

HAZARDOUS MATERIALS MANAGEMENT

Testimony of Geoff Lesh, PE and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff concludes that hazardous materials use at the proposed HHSEGS would not present a significant impact on the public or environment. With adoption of the proposed mitigation measures/conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards (LORS).

These Conditions of Certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and serve as staff's recommendations for the Energy Commission to consider in its decision to avoid or reduce the severity of hazardous material-related impacts to less than significant and for the project to conform to all applicable LORS.

INTRODUCTION

The purpose of this **HAZARDOUS MATERIALS MANAGEMENT** section of this Final Staff Assessment (FSA) is to determine if the proposed HHSEGS could potentially cause significant impacts on the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts on the public are identified, Energy Commission staff must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes the protection of workers from those risks.

For this analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether the risk to local populations is significant. Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there won't be significant off-site impacts. These measures look at potential direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, staff seeks to confirm that the applicant has proposed secondary containment basins for containing hazardous material liquids, and that volatile chemicals would have a restricted exposure to the atmosphere after capture. Containment basins are designed to be able to hold the contents of a full tank plus the potential rainfall from a 25-year storm without any loss of containment. In the event of a spill, the spilled material, along with any mixed-in water and any

contaminated soils, would then be placed into containers and processed and disposed of as required by regulations.

Hazardous materials such as mineral and lubricating oils, corrosion inhibitors, herbicides, and acids and bases to control pH would be present at the proposed project site. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on-site during construction. None of these materials pose a significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

Although no natural gas is stored, the project will involve the handling of moderate amounts of natural gas. Natural gas poses some risk of both fire and explosion. The risk of a fire and/or explosion on-site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices.

The HHSEGS would also require the transportation of certain liquid and solid hazardous materials to the facility. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies (see **HAZARDOUS MATERIALS MANAGEMENT Table 1** below) apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

**HAZARDOUS MATERIALS MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)**

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.

Applicable Law	Description
§112(r)	
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.
49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
6 CFR Part 27	The CFATS (Chemical Facility Anti-Terrorism Standard) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
California Health and Safety Code, sections 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) may require the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Title 8, California Code of Regulations, section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations, section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, Section 41700	Requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency

Applicable Law	Description
	to cause injury or damage to business or property.”
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
LOCAL	
None	

The Certified Unified Program Agency (CUPA) with the responsibility to review the Hazardous Materials Business Plan (HMBP) is the Inyo County Environmental Health Services Department (ICEHSD). With regard to seismic safety issues, the site is located in a seismically active region of California. Construction and design of buildings and vessels storing hazardous materials will meet the appropriate seismic requirements of the 2010 California Building Code.

METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff’s analysis examines the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials traveling off-site and affecting the public, staff analyzed several aspects of the proposed use of materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant would use the chemicals, the manner by which they would be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

Staff reviewed the applicant’s proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

Staff reviewed and evaluated the proposed use of hazardous materials, as described by the applicant (HHSEG 2011a, section 5.5). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and amounts proposed for on-site use, as listed in the revised Table 5.5-3R2 of the Application for Certification (AFC) (CEC 2012jj), and determined the need and appropriateness of their use. Only those that are needed and appropriate are allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.
- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff would propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the project be allowed to use hazardous materials.

PROPOSED PROJECT

SETTING AND EXISTING CONDITIONS

The Hidden Hills Solar Electric Generating System (HHSEGS) will be located on privately-owned land, leased in Inyo County, California, adjacent to the Nevada border. It will comprise two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant will generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 will occupy approximately 1,483 acres (or 2.3 square miles), and Solar Plant 2 will occupy approximately 1,510 acres (or 2.4 square miles). A 103-acre common area will be established on the southeastern corner of the site to accommodate an administrative building, warehouse, maintenance complex, a gas metering station, and an onsite 138 kV switchyard. A temporary construction laydown and parking area on the west side of the site will occupy approximately 180 acres. (HHSG 2011a, section 5.5.1)

Each solar plant will use heliostats, which are elevated mirrors guided by a tracking

system mounted on a pylon, to focus the sun's rays on a solar receiving steam generator (SRSG) on top of a 750-foot tall solar power tower near the center of each solar field. In each plant, one Rankine-cycle steam turbine will receive steam from the SRSG (or solar boiler) to generate electricity. The solar field and power generation equipment will start each morning after sunrise and will shut down when insolation drops below the level required to keep the turbine online.

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material. These include:

- local meteorology;
- terrain characteristics; and
- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the **AIR QUALITY** section of the Application for Certification (AFC) (HHS 2011a) and **FSA**.

TERRAIN CHARACTERISTICS

HHSEGS will be located in southern California's Mojave Desert in Inyo County adjacent to the California-Nevada border. The project site is located in a rural area and is currently undeveloped and unoccupied. The topography of the project site slopes gently, with the highest point in the southeastern corner and the lowest point along the northwest boundary. Sandy alluvium extends onto the project site from the northeast and larger ephemeral washes enter the project site from the east near the California-Nevada state line. The climate at the project site is arid with extreme fluctuations in daily and seasonal temperatures. Rainfall mostly occurs from November through March with late summer rainfall (approximately 0.3 inch per month) a regular occurrence. According to the California Department of Forestry and Fire Protection (CAL FIRE) 2008 Local Responsibility Fire Severity Maps, the project site is within a moderate fire hazard severity zone. (CH2 2012z, p. 70)

Access to the project site is provided via Tecopa Road (also known as Old Spanish Trail Highway), located to the east and south of the project site. State Route 160 (SR 160), located approximately 9 miles to the east of the project site in Nevada, is connected to the project site via Tecopa Road. Tecopa Road connects Nevada SR 160 to California State Route 127 (SR 127) located approximately 28 miles to the west of the project site. Regional access to the project area is provided via Interstate 15 (I-15) located approximately 37 miles to the southeast of the project site. Secondary access to the project site will be from Tecopa Road along the west side of the project site and then

along a paved road between the two solar plants. The internal roadway and utility corridors for each heliostat field and its power block will contain a 20-foot-wide paved or hardscape access road from the entrance of the solar plant site to the power block, and then around the power block.

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk.

Identification of sensitive receptors is typically done to ensure that notice of possible impacts is provided to the community. No daycare, hospital, park, preschool, or school receptors were found within 6 miles of the project site. A sparsely populated rural residential community, Charleston View, lies immediately south of the proposed project site and Tecopa Road. The St. Therese Mission, a commercial facility, is under construction approximately 0.5 mile southeast of the HHSEGS site (immediately north of Tecopa Road). Because this development is planned to include a chapel, garden, restaurant, visitor center that will include a children's playground, and a residential unit, this future development will be treated as a sensitive receptor. The Front Sight Firearms Training Institute is located in Nevada approximately 1.7 miles north of the project site. This facility offers firearm classes during both the day and nighttime hours, including nighttime courses. The nearest residence to any power block equipment is approximately 3,500 feet south of the Solar Plant 2 power block and about 950 feet south of the project's southern boundary (HHSO 2011a, Sect 5.9.3).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direction/Indirect Impacts and Mitigation

Small Quantity Hazardous Materials

In conducting this analysis, staff determined in Steps 1 and 2 that most of the proposed materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in either solid form or in small quantities, have low mobility, low vapor pressure, or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, welding gases, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, sodium hydroxide, diesel fuel, aqueous ammonia (19 percent), sulfuric acid (96 percent) and other various chemicals (see **Hazardous Materials Appendix A** for a list of all chemicals proposed to be used and stored at HHSEGS) would be used and stored on-site and represent limited off-site hazard due to a combination of their small quantities, low volatility, and/or low toxicity¹.

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous material: natural gas.

Large Quantity Hazardous Materials

Natural Gas

Although no natural gas is stored, the project would involve the handling of moderate amounts of natural gas. Natural gas poses some risk of both fire and explosion. The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each solar plant will include two types of gas-fired boilers: the auxiliary boiler and the nighttime preservation boiler (described previously). The auxiliary boiler will have a capacity of 350,000 pounds per hour (lb/hr) at 950° F and 1,450 psia. The night preservation boiler will provide superheated steam to the STG and boiler feedwater pump gland systems overnight and during other shutdown periods when steam is not available from the SRSG. The night preservation boiler will produce 8,000 lb/hour at 680° F and 145 psia.

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed mostly of methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, and tasteless and is lighter than air. Natural gas can cause asphyxiation when methane is 90 percent in concentration. Methane is flammable when mixed in air at concentrations of 5 to 14 percent, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or possible explosion if a release occurs under certain confined conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to cause explosions than many other fuel gases such as propane or liquefied petroleum gas, but can explode under certain conditions (as demonstrated by the natural gas detonation in Belgium in July 2004).

The risk of a fire and/or explosion on site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85A requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas-fired boilers prior to start up, thereby precluding the presence of an explosive mixture. The safety management plan proposed by the applicant would

¹ Boiler Optimization Plan, Hazardous Material Handling, CH2 2012p, pp 5-6:

address the handling and use of natural gas and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

While natural gas would be used in significant quantities, it would not be stored on site. It would be delivered via a new 12-inch-diameter natural gas pipeline to the HHSEGS project site. The gas pipeline would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the HHSEGS site at the California-Nevada border, extending 32.4 miles to the Kern River Gas Transmission (KRG T) existing mainline system just north of Goodsprings in Clark County, Nevada.

The transmission and natural gas pipeline alignments will be located in Nevada, primarily on federal land managed by the U.S. Bureau of Land Management (BLM). A detailed environmental impact analysis of the transmission and natural gas pipeline alignments will be prepared by BLM (HHSG 2011a, Sect 5.12.1).

On site, the gas line will enter the project in the common area and travel about 900 feet to the gas metering station, from there it will continue northwest along the edge of the Solar Plant 2 solar field to the common road between Solar Plants 1 and 2. It will continue down that road to the access road going to each power block. The total distance of the on-site gas line from the gas metering station to the metering set at the power block is 2.4 miles for Solar Plant 1 and 2.3 miles for Solar Plant 2 (see **PROJECT DESCRIPTION FIGURE 2**).

A gas-metering station will be required at the KRG T tap point to measure and record gas volumes. Additionally, a gas meter station will be required in the common area and a gas metering set will be installed at each power block. Construction activities related to the metering station will include grading a pad and installing above- and belowground gas piping, and metering equipment. Pigging facilities will be installed at the HHSEGS meter station, and at the KRG T meter station. A distribution power line for the metering station operation lighting and communication equipment will be installed, and the metering station perimeter will be fenced for security (HHSG 2011a, section 4.2.2).

The natural gas pipeline will be designed to comply with 49 CFR 192, federal standards for gas transmission pipelines (HHSG 2011a, section 4.3). The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192 (see Table 1 LORS), and ASME B31 piping codes. Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure. Additionally, in-California portions of the gas pipeline that would be constructed for this project would be located entirely on-site, which greatly reduces the risks of impacts to the public from a rupture or failure.

Recent incidents have demonstrated significant risks associated with purging of new pipelines with natural gas. On June 28, 2010, the United States Chemical Safety and Hazard Board (CSB) issued Urgent Recommendations to the United States Occupational Safety and Health Administration (OSHA), the National Fire Protection Association (NFPA), the American Society of Mechanical Engineers (ASME), and major gas turbine manufacturers to make changes to their respective regulations, codes, and guidance to require the use of inherently safer alternatives to natural gas blows for the

purposes of pipe cleaning. Recommendations were also made to the fifty states to enact legislation applicable to power plants that prohibits flammable gas blows for the purposes of pipe cleaning. In accordance with those recommendations, staff proposes Condition of Certification **HAZ-6** which prohibits the use of flammable gas blow for pipe cleaning at the facility either during construction or after the start of operations.

All fuel gas pipe purging activities shall vent any gases to a safe location outdoors, away from workers and sources of ignition. Fuel gas pipe cleaning and purging shall adhere to the provisions of most current versions of the National Fuel Gas Code (NFPA 54 and 56-PS) including all Temporary Interim Amendments.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Usage of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage;

Physical separation of stored chemicals in isolated containment areas, separated by a noncombustible partition in order to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program would be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY AND FIRE PROTECTION** section in this **FSA** for more details and specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and

- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At HHSEGS, the project owner would be required to designate an individual who would have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official would oversee the health and safety program and would have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

Staff proposes Condition of Certification **HAZ-1** to ensure that no hazardous material would be used at the facility except as listed in the AFC and reviewed for appropriateness, unless there is prior approval by the Energy Commission compliance project manager (CPM). Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts as listed in **Hazardous Materials Appendix A** to be approved by the CPM. Only those that are needed and appropriate would be allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.

A Hazardous Materials Business Plan (HMBP) would also be prepared by the project owner that would incorporate state requirements for the handling of hazardous materials (HHSG 2011a, section 5.5.4). The HMBP includes:

- Inventory and Site Map,
- Emergency Response Plan
- Owner/Operator Identification
- Employee Training

Staff proposes Condition of Certification **HAZ-2**, which ensures that the HMBP would be provided to the Southern Inyo Fire Protection District (SIFPD), so that SIFPD can better prepare emergency response personnel for handling emergencies which could occur at the facility. In accordance with Condition of Certification **HAZ-3**, the project owner would also be responsible to develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan would include procedures, protective equipment requirements, training and a checklist. It would also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan would be applicable during construction, commissioning, and operation of HHSEGS.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan which includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

A Spill Prevention Control and Countermeasure (SPCC) Plan is required by Federal Regulations (see LORS above) and would be prepared for the petroleum-containing hazardous materials (HHS 2011a, Sect 5.5.6.4.3).

Southern Inyo Fire Protection District (SIFPD) operates one year-round fire station, the Tecopa Station, located at 410 Tecopa Hot Springs Road in Tecopa, California, approximately 27 miles southwest of HHSEGS. The station has an approximate 30- to 40-minute response time to the project site. The SIFPD equipment consists of two Light Rescue Units, two Type 2 Engines, one Basic Life Support Ambulance, and one Ambulance (not staffed). SIFPD indicated in communications in March and July of 2011 that local firefighters are equipped to handle simple HazMat incidents, but that Pahrump Valley Fire Rescue Services (PVFRS) and Nye County Emergency Services (NCES) would need to be called in for assistance with more complex situations given their mutual aid agreements with Inyo County (CEC 2011j).

The PVFRS Main Station² in Pahrump, Nevada, is the closest HazMat responder. It is located 26 road miles from the project site, and has an approximately 40 minute response time. Nye County Emergency Services³ has a HazMat team that operates through the Nye County Fire Department's Station 51 in Pahrump, which is 28 road miles from the project site, and has an approximate response time of 45 minutes. Station 51 is staffed with 15 to 20 volunteers who are trained as HazMat technicians. The team has the following equipment, as of April 2011: one HazMat truck with 25-foot trailer, one biohazard unit, one fire engine, and one ambulance (HHS 2011a, Sect 5.5.4.3).

Staff concludes that, given the remote location and the very unlikely potential for any spill to cause an off-site impact, the hazardous material response time is acceptable. The remote location lengthens the response but, at the same time, eliminates the risk of off-site consequences to the public.

Transportation of Hazardous Materials

Containerized hazardous materials and cleaning chemicals would be transported periodically to the facility via truck and will occur over prearranged routes. While many types of hazardous materials would be transported to the site, previous modeling of spills involving much larger quantities of more toxic materials, (aqueous ammonia and 93 percent sulfuric acid) - two hazardous materials that would be used, stored, and transported at the proposed power plant – has demonstrated that minimal airborne concentrations would occur at short distances from the spill.

The primary regional transportation corridors within the project area include Interstate 15 (I-15), Nevada State Route 160 (NSR160), and California State Route 127 (CSR 127). The project area is primarily served by NSR 160 and local streets, including

² www.pahrumpfire.biz

³ www.nyecounty.net

Tecopa Road that serves the project site. Although the HHSGS would be located in California, due to the location of the project site adjacent to the California-Nevada border, it is anticipated that the majority of the employees and construction workers would access the project site by way of the NSR 160/Tecopa Road intersection in Nevada. For a more detailed discussion traffic impacts associated with both the construction and operation of HHSEGS, please see the **Traffic and Transportation** section of this **FSA**.

During construction and operation of HHSEGS, staff believes that minimal amounts, small shipment sizes, and the types of hazardous materials (water treatment chemicals, paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, and welding gases in standard-sized cylinders) do not pose a significant risk of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Transportation of hazardous materials will comply with the applicable regulations for transporting hazardous materials, including the U.S. Department of Transportation, EPA, California Department of Toxic Substances Control, California Highway Patrol (CHP), and California State Fire Marshal. Specifically, California Vehicle Code sections 31303 and 32105 require that hazardous materials be transported along the shortest route possible and that transporters obtain a Hazardous Materials Transportation License from the CHP. Also, Nevada Administrative Code 459.9785 requires the transporter to hold a uniform permit and a safety permit issued by the Federal Motor Carrier Safety Administration of the United States Department of Transportation and to certify that it has a satisfactory security program as required by 49 CFR 385.407(b), including a written route plan that meets the requirements of 49 CFR 397.101. If the use of routes within Clark or Nye counties is needed, their respective codes specify the permitting requirements (HHSG, section 5.12.4.3.1).

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in a vapor cloud of hazardous materials that could move off-site and impact residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, staff conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake.

Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **GEOLOGY AND PALEONTOLOGY** and **FACILITY DESIGN** in the AFC, staff notes that the proposed facility would be designed and constructed to the applicable standards of the 2010 California Building Standards Code (HSG 2011a, section 2.3.1.1). Therefore, on the basis of occurrences at Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not likely and do not represent a significant risk to the public.

Site Security

HHSEGS proposes to use hazardous materials where special site security measures should be developed and implemented to prevent unauthorized access. US EPA published a *Chemical Accident Prevention Alert* regarding site security (EPA 2000a), the U.S. Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002), the North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S. Department of Homeland Security published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. Staff believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-4** and **HAZ-5** address both Construction Security and Operations Security Plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that HHSEGS would fall into the "low vulnerability"

category, so staff proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures⁴ include perimeter fencing and breach detectors, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. Department of Transportation (DOT) requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. The Energy Commission's compliance project manager (CPM) may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electric Reliability Corporation (NERC), after consultation with appropriate law enforcement agencies and the applicant.

Intentional Destructive Acts

Solar generation projects can be the subject of intentional destructive acts ranging from random vandalism and theft to sabotage and acts of terrorism intended to disable the facility. Acts of vandalism and theft are far more likely to occur than sabotage or terrorism. Theft usually involves equipment at substations and switchyards that contain salvageable metal when metal prices are high. Vandalism usually occurs in remote areas and is more likely to involve spontaneous acts such as shooting at equipment. Theft or opportunistic vandalism is more likely than sabotage or terrorist acts, which are considered to be a negligible risk.

As indicated above, in order to keep the project infrastructure secure from threats from intentional destructive acts, the project site would be physically secured and staffed. Furthermore, uncontrolled access would be prevented through the use of access controls. Discussion of the project's site security plan also occurs in the **SOCIOECONOMICS** and **WORKER SAFETY / FIRE PROTECTION** sections of this **FSA**.

Protection of widely dispersed electrical generation equipment, substations, and thousands of miles of transmission lines from destructive acts is not practical. Damaged equipment and transmission lines may be quickly repaired or replaced in the same manner that storm damaged equipment are returned to service. The results of any such acts could be expensive to repair, but no substantial impacts to continued electrical

⁴ Draft Construction Site Security Plan provided by applicant under confidential cover on April 16, 2012 as Supplemental Data Responses Set 3, Data Response SE-6.

service would be anticipated. No significant environmental impacts would be expected from physical damage to the proposed HHSEGS project or from loss of power delivery.

Facility Closure and Decommissioning

The requirements for handling of hazardous materials remain in effect until such materials are removed from the site, regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner that poses a risk to surrounding populations, staff would coordinate with the California Office of Emergency Services, the Inyo County Environmental Health Services Department, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated.

CEQA Level of Significance

Staff's analysis of impacts associated with the storage, use, and handling of hazardous materials at the proposed HHSEGS has determined that impacts would be below the level of significance if staff's proposed conditions of certification are adopted.

CUMULATIVE IMPACTS AND MITIGATION

Staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed HHSEGS with other existing or foreseeable nearby facilities as listed in the **Cumulative Scenario** section. Because of the small amounts of the hazardous chemicals to be stored at the facility, staff determined that there was essentially no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of hazardous chemicals (the closest proposed major projects in the general area such as Element Solar and Sandy Valley Solar being five or more miles away, see **Cumulative Effects Figure 2**), there is little (if any) possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of HHSEGS would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation would not pose a significant impact on the public. Staff's analysis also shows that there would be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk of exposure to an accidental release of hazardous materials. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have significant impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to the **BIOLOGICAL RESOURCES, AIR QUALITY, SOILS and SURFACE WATER, WATER SUPPLY, WASTE MANAGEMENT** sections of this **FSA**.

Staff proposes six conditions of certification, some of which are mentioned in the text (above), and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy Commission compliance project manager. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project that would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during the construction phase is addressed in **HAZ-4** and **HAZ-5** addresses site security during the operational phase. Condition **HAZ-6** addresses safety in cleaning and purging new gas piping.

PROPOSED CONDITIONS OF CERTIFICATION/ MITIGATION MEASURES

The following conditions of certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and serve as staff's recommendations for the Energy Commission to consider in its decision to avoid or reduce the severity of hazardous material-related impacts to less than significant and for the project to conform to all applicable LORS.

HAZ-1 The project owner shall not use any hazardous materials not listed in **Hazardous Materials Appendix A**, below, or in greater quantities than those identified by chemical name in **Hazardous Materials Appendix A**, unless approved in advance by the Compliance Project Manager (CPM).

Verification: The project owner shall provide to the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan to the Southern Inyo Fire Protection District (SIFPD), Inyo County

Environmental Health Services Department (ICEHSD) and the CPM for review. After receiving comments from the SIFPD, ICEHSD, and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from the CPM. Copies of the final Hazardous Materials Business Plan shall then be provided to the ICEHSD and the Southern Inyo Fire Protection District for information and to the CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-5 The project owner shall prepare a site-specific Operation Security Plan for the operational phase that shall be made available to the CPM for review and approval. The project owner shall implement site security measures

addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002⁵).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least eight feet high around the Power Block and Solar Field;
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement, the CPM in the event of suspicious activity or emergency;
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
6.
 - a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;
 - b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.
7. Site access controls for employees, contractors, vendors, and visitors;
8. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and
9. Additional measures to ensure adequate perimeter security consisting of either:

⁵ North American Electric Reliability Council, www.nerc.com/files/V1-Communications.pdf

- a. Security guard present 24 hours per day, seven days per week, **OR**
- b. Power plant personnel on-site 24 hours per day, seven days per week and **one** of the following:
 - 1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the perimeter fence to the power block, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **OR**
 - 2) Perimeter breach detectors or on-site motion detectors for the power block.

The project owner shall fully implement the security plans and obtain CPM approval of any substantive modifications to the security plans. The CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power plant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the project owner.

Verification: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-6: The project owner shall Comply with NFPA 56(PS) and not allow any fuel gas pipe cleaning activities on site, either before placing the pipe into service or at any time during the lifetime of the facility, that involve “flammable gas blows” where natural (or flammable) gas is used to blow out debris from piping and then vented to atmosphere. Instead, an inherently safer method involving a non-flammable gas (e.g. air, nitrogen, steam) or mechanical pigging shall be used. Exceptions to any of these provisions will be made only if no other satisfactory method is available, and then only with the approval of the CPM.

Verification: At least 30 days before any fuel gas pipe cleaning activities conducted onsite involving fuel gas pipe of four-inch or greater external diameter, the project owner shall submit a copy of the Fuel Gas Pipe Cleaning Work Plan which shall indicate the method of cleaning to be used, what gas will be used, the source of pressurization, and whether a mechanical PIG will be used, to the CBO for information and to the CPM for review and approval.

SAMPLE CERTIFICATION (Attachment "A")

Affidavit of Compliance for Project Owners

I, _____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

(Company Name)

for employment at

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

(Signature of Officer or Agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment "B")

Affidavit of Compliance for Contractors

I, _____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

(Company Name)

for contract work at

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

(Signature of Officer or Agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

REFERENCES

- AICHE (American Institute of Chemical Engineers). 1989. *Guidelines for Technical Management of Chemical Process Safety*, AIChE, New York, NY 10017.
- AICHE (American Institute of Chemical Engineers). 1994. *Guidelines for Implementing Process Safety Management Systems*, AIChE, New York, NY 10017.
- API (American Petroleum Institute). 1990. *Management of Process Hazards, API Recommended Practice 750*, American Petroleum Institute, First Edition, Washington, DC, 1990.
- CEC 2011j – California Energy Commission/L. Worrall (tn: 62845) ROC between CEC staff Analyst Lisa Worrall and Fire Chief Scott F. Lewis from Pahrump Valley Fire Rescue Services. 09/16/2011
- CEC 2012jj – California Energy Commission/M. Monasmith (tn: 67891) Record of Conversation with Geoff Lesh and K. Parker re Haz Mat clarification. 10/22/2012
- CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012
- CH2 2012z – CH2MHill/J. Carrier (tn: 65119) Applicant's Data Response, Set 1C-3. Fire Risk Assessment. 5/08/2012
- Davies, P.A. and Lees, F.P. 1992. *The Assessment of Major Hazards: The Road Transport Environment for Conveyance of Hazardous Materials in Great Britain*. Journal of Hazardous Materials, 32: 41-79.
- Environmental Protection Agency (US EPA). 2000a. *Chemical Accident Prevention: Site Security*, Environmental Protection Agency, Office of Solid Waste and Emergency Response. February 2000.
- Harwood, D.W., Viner, J.G., and E.R. Russell. 1990. *Truck Accident Rate Model for Hazardous Materials Routing*. Transportation Research Record. 1264: 12-23.
- Harwood, D.W., Viner, J.G., and E.R. Russell. 1993. *Procedure for Developing Truck Accident and Release Rates for Hazmat Routing*. Journal of Transportation Engineering. 119(2): 189-199.
- HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011
- HHSG 2011b – BrightSource Energy/C. Jensen (tn: 62125) Supplement to AFC for HHSEGS. 09/07/2011
- HHSG 2011c – BrightSource Energy/C. Jensen (tn: 62322) AFC Supplement B. 09/23/2011

Lees, F.P. 1998). *Loss Prevention in the Process Industries*, Vols. I, II and III. Second Edition, Butterworths.

National Response Center Database. U.S. Coast Guard. 2002

National Transportation Safety Board Database. U.S. Department of Transportation. 2001

North American Electric Reliability Corporation (NERC) 2002. *Security Guidelines for the Electricity Sector*, version 1.0, June 14, 2002.

NRC (National Research Council). 1979. *Ammonia. Subcommittee on Ammonia. Committee on Medical and Biologic Effects of Environmental Pollutants*. Division of Medical Sciences, Assembly of Life Sciences, National Research Council (NRC), Baltimore, Maryland, University Park Press (NTIS No. PB 278-027).

Pet-Armacost, J.J., Sepulveda, J. and M. Sakude. 1999. *Monte Carlo Sensitivity Analysis of Unknown Parameters in Hazardous Materials Transportation Risk Assessment*. Risk Analysis. 19(6): 1173-1184.

Rhyne, W.R. 1994. Hazardous Materials Transportation Risk Analysis. Quantitative Approaches for Truck and Train. Chapter 2: Transportation Quantitative Risk Analysis; and Chapter 3: Databases

U.S. Department of Energy (US DOE) 2002. Draft Vulnerability Assessment Methodology, Electric Power Infrastructure. Office of Energy Assurance, September 30, 2002.

U.S. Department of Justice (U.S. DOJ) 2002. *Special Report: Chemical Facility Vulnerability Assessment Methodology*. Office of Justice Programs, Washington, D.C. July 2002.

OSHA (United States Occupational Safety and Health Administration). 1993. *Process Safety Management / Process Safety Management Guidelines for Compliance*. U.S. Department of Labor, Washington, DC.

Vilchez, J.A., Sevilla, S., Montiel, H. and J. Casal. 1995. *Historical Analysis of Accidents in Chemical Plants and in the Transportation of Hazardous Materials*. J. Loss Prev. Process Ind. 8(2): 87-96.

**Hazardous Materials
Appendix A**

**Hazardous Materials Proposed for Use
At the
HHSEGS Power Project**

Source: Table 5.5-3R2 (CEC 2012jj)

CH2M-Hill 10/19/2012

**Table 5.5-3R2
HHSEGS Chemical Inventory**

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ ^a	RQ of Material as Used Onsite ^b	EHS TPQ ^c	Regulated Substance TQ ^d	Prop 65
Nalco Elimin-OX (or similar oxygen scavenger)	Carbohydrazide	497-18-7	1,200 gallons	e	e	e	e	No
Aqueous Ammonia (19% concentration)	Ammonium hydroxide	1336-21-6	1,200 gallons	1000 lb	1000 lb	500 lb	e	No
Acid	Sulfuric acid (93% - 66° Baumé)	7664-93-9	1,200 gallons	1000 lb	1075 lb	1000 lb	e	No
Lead Acid Batteries	Composed of the following: Lead (45-60% of battery) Sulfuric Acid (10-30% of battery)	7439-92-1 7664-93-9	420,000 lbm	10 lb	16 lb	e	e	Yes (lead)
Caustic	Sodium hydroxide 50%	1310-73-2	1,200 gallons	1000 lb	2000 lb	e	e	No
Diesel Fuel (No. 2)	Diesel Fuel	None	34,000 gallons	42 gal ^f	42 gal ^f	e	e	Yes
Cleaning Chemicals and Detergents	Various	None	2,500 gallons	e	e	e	e	No
Wastewater Treatment System Anti-scalant	Nalco 5200M or similar	Proprietary	1,200 gallons	e	e	e	e	No
Wastewater Treatment System Anti-foaming Agent	Nalco 7468 or similar	Proprietary	1,200 gallons	e	e	e	e	Yes
WSAC Corrosion Inhibitor	Nalco 3DT-187 or similar (Phosphoric acid 5%)	7664-38-2	1,200 gallons	5000 lb	100,000 lb	e	e	No
WSAC Dispersant	Nalco 73801WR or similar	Proprietary	1,200 gallons	e	e	e	e	No
Closed Cooling Water Corrosion Inhibitor	Nalco TRAC107 or similar	1310-73-2 & 1330-43-4	500 gallons	1000 lb	2000 lb	e	e	No
Bisulfite	Sodium bisulfite 30%	7631-90-5	1,500 gallons	5000 lb	16,667 lb	e	e	No
Sodium hypochlorite	Sodium hypochlorite 12% (trade)	7681-52-9	1,500 gallons	100 lb	800 lb	e	e	No
Lubricating Oil	Oil	None	40,000 gallons (does not include oil contained within individual equipment and reservoirs)	42 gal ^f	42 gal ^f	e	e	Yes

**Table 5.5-3R2
HHSEGS Chemical Inventory**

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ ^a	RQ of Material as Used Onsite ^b	EHS TPQ ^c	Regulated Substance TQ ^d	Prop 65
Mineral Transformer Insulating Oil	Oil	8012-95-1	100,000 gallons	42 gal ^f	42 gal ^f	^e	^e	Yes
Hydraulic Oil	Various Oil	None	5,000 gallons (does not include oil contained within individual equipment and reservoirs)	42 gal ^f	42 gal ^f	^e	^e	No
Sulfur hexafluoride	Sulfur hexafluoride	2551-62-4	<u>880.4 lb</u> (contained in circuit breakers)	^e	^e	^e	^e	No
^a Reportable quantity for a pure chemical, per CERCLA [Ref. 40 CFR 302, Table 302.4]. Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported. ^b Reportable quantity for materials as used onsite. Since some of the hazardous materials are mixtures that contain only a percentage of a reportable chemical, the reportable quantity of the mixture can be different than for a pure chemical. For example, if a material only contains 10% of a reportable chemical and the RQ is 100 lb., the reportable quantity for that material would be (100 lb.)/(10%) = 1,000 lb. ^c Threshold Planning Quantity [Ref. 40 CFR Part 355, Appendix A]. If quantities of extremely hazardous materials equal to or greater than TPQ are handled or stored, they must be registered with the local Administering Agency. ^d TQ is Threshold Quantity from 19 CCR 2770.5 (state) or 40 CFR 68.130 (federal) ^e No reporting requirement. Chemical has no listed threshold under this requirement. ^f State reportable quantity for oil spills that will reach California state waters [Ref. CA Water Code Section 13272(f)]								

**HAZARDOUS MATERIALS
Appendix B**

**Basis for Staff's Use of 75 Parts Per Million Ammonia
Exposure Criteria**

BASIS FOR STAFF'S USE OF 75 PARTS PER MILLION AMMONIA EXPOSURE CRITERIA

Staff uses a health-based airborne concentration of 75 parts per million (PPM) to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this level is not consistent with the 200-ppm level used by the U.S. Environmental Protection Agency and the California Environmental Protection Agency in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's analysis of the proposed project. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices and actions are implemented in response to accidental releases. However, the regulations implementing these programs do not provide clear authority to require design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to healthy adult individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures for the entire population. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations), they are not appropriate for and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. The California Environmental Quality Act requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through feasible changes or alternatives to the proposed project.

Staff has chosen to use the National Research Council's 30-minute Short Term Public Emergency Limit (STPEL) for ammonia to determine the potential for significant impact. This limit is designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at this level should not result in serious effects but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL.

**HAZARDOUS MATERIALS Appendix B Table-1
Acute Ammonia Exposure Guidelines**

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH ²	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 minutes	Exposure above this level requires the use of "highly reliable" respiratory protection and poses the risk of death, serious irreversible injury, or impairment of the ability to escape.
IDLH/10 ¹	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 minutes	Protects nearly all segments of general population from irreversible effects.
STEL ²	NIOSH	Adult healthy male workers	35 ppm	15 minutes, 4 times per 8-hour day	No toxicity, including avoidance of irritation.
EEGL ³	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 minutes	Significant irritation, but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one-time exposure.
STPEL ⁴	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 minutes 30 minutes 10 minutes	Significant irritation, but protects nearly all segments of general population from irreversible acute or late effects. One-time accidental exposure.
TWA ²	NIOSH	Adult healthy male workers	25 ppm	8 hours	No toxicity or irritation on continuous exposure for repeated 8-hour work shifts.
ERPG-2 ⁵	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 minutes	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin).

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)

* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.

** The (NRC 1979) describes a study involving young animals, which suggests greater sensitivity to acute exposure in young animals. The WHO (1986) warned that the young, elderly, asthmatics, those with bronchitis, and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

REFERENCES FOR HAZARDOUS MATERIALS APPENDIX B, TABLE 1

- AIHA. 1989. American Industrial Hygienists Association, Emergency Response Planning Guideline, Ammonia, (and Preface) AIHA, Akron, OH.
- EPA. 1987. U.S. Environmental Protection Agency, Technical Guidance for Hazards Analysis, EPA, Washington, D.C.
- NRC. 1985. National Research Council, Criteria and Methods for Preparing Emergency Exposure Guidance Levels (EEGL), Short-Term Public Emergency Guidance Level (SPEGL), and Continuous Exposure Guidance Level (CEGL) documents, NRC, Washington, D.C.
- NRC. 1972. Guideline for Short-Term Exposure of the Public to Air Pollutants. IV. Guide for Ammonia, NRC, Washington, D.C.
- NIOSH. 1994. National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Washington D.C., Publication numbers 94-116.
- WHO. 1986. World Health Organization, Environmental Health Criteria 54, Ammonia, WHO, Geneva, Switzerland.

ABBREVIATIONS FOR HAZARDOUS MATERIALS APPENDIX B, TABLE 1

- ACGIH:** American Conference of Governmental and Industrial Hygienists
- AIHA:** American Industrial Hygienists Association
- EEGL:** Emergency Exposure Guidance Level
- EPA:** Environmental Protection Agency
- ERPG:** Emergency Response Planning Guidelines
- IDLH:** Immediately Dangerous to Life and Health Level
- NIOSH:** National Institute of Occupational Safety and Health
- NRC:** National Research Council
- STEL:** Short Term Exposure Limit
- STPEL:** Short Term Public Emergency Limit
- TLV:** Threshold Limit Value
- WHO:** World Health Organization

HAZARDOUS MATERIALS MANAGEMENT

List of Comment Letters

		Haz Mat Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	X
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	July 21, 2012	Intervenor Cindy MacDonald	
10.1	p. 8-2	Lead Acid Batteries -- What is the number on site?	The lead acid batteries used for pointing heliostats will number one per heliostat or about 85,000. These would small batteries (garden vehicle size). There might also be several hundred more, larger, located inside a building to provide emergency backup power.
10.2	p. 8-2	Lead Acid Batteries -- What is the number for heliostats?	The lead acid batteries used for pointing heliostats will number one per heliostat or about 85,000.
10.3	p. 8-2	Lead Acid Batteries -- What are their lifetimes?	Typically, lead acid batteries last 3-6 years, depending on their usage and environmental conditions.
10.4	p. 8-2	Lead Acid Batteries -- What is their placement?	The batteries would be mounted near the heliostat motor, beneath the mirror of the heliostat. They would be above the ground.

Appendix 1 -- PSA Response to Comments, Haz Mat

10.5	p. 8-2	Lead Acid Batteries -- What are their environmental impacts to soil, water, biological resources?	There should be no impacts. The batteries are sealed. They contain a small amount of dilute sulphuric acid, which should never get spilled. If it did, individual spills would be small and not consequential. Disposal of end-of-life batteries as hazardous waste is regulated.
10.6	p. 8-2	Lead Acid Batteries -- What are their impacts to human health and public safety?	There should be no impacts, either onsite or offsite.
Comment #	DATE	COMMENT TOPIC	RESPONSE
13	July 23, 2012	Applicant, BrightSource Energy, Inc.	
13.1	p. 207	suggested change to PSA page 4.5-5 Step 1, requests revision to first sentence re on-site chemicals and use	Revision to text made to reference revised Table 5.5-3R2.
13.2	p. 207	suggested change to PSA page 4.5-8, 3rd full paragraph through p. 4.5-9, 1st full paragraph: request for update on natural gas supply system, as reflected in General Comments (PROJECT DESCRIPTION)	Revision to text made.
13.3	p. 207	Suggested change to PSA page 4.5-9, 1st full paragraph, 3rd sentence re: pigging facilities for natural gas supply system.	Revision to text made.
13.4	p. 207	Suggested change to PSA page 4.5-10, last paragraph, first sentence, request to update sentence to reflect Condition of Certification, HAZ-1.	Keep standard condition language.
13.5	p. 208	Suggested change to PSA page 4.5-10, last paragraph, second sentence, request to reword sentence re: Table 5.5-3R1.	Revision to text made to reference revised Table 5.5-3R2.
13.6	p. 208	Question regarding PSA page 4.5-11, first partial paragraph, last sentence, requests that certain words be stricken, i.e. "or require" for alternative chemicals.	Revision to text made as requested.

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13.7	p. 208	Add word "Verification" to second paragraph of condition HAZ-1	Revision made to HAZ-1 .
13.8	p. 208	Reword HAZ-2 for better clarity.	Revision made to HAZ-2 .
13.9	p. 208	Request to change 60 days to 30 days for submittal of Hazardous Materials Business Plan prior to delivery.	Staff believes 60 days is prudent considering volume of submittals to the CPM to occur during the pre-construction period.
13.10	p. 208	Request to reword requirement for a Safety Management Plan for hazardous materials to apply to those delivered in large, bulk quantities by tanker trucks. Request to change review time from 60 to 30 days.	Revision to text made as requested regarding Safety Management Plan. Review period of 60 days seems reasonable considering volume of submittals to the CPM to occur during the pre-construction period.
13.11	p. 209	Request to reword/reformat HAZ-4 for clarity.	Revision to text made.
13.12	p. 209	Request to reword/reformat HAZ-5 for clarity.	Revision to text made.
13.13	p. 209	Request to change language of Haz 5 to move requirements of the condition to the verification section.	Keep standard condition language to maintain requirements in condition, rather than move to verification portion of HAZ-5..
13.14	p. 211	Suggest revision to language of HAZ-6 Verification.	Revision to text made.