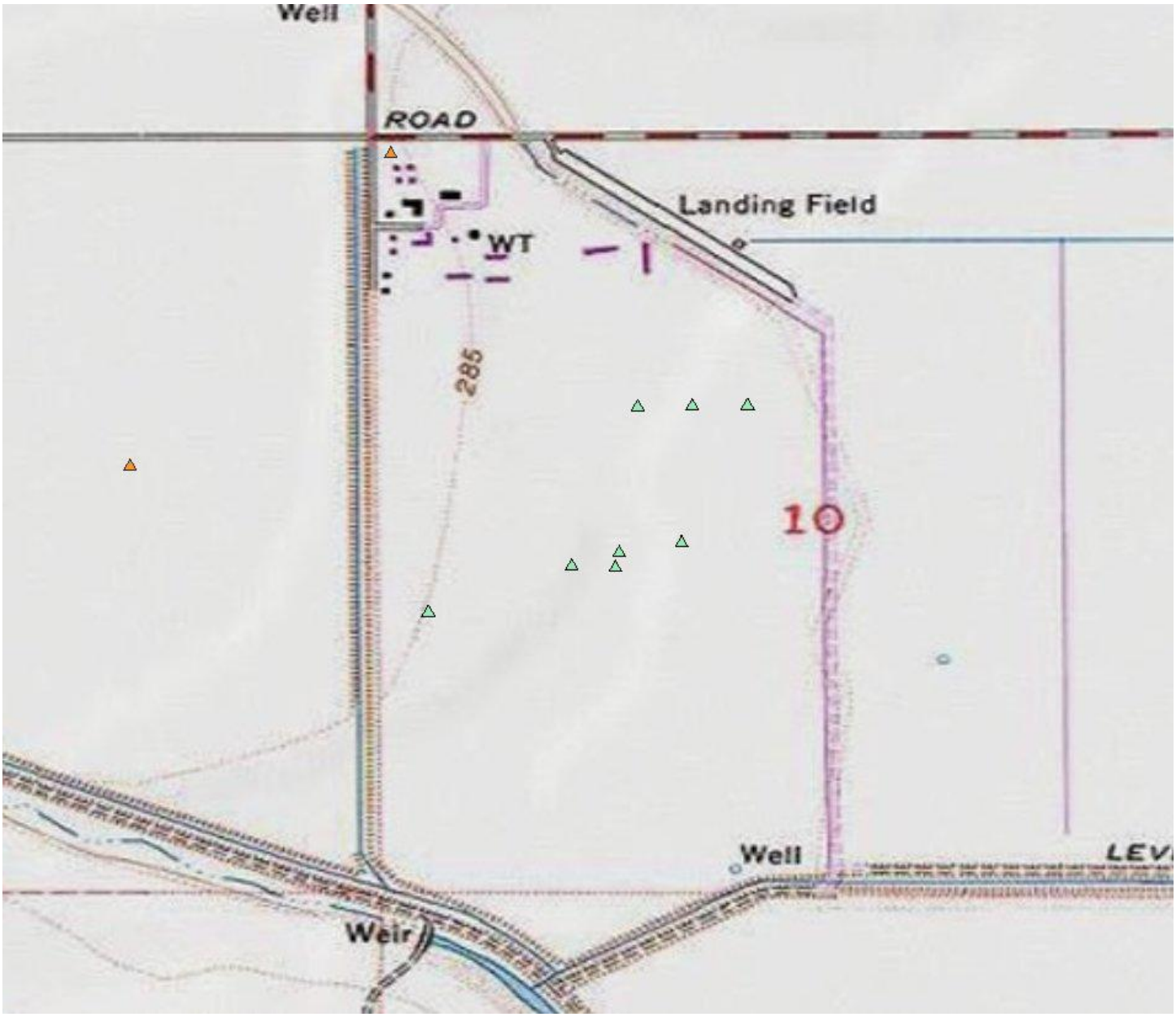
Signature Control No: 194784999-197747113 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

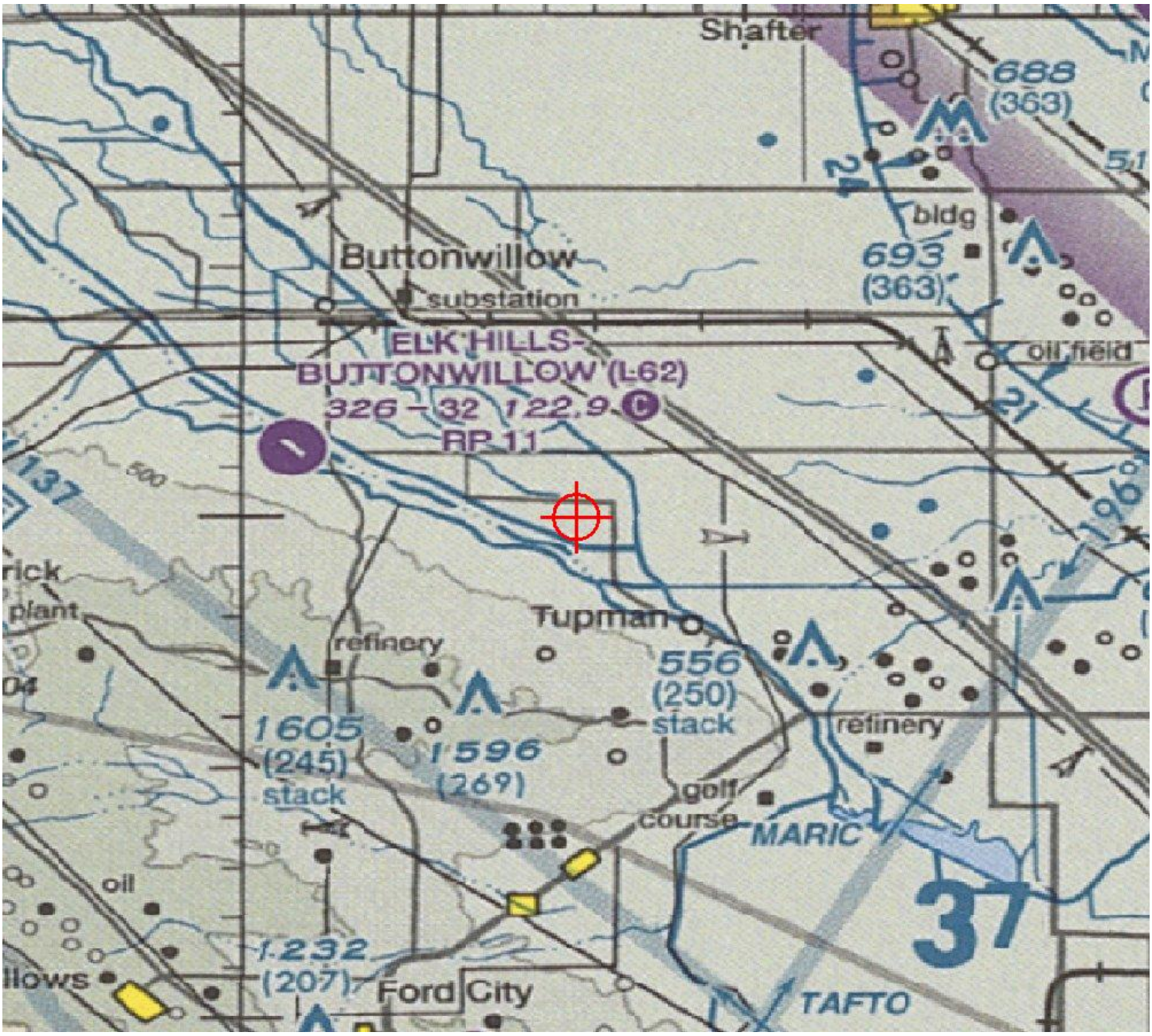
Case Description for ASN 2013-AWP-4557-OE

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4557-OE



Sectional Map for ASN 2013-AWP-4557-OE



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2013-AWP-4556-OE
Prior Study No.
2012-AWP-4417-OE

Issued Date: 09/09/2013

Ms. Marisa Mascaro
Hydrogen Energy California LLC
30 Monument Square, Suite 235
Concord, MA 01742

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Building #C - Air Separation Column Can
Location:	Bakersfield, CA
Latitude:	35-19-52.19N NAD 83
Longitude:	119-23-36.13W
Heights:	289 feet site elevation (SE)
	200 feet above ground level (AGL)
	489 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 03/09/2015 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

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If we can be of further assistance, please contact our office at (310) 725-6557. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2013-AWP-4556-OE.

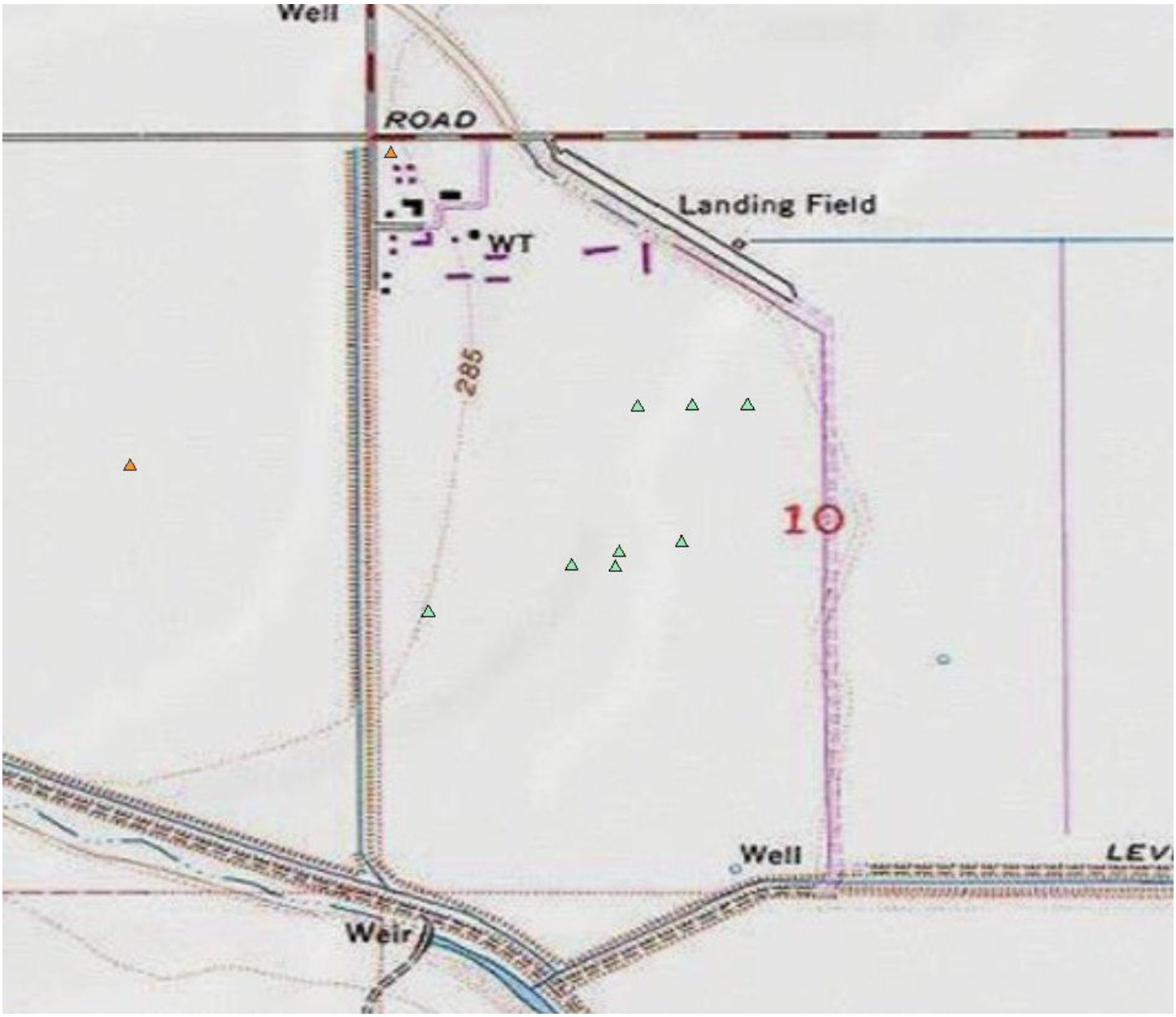
Signature Control No: 194784979-197747244 (DNE)
Karen McDonald
Specialist

Attachment(s)
Case Description
Map(s)

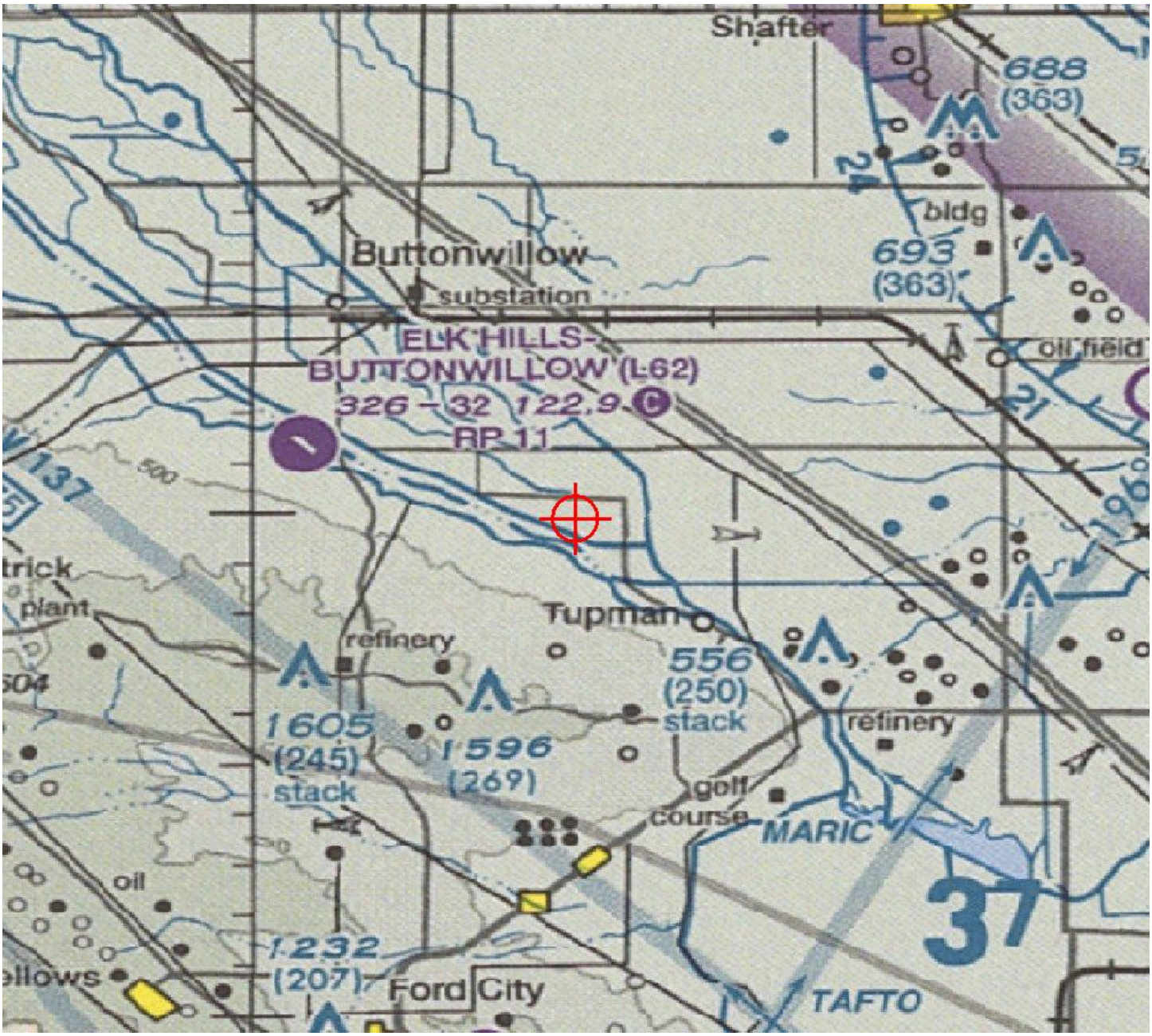
Case Description for ASN 2013-AWP-4556-OE

Hydrogen Energy California LLC is proposing an Integrated Gasification Combined Cycle polygeneration project called the Hydrogen Energy California (HECA) Project. Various structures associated with the HECA project will exceed 200 feet above ground level.

Verified Map for ASN 2013-AWP-4556-OE



Sectional Map for ASN 2013-AWP-4556-OE



APPENDIX C

UPDATED METHANOL TANK OFFSITE CONSEQUENCES ANALYSIS

APPENDIX C
UPDATED METHANOL OFFSITE CONSEQUENCES ANALYSIS
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APPENDIX C
UPDATED METHANOL OFFSITE CONSEQUENCES ANALYSIS

1.0 INTRODUCTION

HECA has refined the design of the Rectisol® unit and will use up to approximately 600,000 gallons of methanol in the unit. The methanol will be stored in an above-ground storage tank (AST) at atmospheric pressure and temperature conditions. The methanol tank has a 600,000-gallon capacity and a fixed roof. It is 55 feet tall above grade (with 48-foot-high sides) and is 46 feet in diameter. The methanol AST will be surrounded by a concrete sump that has an area of 20,000 square feet and a height of 4 feet.

The methanol AST is located away from the process unit to reduce hazards. A pump and isolation valve are placed on the piping between the storage tank and the acid gas removal (AGR) unit, physically isolating the AST and AGR unit. Methanol is considered to be a hazardous substance due to its flammable and moderately toxic chemical properties. Accordingly, the offsite consequences analysis for methanol has been updated.

2.0 APPLICABLE REGULATORY REQUIREMENTS

The Project will comply with applicable laws, ordinances, regulations, and standards (LORS) pertaining to the storage and use of hazardous materials. Methanol is not regulated under the California Accidental Release Prevention (CalARP) program, the federal Clean Air Act (CAA) Risk Management Program (RMP), and the Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM). As such, there are no specific threshold requirements for methanol. However, it is regulated as a hazardous material under various federal and state regulations (see Table 1), and is therefore evaluated here.

Table 1
Regulatory Program Applicability

Hazardous Chemical	Federal RMP Threshold (pounds)	State CalARP Threshold (pounds)	Federal PSM Threshold (pounds)	Regulatory Program Applicability
Methanol	N/A	N/A		The Project Site will have methanol on site for use in the Acid Gas Removal unit. Methanol will be stored within a large aboveground storage tank. The capacity of this tank is approximately 600,000 gallons. In addition methanol will be contained within process equipment and piping. Methanol is not regulated under the state CalARP, federal RMP, or federal PSM program enforcement. However, methanol is regulated under 29 CFR § 1910, 40 CFR §§ 116, 117, 355, 372, 302.

Notes:

CalARP	=	California Accidental Release Prevention
CFR	=	Code of Federal Regulations
lbs.	=	pounds
N/A	=	not applicable
RMP	=	Risk Management Plan
scf	=	standard cubic foot

3.0 OFFSITE CONSEQUENCE ANALYSIS

Offsite consequence analysis (OCA) modeling was performed to address the potential offsite impacts from a worst-case release scenario for each substance. The OCA modeling was used to determine if an accidental chemical release would remain within the Project Site or the Controlled Area, or extend off site.

The Project Site consists of the 453-acre area directly used for the IGCC electrical generation, low-carbon nitrogen-based products manufacture. The Controlled Area consists of an additional 653 acres of land, which surround the Project Site on the south, west, and north. Both the Project Site and Controlled Area are lands that will be owned by HECA. Therefore, HECA has control of all activities and development that may occur in either land. Territory extending beyond both the Project Site and Controlled Area boundaries is considered to be off site in this analysis.

The OCA models provide an examination of separate hazards: (1) the dispersion of the substances in the form of a vapor cloud; (2) the ignition of the released substance; and/or (3) pool fire. The modeling assumptions for a worst-case release scenario are that the total contents from the largest inventory (e.g., tank or pipe) are accidentally vented.

For dispersion modeling, the calculations also assumed the worst-case atmospheric conditions during such a release, when applicable. These conditions provide conservative results, because these extreme and unlikely climatic conditions maximize the vaporization to create the vapor cloud and minimize its dispersion. The specific atmospheric parameters under which a worst-case release scenario is examined are provided by the California Code of Regulations (CCR) Title 19 § 2750.2, and consist of the following:

- Temperature – The highest temperature—115 degrees Fahrenheit (°F)—is recorded for the area in the past 3 years. High temperatures are used because increased temperatures accelerate the vaporization rate of substances upon release.

- Average Humidity – 50 percent atmospheric humidity is used when performing the worst-case scenario evaluation. An average humidity of 50 percent is found during months providing the highest temperatures for the area. This level of humidity provides low interference for chemical dispersion, but is still taken into consideration to provide conservative results.

- Wind Speed – A 1.5-meter-per-second (m/s) wind speed is used when performing the worst-case scenario evaluation (equivalent to 4.92 feet per second [ft/s]). A low wind speed prevents the quick dispersion of vapor clouds.

- Atmospheric Stability – An atmospheric stability level of F is applied for the worst-case scenario OCA.[1] The Level F atmospheric stability provides the most stable atmospheric

[1] Level F atmospheric stability: provides the most stable atmospheric environment where the tendency of the atmosphere is to resist or enhance vertical motion and/or turbulence—this also contributes to minimum dissipation of the vapor cloud.

environment where the tendency of the atmosphere is to resist or enhance vertical motion and/or turbulence—this also contributes to minimum dissipation of the vapor cloud.

The U.S. Environmental Agency (USEPA) approved ALOHA® for use in examining the impacts from a hypothetical accidental spill. ALOHA® is a Gaussian plume model that incorporates continuous source and meteorological parameters.

For vapor cloud release calculations, the endpoint selected by the USEPA's RMP OCA guidance as a significance criterion is an overpressure of 1.0 pound per square inch (psi) for vapor cloud explosion. An overpressure of 1.0 psi may cause partial demolition of houses and shattering of glass windows. Blast impacts are also of concern wherever flammable materials and ignition sources are present, or where processes operate under high temperatures and pressures.

Models considering the ignition of a material (such as methanol) examine the impact from a vapor cloud release of the flammable material, or the heat or radiation derived from the ignition of the material. As stated above, the OCA for these scenarios uses the maximum quantity of the materials and the specific combustion characteristics of the material to conservatively assess the potential impact distance from either a vapor cloud release or a burning pool of liquid.

The following sections provide the specific modeling criteria, programs, and procedures applied for methanol.

3.1 Modeling Parameters

3.1.1 Methanol

Although the maximum storage capacity of the methanol AST is 600,000 gallons, the actual amount of methanol that would be on the Project Site is currently estimated to be 535,000 gallons. An initial volume of 535,000 gallons will be initially charged into the 600,000-gallon AST. Prior to facility start-up, and during normal operations, most of the methanol will be within process vessels, equipment, and piping. During normal operations, 63,600 gallons of methanol or less will remain in the AST. The total inventory of methanol would only be transferred back to the AST if the Rectisol® unit needs to be emptied for maintenance reasons. Therefore, a release scenario involving a release of the entire methanol inventory from a completely full 600,000-gallon AST is considered to be the absolute worst case.

Methanol is considered to be a hazardous substance due to its flammable and moderately toxic chemical properties. Methanol is listed in the following federal regulations:

- 29 CFR 1910.1200 (OSHA)
- 40 CFR 116 and 40 CFR 117 (USEPA)
- 40 CFR 355, Appendices A and B (USEPA)
- 40 CFR 372 (Superfund Amendments and Reauthorization Act [SARA] Title III)
- 40 CFR 302 (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA])

Although it is a listed hazardous substance, federal regulations do not require an OCA for the storage of methanol. Additionally, methanol is not regulated under applicable state regulations. Nonetheless, an OCA was conducted to evaluate the potential impact area associated with a worst-case methanol release at the Project Site. Because methanol is a flammable substance, the most severe potential consequence from an accidental worst-case release could be a vapor cloud release. The second potential consequence from an accidental worst-case release of methanol would be a burning pool of liquid.

3.2 Modeling Outputs

3.2.1 Pool Fires

For the methanol pool fire scenario, it was conservatively assumed that the entire contents of the methanol AST (600,000 gallons) is released, forming a burning pool of liquid.

ALOHA 5.4.3 Methodology

Site Data:

- Location: BAKERSFIELD, CALIFORNIA
- Building Air Exchanges Per Hour: 0.60 (unsheltered single storied)
- Time: May 21, 2013 – 0938 hours PDT (using computer's clock)

Chemical Data:

- Chemical Name: METHANOL
- Molecular Weight: 32.04 g/mol
- AEGL-1 (60 min): 530 ppm
- AEGL-2 (60 min): 2,100 ppm
- AEGL-3 (60 min): 7,200 ppm
- IDLH: 6000 ppm
- LEL: 71,800 ppm
- UEL: 365,000 ppm
- Ambient Boiling Point: 146.7° F
- Vapor Pressure at Ambient Temperature: 0.46 atm
- Ambient Saturation Concentration: 476,049 ppm or 47.6%

Atmospheric Data: (Manual Input of Data)

- Wind: 1.5 meters/second from e at 3 meters
- Ground Roughness: open country
- Cloud Cover: 5 tenths
- Air Temperature: 115°F
- Stability Class: F (user override)
- No Inversion Height
- Relative Humidity: 50%

Source Strength:

- Burning Puddle/Pool Fire
- Puddle Area: 20,000 square feet
- Puddle Volume: 600,000 gallons
- Initial Puddle Temperature: Air temperature
- Flame Length: 23 yards
- Burn Duration: ALOHA limited the duration to 1 hour
- Burn Rate: 4,270 pounds/min
- Total Amount Burned: 256,364 pounds

Threat Zone:

- Threat Modeled: Thermal radiation from pool fire
- Red: 54 yards --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)
- Red: 162 feet --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

USEPA Methodology

The radiation per unit area received by a receptor at some distance *x* from the point source of a pool fire is given by the following Equation 1 and is found in USEPA's RMP Guidance:

EQUATION 1

$$q = \frac{fmH_c\tau_a}{4\pi x^2}$$

where:

q	=	Radiation per unit area received by the receptor (watts per square meter)
m	=	Rate of combustion (kg/s)
τ_a	=	Atmospheric transmissivity
H_c	=	Heat of combustion of methanol (J/kg)
f	=	Fraction of heat of combustion radiated
x	=	Distance from point source to receptor (m)

The combustion rate of methanol can be estimated by the following Equation 2 and is found in USEPA's RMP guidance:

EQUATION 2

$$m = \frac{0.001 H_c a}{H_v + C_p(T_b - T_a)}$$

where:

q	=	Radiation per unit area received by the receptor (watts per square meter)
m	=	rate of combustion (kg/s)
τ_a	=	atmospheric transmissivity
H_c	=	Heat of combustion of methanol (J/kg)
H_v	=	Heat of vaporization of methanol (J/kg)
C_p	=	Liquid heat capacity (J/kg-K)
f	=	Fraction of heat of combustion radiated
x	=	Distance from point source to receptor (m)

By combining Equations 1 and 2 noted above, the following Equation 3 for liquid pools fire was determined.

EQUATION 3

$$x = H_c \sqrt{\frac{0.0001A}{5{,}000\pi(H_v + C_p(T_b - T_a))}}$$

where:

x	=	distance to the 5 kilowatt per square meter Endpoint (meters)
H_c	=	22,700,000 J/kg
H_v	=	1,100,000 J/kg
A	=	pool area (m^2)
C_p	=	2,482 J/kg-ºK
T_b	=	337.8 ºK
T_a	=	320 ºK

Parameter Inputs and Assumptions:

q	=	5,000 watts per square meter
τ_a	=	1
f	=	0.4

Equation 3 was used to determine the 5 kW/m^2 endpoint of a potential worst case complete methanol release from the AST. All variables noted in the equation are constant except the area of the pool fire, which is determined by the volume of released methanol assuming a uniformly 1-inch-thick pool. The table below shows the various dimensions of the release scenarios.

Methanol Release Quantity (gal.)	Methanol Release Quantity (ft^3)	Area Assumes 1-inch Thick Pool	
		Area (ft^2)	Area (m^2)
600,000	80,208.6	962,503	89,419

The following are the 5 kW/m^2 endpoint results for a 600,000-gallon pool fire derived from the equations and parameters listed.

$$x_{600,000} = 506.33 \text{ m} = 1{,}661 \text{ feet}$$

The above value assumes the entire quantity from the tank is completely spread out on the ground in a 1-inch pool without any form of containment. However, for the proposed 600,000-gallon tank, a 200-foot × 100-foot × 4-foot sump will be in place to act as secondary containment for the tank, which will reduce the distance to the 5 kW/m^2 endpoint. The sump is capable of holding the entire 600,000-gallon volume. Should the tank rupture and spill its entire contents, the sump would contain the methanol and only allow 200 feet × 100 feet area of methanol to be exposed to the atmosphere. The worst case scenario should be modeled around the fact that only 20,000 ft^2 of methanol would be exposed to the atmosphere and allowed to burn. Thus the following 5 kW/m^2 endpoint is calculated which accounts for the 20,000 square foot sump:

$$x_{sump} = 79.99 \text{ m} = 239 \text{ feet}$$

Thus, the presence of the sump reduces the endpoint impact distance to 240 feet.

3.2.2 Vapor Release

For the vapor release scenario, it was conservatively assumed that the entire contents of the methanol AST (600,000 gallons) are released and then vaporized instantaneously. Since methanol is a volatile flammable liquid, it has the potential to form a gaseous cloud in the atmosphere. The cloud could be ignited, causing an explosion which could create an overpressure wave that has the likelihood of shattering glass and knocking personnel off their feet at just 1 psi overpressure.

ALOHA 5.4.3 Methodology

The Source Strength calculation tool within USEPA's ALOHA 5.4.3 modeling software was used to estimate the amount of methanol vaporized. ALOHA 5.4.3 is able to determine the amount of substance released into the atmosphere given certain parameters. The parameters include temperature and the area of methanol exposed to the atmosphere. The ALOHA 5.4.3 parameters and results are as follows.

Site Data:

- Location: RIVERSIDE, CALIFORNIA
- Building Air Exchanges Per Hour: 0.60 (unsheltered single storied)
- Time: May 21, 2013 0938 hours PDT (using computer's clock)

Chemical Data:

- Chemical Name: METHANOL
- Molecular Weight: 32.04 g/mol
- AEGL-1 (60 min): 530 ppm
- AEGL-2 (60 min): 2100 ppm
- AEGL-3 (60 min): 7200 ppm
- IDLH: 6000 ppm
- LEL: 71800 ppm
- UEL: 365000 ppm
- Ambient Boiling Point: 146.7° F
- Vapor Pressure at Ambient Temperature: 0.46 atm
- Ambient Saturation Concentration: 476,049 ppm or 47.6%

Atmospheric Data: (Manual Input of Data)

- Wind: 1.5 meters/second from E at 3 meters
- Ground Roughness: open country
- Cloud Cover: 5 tenths
- Air Temperature: 115° F
- Stability Class: F (user override)
- No Inversion Height
- Relative Humidity: 50%

Source Strength:

- Evaporating Puddle (Note: chemical is flammable)
- Puddle Area: 20,000 square feet
- Puddle Volume: 600,000 gallons
- Ground Type: Concrete
- Ground Temperature: 115° F
- Initial Puddle Temperature: Ground temperature
- Release Duration: ALOHA limited the duration to 1 hour
- Max Average Sustained Release Rate: 680 pounds/min (averaged over a minute or more)
- Total Amount Released: 37,889 pounds

Threat Zone:

- Threat Modeled: Overpressure (blast force) from vapor cloud explosion
- Type of Ignition: ignited by detonation
- Model Run: Heavy Gas

Red: 173 yards --- (1.0 psi = shatters glass)

Parameters input into ALOHA 5.4.3 are considered to be on the conservative side. For example, the methanol temperature and ground temperature were assumed to be at 115° F, which was the highest recorded temperature for the area in the past 5 years. A factor of 10 is also included in order to ensure that the scenario is a worst-case release scenario.

W	**=**	**37,889 pounds * 10**	**=**	**378,890 pounds**
D_{sump}	**=**	**0.46 miles**	**=**	**2,428.8 feet**

ALOHA 5.4.3

Red: 173 yards --- (1.0 psi = shatters glass)

Red: 519 feet --- (1.0 psi = shatters glass)

USEPA Methodology

The following equation uses the TNT-equivalency method of determining the distance of a 1 psi overpressure and is found in USEPA's RMP Guidance documents.

EQUATION 4

$$D_{mi} = 0.0081(0.1W_{lbs}\frac{H_c}{H_{c\,TNT}})^{1/3}$$

where:

D	=	Distance of overpressure (miles)
W	=	Weight of flammable substance (pounds)
H_c	=	Heat of Combustion of Methanol and TNT (22,700 kJ/kg)
$H_{c\,TNT}$	=	Heat of Explosion of TNT (4,680 kJ/kg)

A density value of 791.80 kg/m^3 or 6.61 lbs/gal was used to convert the tank volumes into a weight. The following table details the conversion:

Methanol	
Gallons	**Pounds**
600,000.00	3,964,734.75

Given the above listed weight, an overpressure of 1 psi from the blast force generated by the explosion of a methanol gas cloud can potentially reach the following distance, given that the entire content of the tank is instantly vaporized:

$D_{600,000}$ = 1.01 miles = 5,332.8 feet

The scenario of the contents of a tank instantly vaporizing upon release is an unrealistic one since the physical properties of methanol make this impossible; therefore, the estimated impact distances are drastically overestimated.

3.3 Results of Modeling

The methanol storage area is approximately 0.11 mile from the Project Site's east and west boundaries and 0.4 mile from the Controlled Area boundaries on the north and south. As discussed in the Section 3.1, Modeling Parameters, two worst-case scenarios were modeled for methanol: (1) pool fire; and (2) vapor cloud release. The two calculations use different models and methods. USEPA's Guidance document uses the TNT-Equivalence method, while ALOHA 5.4.3 uses the Baker-Strehlow-Tang method.

Modeling indicated that a potential methanol pool fire resulting from the worst-case complete release of a single tank may reach a distance of 162 feet (.03 mile), based on the ALOHA method and 239 feet (0.05 mile) based on the USEPA method from the center of the methanol pool. Therefore, the potential impact distance from the methanol pool fire scenario would be within the Project Site.

The modeling showed that the potential impact distance from a worst-case methanol vapor cloud release may reach a distance of approximately 519 feet (0.1 mile) from the location of the tank, based on the ALOHA method, and would stay within the boundary of the Project Site. Using the USEPA method, the potential impact distance could be 2,425 feet (0.5 mile). Therefore, the potential impact from the methanol vapor cloud release could extend into the Controlled Area north and south of the Project site. There would be no potential offsite impact for a worst-case methanol vapor cloud release, even when using the conservative USEPA methodology.

As discussed in Section 3.1, the modeling assumes a highly unlikely event and worst-case conditions. These assumptions do not take into account any safety measures that will be employed for the Project. For example, safety measures in the Project Site will include a fire suppressant foam system surrounding the methanol storage tank and within the berm area, and a fire water system. The implementation of these safety measures will significantly reduce the likelihood of a pool fire and/or vapor cloud explosion. The potential impacts from the use and storage of methanol on the Project Site will be less than significant.

Summary of Results

	Method of Calculation	
	600,000-Gallon Tank (w/ Sump)	
Scenario	**USEPA Guidance Eq.**	**ALOHA 5.4.3**
Pool Fire	239 feet	162 feet
Vapor Cloud Explosion	2,425 feet	519 feet