

Appendix L
Hazardous Materials Handling

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1.0 INTRODUCTION

The Solar One Facility will consist of 34,000 25kW Stirling cycle solar generating systems constituting a generating facility rated at 850 MW. Administration and operations buildings, maintenance buildings, water treatment buildings, electrical substations, site access and onsite roadways will be constructed for this new facility.

1.1 ENVIRONMENTAL SETTING

The proposed Solar One site will be located in San Bernardino County, 37 miles east of Barstow, CA. The site vicinity is undeveloped. The nearest residential development is within one (1) mile of the northeast corner of the site. In addition, there is a home located approximately 1.5 miles directly east of the Project site. There are no schools, hospitals, residences, or other sensitive receptors within one (1) mile of the site.

The closest school is Newberry Springs Elementary, which is 14 miles west of the Project in Newberry Springs, California. The nearest residence is 7,700 feet to the east of the Project boundary. There are no schools, hospitals, residences, or other sensitive receptors within one mile of the site.

- The closest hospital, Barstow Community Hospital, is approximately 37 miles away in Barstow, California. Major medical cases will be flown to Loma Linda University Medical Center Hospital in Loma Linda, California.

2.0 CONSTRUCTION PHASE

The only hazardous materials expected to be used onsite during construction are gasoline, diesel fuel, oil, lubricants, solvents, adhesives, and paint materials. There are no feasible alternatives to these materials for the operation of construction vehicles and equipment, or for painting and caulking of enclosures and equipment. Welding gases (i.e., acetylene and oxygen) are also likely to be used onsite in small volumes. No acutely hazardous materials, other than small volumes of acetylene, will be used or stored onsite during construction.

The potential for significant environmental impacts from hazardous material incidents during construction is minimal. Only small volumes of hazardous materials will be onsite during construction. In addition, trained maintenance and service personnel will be handling these materials when they are used. The most likely incidents involving these materials are dripping of gasoline, diesel fuel, oil, hydraulic fluid, and lubricants from vehicles or equipment. The worst-case scenario would be an accident involving the release of one of these materials from a service vehicle during equipment maintenance or fueling. The risk of such an occurrence will be mitigated through the Emergency Response Program, and employee and construction worker training for these procedures. These materials have low acute toxicity.

An Environmental Safety Plan including a Hazardous Materials Management Plan (HMMP) will similarly address roles, responsibilities, and identify primary contacts, procedures and actions necessary to minimize the impact of the work on the surrounding environment.

Long-term or cumulative impacts will be avoided by cleaning up spills when they occur. In the case of a large spill, contaminated soil will be placed into barrels or roll-off bins by service personnel for subsequent evaluation and offsite disposal. Handling procedures for hazardous chemicals onsite during construction activities are referenced in Section 3.1 of this appendix.

3.0 OPERATIONS PHASE

During operation of Solar One Project, hazardous materials will be used and stored onsite. The Tables L-1 and L-2 outline the major hazardous materials to be stored and/or used at the site. These include:

- Insulating and lubricating oils for the electric equipment and rotating equipment (Note that transformer oils do not contain PCBs.)
- Hydrogen for the Stirling engine working fluid
- Diesel fuel oil for operating a fire water pump
- Gasoline and diesel fuel for maintenance vehicles
- Propane for maintenance vehicles (fork lifts)
- Polymer for water treatment
- Welding gases (i.e., acetylene and oxygen) for maintenance activities.

In addition, small quantities (typically less than five (5) gallons) of paints, oils, solvents, pesticides, and cleaners, similar to the types purchased in retail hardware stores, to be used at the site will be stored in a designated chemical storage room at the Main Services Complex.

3.1 HANDLING PROCEDURES FOR HAZARDOUS CHEMICALS

The Project will implement a Hazardous Materials Management Program (HMMP) developed for the Solar One construction and operation phases, and will include, at a minimum, procedures for:

- Hazardous Materials Handling, Use and Storage
- Emergency Response
- Spill Control and Prevention
- Employee Training
- Record Keeping and Reporting

The HMMP will be developed and implemented prior to start of construction. The program will be revised and updated employees will be trained and the program will be implemented prior to the start of commercial operation. The procedures outlined the HMMP will be in accordance with all applicable LORS.

3.1.1 Chemical Management

The Tables L-1 and L-2 list the chemicals to be used, handled, and stored at the project site during operation.

The storage, use and handling of these hazardous materials will be in accordance with applicable LORS and will include the following items:

- A HMMP will be developed and implemented prior to turnover of site management from the construction contractor to the operating company.
- Facility personnel will be trained in hazardous materials and hazardous waste awareness, handling and management as required for their level of responsibility.
- Bulk chemicals will be stored in the original shipping container provided by and returned to the chemical provider.
- Hydrogen gas will be provided and refilled at each SunCatcher k-bottle by the gas provider with storage facilities for k-bottles following all LORS applicable to this application. These are outlined in Appendix F.
- Chemical storage areas and feed / transfer areas will be equipped with secondary containment sufficient in size to contain the volume of the largest container or tank including an allowance for rainwater.
- Small quantity chemicals used for maintenance tasks will be kept in appropriate flammable material or corrosive material storage lockers following all applicable LORS.
- Periodic inspections will ensure that all containers are secure and properly marked.

TABLE L-1		
SUMMARY OF WATER TREATMENT MATERIALS USAGE AND STORAGE		
Chemical	Application	Expected Storage Quantity (Gallons – Average)
Sodium hypochlorite 12.5% solution (Bleach)	Disinfectant for potable water	4

TABLE L-2				
SUMMARY OF NON-WATER TREATMENT MATERIALS USAGE AND STORAGE				
Chemical	Application	Storage Location	Storage or Usage Quantity	
			Average	Maximum
Insulating oil (heat transfer)	Electric equipment	--	60,000 gal, Initial fill	Not stored on site. Initial fill quantity is brought to site at the time of replacement
Lubricating oil	PCU	Maintenance Buildings	122,778 gal, Initial fill With usage of 46 gallons per month	300-gallon recycle tank located in the Maintenance Building.
Hydrogen	PCU Working Fluid	K-bottles mounted on each SunCatcher	Usage of 56,667 cubic feet per day	Initial fill
Ethylene Glycol	Inlet air chiller loop - alternating	Maintenance Buildings	110,000 gal, Initial fill, with usage of 46 gallons per month	Initial fill
Various Solvents, Detergents, Paints and other cleaners	Building Maintenance and equipment cleaning	Maintenance Buildings	Three (3) 55-gallon drums Commercial 1-gallon containers	Ten (10) 55-gallon drums Commercial 1-gallon containers
Gasoline	Maintenance Vehicles	Two double-wall 5,000 gallon Refueling Station with containment.	2,500 to 5,000 gallons refueling stations	Full tank of 5,000 gallons
Diesel Fuel	Firewater Pump and Maintenance Vehicles	Firewater Skid Double-wall 5,000-gallon Refueling Station with containment.	100 gal for initial fill 2,500 to 5,000 gallons refueling stations	Maintain full diesel tank Full tank of 5,000 gallons

3.1.2 Hazardous Wastes

The Tables L-3 and L-4 lists the types of wastes to be generated during construction and commercial operation of the project. These wastes will be managed in accordance with applicable LORS consistent with the implementation of the HMMP for the approved Solar One facility as follows:

- The Applicant will secure an EPA Hazardous Waste Generator ID number prior to turnover of site management from the construction contractor to the operating company.
- All hazardous wastes will be stored in appropriate bulk storage containers or in labeled 55-gallon drums equipped with secondary containment and closed-tops with bungs for liquid wastes or in secured open-tops drums for solid wastes.
- All waste drums will be stored in accordance with good practice and applicable LORS, and will be protected from environmental conditions; including rain, wind and direct heat; and physical hazards such as vehicle traffic and sources of heat and impact.
- Storage of hazardous waste will at no time exceed 90 days from the date of initial accumulation of a total of 55 gallons of hazardous waste or more on site.
- All PCU oil will be stored in 150-gallon double-walled storage tanks onsite in accordance with good engineering practices and applicable LORS. One tank will contain recovered oil from PCU overhauls to be filtered for re-use in PCU operation. Filtered oil will be contained in a second 150-gallon double-walled tank for storage.
- Waste lubricating oils will be recovered and reclaimed by a waste oil-recycling contractor.
- Used hydrogen gas k-bottles will be stored to the specific requirements outlined in NFPA 50A following good engineering practices and applicable LORS. Cylinder storage location will be in a well-ventilated, dry, secured compound from unauthorized access, well protected from vehicle, pedestrian and other potential sources of impact, and separated from other potentially combustible materials or other oxidizers by a barrier of noncombustible material. Further description of the storage and handling of Hydrogen Gas is outlined in Appendix K.
- Spent lubricating oil filters from PCU and vehicles will be disposed at an authorized waste disposal facility.
- California-authorized and certified hazardous waste haulers will transport hazardous wastes to registered waste treatment, storage, disposal and recycling facilities.

- Hazardous waste generation, handling and storage areas will be inspected and monitored on a regular basis.
- Emergency response and reporting will be performed per written procedures that follow government and industry requirements and standards.
- Workers will be trained to handle hazardous wastes generated at the site.

**Table L-3
Summary of Construction Waste Streams and Management Methods**

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	On-Site Treatment	Waste Management Method
Construction waste – non-hazardous recyclable	Scrap wood, steel, glass, plastic, and paper	90 cubic yards per week	Intermittent	Segregation into composition type; store for less than 30 days	Recycling facility
Construction waste – hazardous	Empty hazardous material containers	2 cubic yards per week	Intermittent	Store for less than 90 days	Return to vendor or to hazardous waste disposal facility
Construction waste – hazardous	Solvents, used oils, paint, oily rags, cleaners, and adhesives	200 gallons	Every 90 days	Store for less than 90 days	Dispose to hazardous waste disposal facility or recycle
Construction vehicles – hazardous	Waste oil including used motor oil, transmission fluid, hydraulic fluid, and antifreeze	226 gallons	Every 90 days	Store for less than 90 days	Dispose to hazardous waste disposal facility or recycle
Spent batteries – hazardous	Lead acid and alkaline	45 per year	Intermittent	Store for less than 90 days	Dispose to recycling facility
Storm water from construction – non-hazardous	Surface runoff (water, inert material, dirt and concrete particles)	17 gallons per day	Intermittent	None	Water will percolate into on-site soils
Residual solids from retention pond – non-hazardous	Dirt and concrete particles	57 cubic yards one time at end of construction	5 x 10 cubic yards Truck	None	Excavate at end of construction and spread on-site
Sanitary waste – non-hazardous	Portable chemical toilets sanitary waste	452 gallons per day	Periodically pumped to tanker truck by licensed contractor	None	Ship to sanitary water treatment plant

**Table L-4
Summary of Operation Waste Streams and Management Methods**

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	On-Site Treatment	Waste Management Method
Office and packaging materials from supplies deliveries – non-hazardous	Paper, wood, plastic, and cardboard	11 cubic yards per week	Intermittent	Segregation into composition type; store for less than 30 days	Weekly collection for recycling and/or approved waste disposal
Sanitary wastewater solids – non-hazardous	Rest rooms and sanitary waste	5,650 gallons per month	Intermittent	None	Dispose to sanitary leach field
Spent batteries – hazardous, recyclable	Lead acid, alkaline, gel cell, nickel, and cadmium	34 units per week	Intermittent	Store for less than 30 days	Dispose to authorized waste recycling facility
PCU oil ¹ – motor oil – hazardous, recyclable	PCU overhaul	20 gallons per month	Intermittent	Two 100 United States gallon tanks for filtering and re-use in PCU	Recycle
PCU coolant – ethylene glycol – hazardous	PCU overhaul	20 gallons per month	Intermittent	Store for less than 90 days	Dispose to authorized waste disposal facility
PCU hydrogen gas – non-hazardous, recyclable	Refill k-bottles in place	5,650 k-bottles per month	2 times per year per SunCatcher	Refill k-bottles on-site	Empty k-bottles returned through supplier
Oily absorbent and spent oil filters – hazardous, recyclable	PCU and hydraulic equipment overhauls	One 55-gallon drum per month	Intermittent	Store for less than 90 days	Dispose to authorized recycle facility
Oily rags – non-hazardous	PCU and hydraulic equipment overhauls	One 55-gallon drum per month	Intermittent	Store for less than 90 days	Laundry at authorized recycle facility
Used hydraulic fluid, oils and grease – hazardous, recyclable	PCU and hydraulic equipment overhauls	Less than 13 gallons per month	Intermittent	Store for less than 90 days	Dispose to authorized recycle facility

Table L-4
Summary of Operation Waste Streams and Management Methods

Waste Stream and Classification	Origin and Composition	Estimated Amount	Estimated Frequency of Generation	On-Site Treatment	Waste Management Method
De-mineralized water treatment wastewater salt cake – non-hazardous or designated waste	Zero discharge system; naturally occurring salt compounds	68,000 pounds per year	Intermittent	Evaporative pond containment	Non-hazardous waste disposal facility

Notes:

¹Assumption is based on 5,300 United States gallons per year for Power Conversion Unit oil changes at a 98 percent recovery rate.

PCU = Power Conversion Unit

AES of Fontana, located at, 13579 Whitram Avenue, Fontana, California, has been identified as a business that specializes in transporting, disposing, and recycling of hazardous waste. AES works in accordance with EPA and either recycles or treats all hazardous waste by distributing different types of materials to appropriate companies in the area. The Table L-5 lists the appropriate businesses that address the specific types of hazardous waste.

Table L-5 Business Listings of Specific Hazardous Waste Handlers		
Hazardous Material Type	AES Distribution List	Contact Information and Location
All fluids and wastes from trucks (motor oil, coolant, hydraulic fluid, etc.)	D-K Environmental Refinery	323-268-3387 Los Angeles, CA
Spent alkaline batteries and spent lamps from lighting fixtures	Lighting Resources, LLC Universal Waste	800-572-9253 Ontario, CA
Absorbent automotive waste (plus contaminated dirt and gravel)	Siemens Carbon Regeneration Facility	866-372-9378 Colorado River Indian Reservation, Near Parker, AZ
Spent lead-acid or nickel-cadmium batteries	Exide Technologies	818-252-2022 Arleta, CA

3.1.3 Accidental Release

There are four (4) types of hazardous materials that will be used at the site during the operational phase that pose a risk of accidental release: Hydrogen gas, gasoline fuel diesel fuels for the operation’s vehicles, and transformer insulating oil..

The most likely cause of an accidental release would be gasoline or diesel fuel leakage due to an accidental collision or a spill while refueling a maintenance vehicle. A less likely possibility of tank leakage is aging tank material and/or oxidation of the tank structure.

Protective measures to be adopted during a gasoline spill include:

- Eliminate all sources of ignition in the vicinity of the spill or released vapor.
- If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
- Stop the source of the release if you can do it without risk.
- Contain release to prevent further contamination of soil, surface water or groundwater.
- Clean up spill as soon as possible, observing precautions in Exposure Controls / Personal Protection.
- Use appropriate techniques such as applying non-combustible absorbent materials or pumping.

- All equipment used when handling the product must be grounded.
- A vapor suppressing foam may be used to reduce vapors.
- Use clean non-sparking tools to collect absorbed material.
- Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable LORS.
- Report gasoline spills to local authorities and/or the US Coast Guard's National Response Center at (800) 424-8802 as appropriate or required. This material is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Petroleum Exclusion. Therefore, releases to the environment may not be reportable under CERCLA.

A second cause of accidental release could occur during the refilling of a SunCatcher hydrogen k-bottle cylinder. Quick connect seals break, hoses rupture, and other various minor sealing issues. Training will be the keys to success for these evolutions.

Only experienced and properly instructed personnel will handle compressed hydrogen gas. During filling, the cylinders will be secured in an upright position. The valve protection cap will be removed only just before connecting the cylinder to the manifold. The cylinder units will be electrically bonded to the system before discharging hydrogen. Personnel will ensure all connection will remain gas-tight during filling.

If a release were to occur, personnel would be required to evacuate the immediate area then eliminate any possible sources of ignition, provide necessary ventilation, and shut off the source of hydrogen, if possible. If hydrogen is leaking from a cylinder or valve, personnel would be required to call the supplier's emergency phone number. Since this type of incident would most likely occur at the SunCatcher, personnel would be instructed to allow the hydrogen gas to dissipate to atmosphere. Hydrogen poses no adverse ecological effects on the environment. The risk of fire is minimized by refilling operations occurring outdoors, preventing hydrogen from attaining the minimum 4-percent lower explosive limit.

Appendix F provides further detail on the handling of hydrogen gas.

Transformer oil poses a minor risk of accidental spill.

Transformer oil is not stored on site except in the transformers. The substation transformers each contain approximately 10,000 gallons of insulating oil. The GSUs each contain approximately 530 gallons of oil. The total transformer oil contained in all of the transformers amounts to approximately 360,510 gallons.

Substation transformers will be delivered to the site without the oil. The oil will be inserted into the transformer tanks from delivery tankers onsite. Precautions will be taken during oil

transfer to prevent spills. Adsorbent materials will be carried on the supply truck for quick response to an inadvertent oil spill. Any soil contaminated by a spill will be removed to an offsite hazardous waste disposal facility. Substation transformer pads will be designed for containment of the transformer oil in the event the tank is breached.

GSUs will be delivered to the site filled with oil.

During operations, samples of transformer oil will be drawn from a test port on each transformer tank for testing approximately every three (3) months. Oil will be removed from the tank for maintenance on intervals of 10 to 15 years.

3.2 FIRE AND EXPLOSION RISKS

There are three (3) types of hazardous highly flammable or explosive materials that will be used at the site during the operational phase: hydrogen gas, oxygen and acetylene welding gases, and gasoline fuel for the operation's vehicles. Additionally, two (2) other flammable materials that are difficult to ignite will be used at the site during the operations phase: transformer insulating oil and diesel fuels for the operation's vehicles.

Gasoline is a Type IB flammable liquid and is considered a severe fire hazard. The vapor is heavier than air. Vapor or gases may ignite at distant ignition sources and flash back. To mitigate the fire and explosion risks, the gasoline storage tank shall be constructed with emergency relief venting or a device or devices that will relieve excessive internal pressure caused by an exposure fire.

The gasoline and diesel fuels will be stored in one (1) set of 5,000-gallon tanks located adjacent to the Main Services Complex. An additional tank(s) may be located adjacent to the Satellite Services Complex.

Gasoline and diesel fuel tanks will be located away from electrical lines and other potential ignition sources. The fuel tanks will be provided with dikes and/or firewall capable of containing the volume of the largest tank. These tanks will be installed in a way that the exterior surface, including the bottom of the tank and connection piping, can be directly monitored and directly viewed. These are requirements of the California Code of Regulations (26 CCR Division 9 title 14- Toxic Tank Settings) to prevent damage to natural resources in the case of a spill and the 2001 California Fire Code has additional requirements which will be described in Appendix F.

In addition, the storage tanks for gasoline and diesel fuel will be protected from vehicular impact and other impacts by bollards constructed of steel pipe filled with concrete and set in concrete or equivalent.

Hydrogen gas will be used in the Power Conversion Unit (PCU) Stirling engine as a working fluid. Hydrogen is a flammable, colorless, odorless, compressed gas packaged in cylinders at high pressure. It poses an immediate fire and explosive hazard when concentrations exceed 4-percent. It is much lighter than air and burns with an invisible flame.

A maximum of 100 cylinders (k-bottles) of hydrogen may be stored at each of the Main Services Complex at any one time to provide for maintenance replacement and make-up consumption of hydrogen by the PCU Stirling engine. One k-bottle of hydrogen gas is mounted on each SunCatcher to re-supply the PCU. The gas will be stored in approved individual gas cylinders supplied by an approved hydrogen gas supplier. The cylinders will be stored outside near the Main Services Complex away from electrical lines and other potential ignition sources, as required by the applicable building and fire codes. Cylinders will be stored upright, chained to a supporting structure, and protected from vehicular impact and other impacts by bollards constructed of steel pipe filled with concrete and set in concrete or equivalent. Sunshades will be provided to prevent direct solar heating of the hydrogen cylinders.

The potential fire or explosion risks for hydrogen are mitigated by storage and use in well-ventilated open areas. This allows the hydrogen gas to dissipate to atmosphere thus preventing concentrations from reaching 4-percent when mixed with air. This mitigates the potential fire and explosion risk. Further details on the storage, use and handling of hydrogen gas are further outlined in Appendix K.

Other gases to be stored and used at the facility may include shop-welding gases for maintenance activities. Typical welding gases are oxygen and acetylene. The potential impacts presented by the use of these gases at the facility do not appear to be significant based on the following:

- A limited quantity of each gas will be stored at the facility, max of six (6) to ten (10) bottles at each of the Main Services Complex. .
- The gases will be stored in Department of Transportation (DOT)-approved safety cylinders secured to prevent upset and physical damage.
- Incompatible gases (e.g., flammable gases and oxidizers) will be stored separately.
- The gases will be stored in multiple standard-sized portable cylinders in contrast to larger cylinders, generally limiting the quantity of gas released from an individual cylinder failure to less than 200 cubic feet.

Transformer oil will not be stored on site except in the transformers. The substation transformers each contain approximately 10,000 gallons of insulating oil. The generator step-

up unit transformers each contain approximately 530 gallons of oil. The total transformer oil contained in the transformers amounts to approximately 360,510 gallons.

Substation transformers will be delivered to the site without the oil. The oil will be inserted into the transformer tanks from delivery tankers onsite. Precautions will be taken during oil transfer to prevent spills. Adsorbent materials will be carried on the supply truck for quick response to an inadvertent oil spill. Any soil contaminated by a spill will be removed to an offsite toxic disposal facility. Substation transformer pads will be designed for containment of the transformer oil in the event the tank is breached.

Generator step up unit transformers will be delivered to the site filled with oil.

During operations, samples of transformer oil will be drawn from a test port on each transformer tank for testing approximately every three months. Oil will be removed from the tank for maintenance on intervals of 10 to 15 years.

3.3 ACUTELY HAZARDOUS MATERIALS

Since 1986, to prevent accidental releases of hazardous materials and to reduce their potential impact on the public and environment, California has had laws requiring a business that used materials defined as acutely hazardous materials in certain quantities to develop a Risk Management and Prevention Program (RMPP).

In 1996, pursuant to Section 112(r) of the federal Clean Air Act, the U.S. EPA created the Risk Management Program (RMP). In September 1996, Senate Bill (SB) 1889 was enacted to change the California Health and Safety Code (CHSC) § 25531 et. seq., replacing the state RMPP requirements with the federal RMP requirements. Pursuant to SB1889, the California Office of Emergency Services (OES) was required to adopt implementing regulations and to seek and maintain delegated authority for the federal program. The new California implementation program is called the California Accidental Release Prevention (CalARP) Program. The CalARP Program is a merging of the federal and state programs for the prevention of accidental release of regulated toxic and flammable substances. The CalARP Phase I Final Regulations were approved on November 16, 1998 (CCR Title #19, Division 2, Chapter 4.5).

The final CalARP Program regulations provide two sets of regulated substances lists: one for federal regulated substances and one for state regulated substances.

- Section 2770.5 – Tables 1 and 2 of Section 2770.5 list federal regulated substances and threshold quantities for accidental release prevention, including flammable substances. Anhydrous ammonia, hydrogen, hydrochloric acid, and cyclohexylamine are examples of chemicals on this list.
- Section 2770.5 – Table 3 of Section 2770.5 lists state regulated substances and threshold quantities for accidental release prevention. Anhydrous ammonia, sulfuric acid and cyclohexylamine are examples of chemicals included on this list.

An RMP is required for any facility that stores more than a threshold quantity of a regulated substance on site.

None of the chemicals proposed for use by Solar One are regulated substances subject to the requirements of the CalARP Program.

Regulated substances, besides hydrogen, that may be used and stored at the facility will be stored and used in quantities in accordance with applicable laws, ordinances, regulations and standards (LORS).

3.4 OTHER HAZARDOUS MATERIALS

No adverse environmental impacts are anticipated related to other hazardous materials used at the facility. Only small quantities of paints, oils, solvents, pesticides, and cleaners, typical of those packaged for retail consumer use, will be present during operation of the facility. These materials will be stored in designated chemical storage rooms at the Main Services Complex. .

Small volumes of petroleum products associated with construction equipment will be onsite during construction. Long-term or cumulative impacts will be avoided by cleaning up any accidental spills of these materials as soon as they occur.

3.5 MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets for the hazardous materials will be kept onsite as required by 29 CFR 1910 OSHA Hazard Communication rules and regulations.

3.6 LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The LORS applicable to Solar One in the context of hydrogen handling are discussed in Appendix K.

This application will comply with all LORS pertaining to hazardous materials.

4.0 MITIGATION MEASURES

The following subsections describe measures that Solar One plans to take during both the construction and operating phases of the project to mitigate the risk in handling hazardous materials, particularly the risk of inadvertent spills or leaks that might pose a hazard to human health or the environment

4.1 CONSTRUCTION PHASE

During construction, hazardous materials stored onsite will be limited to small quantities of paint and thinner, solvents, cleaners, sealants, lubricants and 5-gallon emergency fuel containers. Paint, thinner, solvents, cleaners, sealants, and lubricants will be stored in locked enclosures, handled per the manufacturer's directions, and replenished as needed. The emergency fuel containers will be DOT approved 5-gallon safety containers secured to the construction equipment. The emergency fuel will be used when regular vehicle fueling is unavailable.

Fuel, oil and hydraulic fluids will be transferred directly from a service truck to construction equipment tanks and will not otherwise be stored onsite. Fueling will be performed by designated and trained service personnel either prior to the start of the work day or at completion of the work day. Service personnel and construction contractors will follow Standard Operating Procedures (SOP) for filling and servicing construction equipment and vehicles. The SOP is designed to reduce the potential for incidents involving the hazardous materials and include the following:

- Refueling and maintenance of vehicles and equipment will occur only in designated areas that are either bermed or covered with concrete or asphalt to control potential spills.
- Vehicle and equipment service and maintenance will be conducted only by authorized personnel.
- Refueling will only be conducted with approved pumps, hoses and nozzles.
- Catch-pans will be placed under equipment to catch potential spills during servicing.
- All disconnected hoses will be placed in containers to collect residual liquids in the hose.
- Vehicle engines will be shut down during refueling.
- No smoking, open flames or welding will be allowed in refueling or service areas.
- When refueling is completed, the service truck will leave the project site.

- Service trucks will be provided with fire extinguishers and spill containment equipment, such as adsorbents.
- In the event a spill contaminates soil, the soil will be containerized and disposed of as a hazardous waste.
- All containers used to store hazardous materials will be inspected at a minimum of once per week for signs of leaking or failure. All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook, which will be maintained onsite.

Small spills will be contained and cleaned up immediately by trained onsite personnel. Larger spills will be reported via emergency phone numbers (911) to obtain help from the appropriate San Bernardino County Fire Department Hazardous Materials Emergency Response Unit. Spills will be reported in accordance with the appropriate San Bernardino County Fire Department Spill Reporting Policy. All personnel working on the project during the construction phase will be trained in handling hazardous materials and the danger associated with hazardous materials.

During construction, contractors intending to use temporary tanks to supply fuel or propane shall obtain permits from the appropriate San Bernardino County Fire Department and shall comply with provisions California Fire Code Article 87, Fire Safety During Construction.

An onsite health and safety person will be designated to implement health and safety guidelines and contact emergency response personnel and the local hospital if necessary. Material Safety Data Sheets (MSDS) will be maintained for each onsite chemical. Employees will be made aware of the chemicals and the location of MSDS sheets.

4.2 OPERATION PHASE

Hazardous materials will be stored and handled at Solar One in accordance with all applicable local, state and federal LORS. A safety program will be implemented including safety training programs for contractors and operations personnel. A Hazardous Materials Management Plan will be prepared for approval by the CEC CPM and the appropriate San Bernardino County Fire Department that is designated as the local Certified Unified Program Agency (CUPA).

A fire protection system will be included to detect, alarm, and suppress a fire, in accordance with the applicable LORS.

The Tables L-1 and L-2 describe the hazardous materials that will be stored at Solar One. Of the hazardous materials that are continuously onsite, two hazardous flammable materials merit individual mention because of the quantity of material stored.

4.2.1 Hydrogen Gas

Discussion of hydrogen gas is outlined in Appendix K.

4.2.2 Gasoline

The gasoline fuel storage and dispensing facilities will be set up according to the 2001 California Fire Code Section 5202. The storage tank for dispensing of gasoline fuel into the maintenance vehicle tank, shall meet the following requirements, as defined by California Fire Code 7902.1.9. Fuel handling discussion is outlined in Appendix R.

- Normal and emergency venting
- Flame arresters
- Secondary containment, diking
- Vehicle impact protection
- Overfill prevention
- Fill pipe connections
- Spill containers
- Anti-siphon devices.

The dispensing mechanism is composed of the following elements, per 2001 CFC Section 5202.4.

- Dispenser hoses shall be a maximum of 18 feet in length. Dispenser hoses for gasoline fuel shall be equipped with a listed emergency breakaway device designed to retain liquid on both sides of a breakaway point.
- Overhead-type dispensing units shall be provided with a listed automatic-closing type hose-nozzle valve without a latch-open device.

4.2.3 Other Hazardous Materials

All hazardous materials will be handled and stored in accordance with applicable LORS. Incompatible materials will be stored in separated storage and containment areas. Areas susceptible potential leaks and/or spills will be equipped with the following:

- Secondary containment
- Spill control below hose connection valves
- Liquid level limit control when capacity exceeds 500 gallons

- Product identification labels
- Hazard warning signage (per CFC Articles 79 and 80).

All product piping will be labeled by color code to identify contents and have the direction of flow noted.

A worker safety plan in compliance with applicable LORS will be implemented and will include training for both contractors and operations personnel. Training programs will include safe operating procedures, the operation and maintenance of hazardous materials systems, proper use of personal protective equipment, fire safety, and emergency communication and response procedures. All plant personnel will be trained in emergency procedures including plant evacuation and fire prevention. In addition, designated personnel will be trained as a plant hazardous material response team and will receive first responder and hazardous material technical training as described in the Hazardous Materials Business Plan. However, in the event of an emergency, plant personnel will defer to the appropriate San Bernardino County Fire Department Hazardous Materials Response Unit.

4.3 TRANSPORTATION AND/OR DELIVERY OF HAZARDOUS MATERIALS

Hazardous materials will be periodically delivered to Solar One. Transportation will comply with all DOT, U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), California Highway Patrol (CHP), and the California State Fire Marshal regulations for the transportation of hazardous materials. Under the California Vehicle Code, the CHP has authority to adopt regulations for the transportation of hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery. There are no hazardous materials posing an inhalation hazard that will be delivered to Solar One.

4.4 HAZARDOUS MATERIALS MANAGEMENT PLAN (HMMP)

Hazardous materials handling and storage, as well as training in the handling of hazardous materials will be set forth in more detail in a Hazardous Materials Management Plan that the applicant will develop. These plans will be developed in coordination with the appropriate San Bernardino County Fire Department.

An HMMP is required by the California Code of Regulations (Title 19) and the Health and Safety Code (Section 25504). This plan will include an inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. The topics to be covered in the plans are as follows:

- Facility Identification
- Emergency Contacts

- Inventory Information (for every hazardous material)
- Material Safety Data Sheets (MSDSs) for every hazardous material
- Site Map
- Emergency Notification Data
- Procedures to Control Actual or Threatened Releases
- Emergency Response Procedures
- Training Procedures
- Certification
- Standard Operating Procedures for hazardous material unloading

4.5 RISK MANAGEMENT PLAN

A Risk Management Plan (RMP) will not be required pursuant to the Clean Air Act (CAA) and its regulations (40 DFR 68 Subpart G) and under California's Accidental Release Prevention Program (CalARP) pursuant to the Health and Safety Code Sections 25331 through 25543.3.

The Code of Federal Regulations 40 (CFR) Part 68, and the California Code of Regulations (CCR), Division 2, Chapter 4.5, regulate the potential accidental release of hazardous materials. The California program is similar to the federal program but may be more stringent in some areas. CCR Article 8, Section 2770.5 includes tables of federally and state regulated substances including threshold quantities for regulation under the California Accidental Release Prevention (CalARP) program. Solar One will not store hazardous materials in excess of the threshold quantities.

4.6 MONITORING

An extensive monitoring program will not be required because environmental effects during the construction and operation phases of the facility are expected to be minimal. However, enough monitoring will be performed during both phases to ensure the proposed mitigation measures and that these measures are effective in mitigating any potential environmental effects.

Visual monitoring during construction and operation will be performed to determine compliance with and the effectiveness of the proposed mitigation measures. Written records of all monitoring events will be kept, including observations, actions taken, persons involved, and any recommendations.

4.7 APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The storage and use of hazardous materials at Solar One are governed by federal, state and local laws. Applicable LORS address the use and storage of hazardous materials to protect the environment from contamination and protection of facility workers and the surrounding community from exposure to hazardous materials.

4.8 REFERENCES

- Lewis, Richard J., Sr. 1992. Sax's Dangerous Properties of Industrial Materials.,Eighth Edition. Van Nostrand Reinhold. New York, New York.
- National Institute of Occupational Safety and Health. 1997. NIOSH Pocket Guide to Chemical Hazards. DHHS. Publication No. 97-140. U.S. Government Printing Office. Washington, D.C.
- U.S. EPA, 1987. Technical Guidance for Hazard Analysis, Emergency Planning for Extremely Hazardous Substances, December 1987.
- California Fire Code, 2001. Based on 2000 Uniform Fire Code. Article 52- Motor Vehicle Fuel-Dispensing Stations and Article 79- Flammable and Combustible Liquids
- National Fire Protection Agency, 2003, Chapter 30- Flammable and Combustible Liquids Code
- California Code of Regulations Title 26 Division 9 title 14- Toxic Tank Settings

Appendix X

EPA RMP*COMP OCA Modeling Results

Stirling Energy System Solar One Project

RMP*Comp Ver. 1.07
Results of Consequence Analysis

Chemical: Hydrogen
CAS #: 1333-74-0
Category: Flammable Gas
Scenario: Worst-case
Quantity Released: 1.1 pounds
Release Type: Vapor Cloud Explosion
Estimated Distance to 1 psi overpressure: .01 miles (.02 kilometers)

-----Assumptions About This Scenario-----

Wind Speed: 1.5 meters/second (3.4 miles/hour)
Stability Class: F
Air Temperature: 77 degrees F (25 degrees C)

RMP*Comp Ver. 1.07
Results of Consequence Analysis

Chemical: Hydrogen
CAS #: 1333-74-0
Category: Flammable Gas
Scenario: Worst-case
Quantity Released: 115.2 pounds
Release Type: Vapor Cloud Explosion
Estimated Distance to 1 psi overpressure: .05 miles (.09 kilometers)

-----Assumptions About This Scenario-----

Wind Speed: 1.5 meters/second (3.4 miles/hour)
Stability Class: F
Air Temperature: 77 degrees F (25 degrees C)