Safety and Oil Spill Prevention Audit

SoCal Holding, LLC
Huntington Beach Onshore Facility

California State Lands Commission

May, 2015

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Executive Summary

Safety Audit of the Huntington Beach Onshore Facility

A Safety and Oil Spill Prevention Audit of the Huntington Beach onshore processing facility and state oil and gas lease upland production areas was started in October 2013. Fieldwork was concluded in June 2014 with completion of the Electrical portion of the audit in July. A concurrent audit for platform Emmy is the subject of a separate report. Oil and Gas production operations on the Bolsa Chica wetlands were not part of this audit.

The objective of the Safety and Oil Spill Prevention Audit is to ensure that oil and gas production facilities on State leases are operated in a safe and environmentally sound manner, comply with state and federal regulations, and meet the Best Achievable Protection requirement of Public Resources Code (PRC) 8755. The audit followed the established procedures that have been used by CSLC for many years and the applicable regulations and standards commonly used are provided in Appendix C. Audit findings are based on and reference these criteria.

Company Background

SoCal Holding, LLC, is the current owner of the Huntington Beach onshore facility and holds interest in the state oil and gas leases at that location. Approval for the transfer of the interest in the Huntington Beach leases from Oxy, CA to SoCal Holding, LLC, a Delaware Corporation that is a subsidiary of Oxy USA and of California Resources was granted in December 2014. Occidental Oil and Gas Holding Corporation (Oxy) had purchased the Huntington Beach and platform Emmy operation from AERA Energy, LLC in November 2011.

Description of the Facilities

The SoCal Holding Huntington Beach facilities are located about 40 miles south of the Los Angeles International Airport in the City of Huntington Beach, on the east side of Pacific Coast Highway and beach areas that are adjacent to the highway. Facilities include three geographical components: the Highlands, Lowlands, and Townlot leases with onshore well areas producing from offshore state leases; (PRC 91, 163, 392, 425, and 426), as well as an onshore production facility that treats oil and gas prior to sales and shipment. The onshore production facility consists of an oil dehydration and water processing area; a tank farm with oil sales site; a hydrogen sulfide gas processing unit (Stretford Unit); a Gas Plant; CO_2 processing unit (Amine Unit); a warehouse complex; and related subsea and onshore pipelines. Hydrogen sulphide (220-300ppm) in the gas stream is converted to elemental sulfur in the Stretford Unit. Additional gas processing in the Amine Unit captures CO_2 to meet sales specifications. The facility also produces oil and gas that is sent ashore from platform Emmy which is located to the southwest, in state waters, one mile off Huntington Beach.

Platform Emmy has 31 active wells that produce from the PRC 425 and 426 leases and some onshore reservoir areas. The onshore operation currently has 135 producing wells and 45 active water injection wells. The Huntington Beach field also has two production areas in the North and South Bolsa Chica Wetlands. These areas are not included as part of the audit. Currently, SoCal Holding Offshore and Onshore leases combine to produce 5,100 Barrels of Oil per Day (BOPD), 165,000 Barrels of Water per Day (BWPD), and 1,900 Thousand Cubic Feet of Gas per Day (MCFD) of natural gas.

The oil producing formations are typically below hydrostatic pressure, and the wells require artificial (mechanical) lift to produce. Consequently, the potential for a well blowout is minimal. The onshore wells are produced using sucker rod pumping units and electric submersible pumps. The onshore graded drainage pattern, location of equipment, pads, and pits are intended to minimize environmental damage and aesthetic impact.

Safety Audit Results

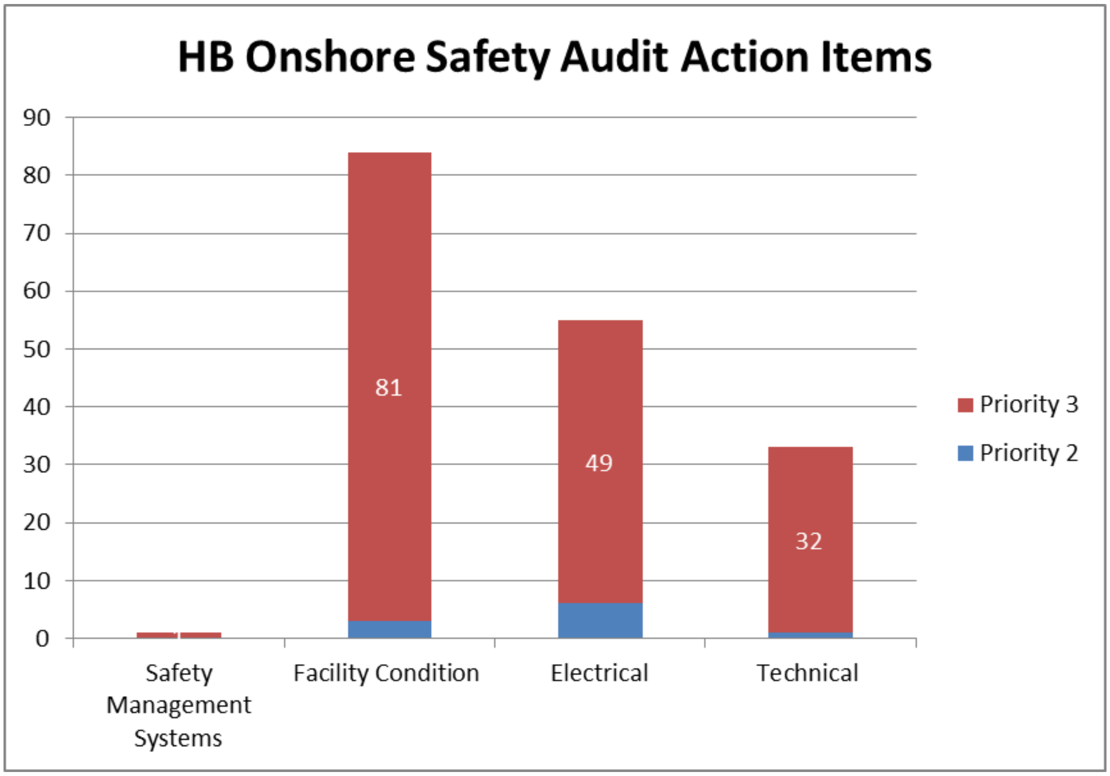
The Safety and Oil Spill Prevention Audit found the Huntington Beach onshore facility complies with applicable safety and regulatory requirements and that an adequate level of safety and environmental protection has been achieved for lease facilities and activities. The established safety culture also ensures the protection of workers, the public and the environment.

The condition of the onshore facility was found to be in a generally appropriate state of repair, clean, and well organized. SoCal Holding has well established safety policies, health and environmental programs that have continued at this location. A consistent and positive safety and environmental culture is evident in the SoCal Holding employees that enhance reliability, performance, and teamwork. Personnel are knowledgeable, and provided valuable assistance to the state lands team with this safety audit.

Safety systems and equipment remain fit for service; however, during the ownership transition from AERA to Oxy in 2011 not all safety device and equipment maintenance records were transferred from SAP to Oxy’s asset management software program (Maximo) resulting in inspection lapses. Mechanical integrity of process equipment and safety devices can only be ensured though routine inspections, tests and preventive/predictive maintenance protocols. Gaps in the mechanical integrity program can increase risk and reduce compliance.

The audit identified 173 action items. There were no priority one items that posed a high or immediate risk to personnel, the facility, or the environment. The number of priority two action items was also quite low at ten, with the majority (163) being priority three action items. This is a favorable result since the number is on par with other comparable facilities and since the items are mostly priority three, which is the lowest in terms of significance or risk. A number of the priority two action items have been already or are currently being addressed by SoCal Holding personnel. As of the time of this report, SoCal Holding has already completed 10% of the 173 action items (20% of the priority two items have been completed and 10% of the priority three items have been completed). Resolution of the remaining priority two-action items is required within 120 days, and resolution of the remaining priority three actions items is required within 180 days.

The following chart displays the action items identified by the subject teams that total 173. This distribution is similar to the other facilities in California where the items identified are typically related to piping, equipment, electrical, and system condition and maintenance.



Introduction

SoCal Holding, LLC
Onshore Facility
Huntington Beach

May, 2015

1.0 INTRODUCTION

1.1 Safety Audit Background

The California State Lands Commission (CSLC) Mineral Resources Management Division (MRMD) conducts safety and oil spill prevention audits of operators and/or contractors for lands in which the State has an interest. CSLC sponsored safety audits ensure oil and gas production facilities on State leases or granted lands are operated in a safe and environmentally sound manner and comply with Federal, State, and local codes/permits, as well as industry standards and practices. MRMD staff is tasked with oil spill prevention in California's ocean and tidelands, prevention of waste, conservation of natural resources, and ensuring that safety and health standards are being met. Public Resources Code (PRC) 6103, 6108, 6216, 6301, 6873(d), 8755 and 8757 provide authority for MRMD regulations as well as the existing inspection and the safety audit program.

In 1990, the California Legislature enacted the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (California Government Code 8670.1). The Act covers all aspects of marine oil spill prevention and response in California. The Act also gave the State Lands Commission certain authority over marine terminals. Under the legislation, marine facilities must provide the best achievable protection of the coast and marine waters.

Frequent monitoring and inspections of onshore and offshore oil and gas drilling and production facilities ensure that best achievable protection is in place to safeguard the public and environment. The Safety Audit Program, in conjunction with the State Lands Commission's inspection program, helps prevent oil spills and other accidents with on-site inspection and verification activities. The Safety Audit Program also aids prevention through review of facility design, maintenance, human factors, and other aspects of safety management.

Audit team members systematically assess an organization's facilities and safety management programs and provide feedback for improvement. Their areas of emphasis include:

- Equipment Functionality and Integrity (EFI)
- Electrical (ELC)
- Technical (TEC)
- Safety Management Programs (SMP)
- Human Factors (HF)

Appropriate company contacts and resources are identified prior to the start of the audit. Progress and deficiency reports are communicated periodically throughout the audit process and an "action item matrix" is used to categorize and track action items. The matrix contains recommended corrective actions and a priority ranking for the specified corrective actions. A report highlighting the strengths and weakness of the facility is generated from the matrix items.

Draft copies of the report and the action item matrix are provided to the company frequently throughout the audit. The final audit report is presented to company management formally, which affords the opportunity to discuss the findings and the corrective actions proposed in the final report. Throughout the clearance phase of the audit, the MRMD team continues to assist the operator in resolving the action items and tracks progress of the proposed corrective actions.

This program could not be successfully undertaken without the cooperation and support of the operating company. The safety audit benefits both the company and the State by reducing workplace hazards, environmental accidents, property damage, and in particular, oil spills. Previous experience shows safety assessments help increase operating effectiveness and efficiency; and lower operating costs. History has also shown that improving safety and reducing accidents makes good business sense.

1.2 Facility Background

1.2.1 Description of the Oil Field: SoCal Holding Huntington Beach (SoCal Holding) is a California based oil and gas operation located mostly within the City of Huntington Beach producing from the Huntington Beach field. The Huntington Beach field has produced more than one billion barrels of oil in its ninety-four year history. The field was originally discovered on May 24, 1920 when Standard Oil Company struck oil at 2,199 feet in Huntington Beach.

The SoCal Holding HB operation includes an onshore facility and Platform Emmy which are located approximately 40 miles south of the Los Angeles International Airport. The operation currently uses waterflooding to produce a total of 5,100 barrels of oil per day (BOPD), 165,000 barrels of water per day (BWPD), and 1,900 cubic feet per day of natural gas between the onshore and platform wells. The oil formations in this mature oil field are typically below hydrostatic pressure. The onshore production area covers over 1,300 acres and encompasses six leases (i.e., PRC 91, PRC 163, PRC 392, PRC 425, PRC 426 and PRC 4736). The onshore field operation has a 135 production wells using 55 electrical submersible pumps (ESP) and 80 beam pumping units for artificial lift. The wells that originate onshore produce approximately 3,000 BOPD, 120,000 BWPD and 1,500 MCFD of natural gas.

Platform Emmy, installed in 1963, is located 1.3 miles from the shore in 43 feet of water. The platform also produces from state offshore leases within this field, but is the subject of a separate safety audit. The platform was installed to complete the offshore development of the heavy oil reserves of these leases. Platform Emmy has 31 production wells using 28 ESPs and 3 beam pumping units producing from state leases PRC 392, PRC 425 and PRC 426. The platform produces an approximate additional 2,100 BOPD, 45,000 BWPD and 400 MCFD of natural gas, which must be processed at the onshore facility.

SoCal Holding's current development plan is to increase Huntington Beach oil field production over a five-year period, assuming that it is economically feasible to do so. SoCal Holding has obtained eighty-five new well permits for both their onshore and offshore facilities to drill water injection and production wells. A specially designed drilling rig and additional well cellars were constructed to perform drilling from onshore. The drilling program strategy will depend on oil discovery, market conditions, and current facility equipment capacity.

1.2.2 Company History: SoCal Holding, LLC, currently owns the Huntington Beach leases and onshore facility operations. In December 2014, Oxy USA was granted approval for the transfer of their interest in the Huntington Beach leases to SoCal Holding, LLC, a Delaware Corporation that is a subsidiary of Oxy USA, and of California Resources Corporation. Occidental Oil and Gas Holding Corporation (Oxy) had previously purchased the Huntington Beach and platform Emmy operation from AERA Energy, LLC in November 2011.

California Resources Corp. operates and oversees the day-to-day operations of the Huntington Beach Facility. California Resources is currently California's largest natural gas producer and the state's largest oil producer based on gross-operated barrels of oil equivalent (BOE). They employ more than 8,000 employees and contractors statewide. Assets under the umbrella of California Resources include operations in Long Beach, Elk Hills in Kern County, and Vintage Production California LLC with operations in San Joaquin, Ventura and Sacramento basins.

1.3 Facility Description

The SoCal Holding Huntington Beach facility is located in the City of Huntington Beach, in Orange County, California. The onshore facility has a number of well areas as well as facilities to process the oil and gas for sales and shipment. The main part of the facility resides on a strip area that is approximately 500 to 1000 feet wide and 8,000 feet long, bounded by the Pacific Coast Highway on the west side, residential housing on the east, and sits on relatively flat terrain. There are additional well areas including the Highlands, Lowlands, and Townlot areas. The production operations at the North and South Bolsa Chica Wetlands are not included in this safety audit. Platform Emmy's production is comingled with the onshore production to be processed at this facility.

1.3.1 Oil Processing: The production fluid mixture of oil, water and gas from the various leases travels from the wellhead to the inlet of three-phase separators known as the Free Water Knock Outs (FWKO). Eight FWKOs are assigned to specific leases and one vessel is used as a spare during emergency or preventive maintenance activities. The FWKOs reduce water content in the oil to pipeline specifications before entering the Lease Measuring System (LMS) Units. The LMS meters track total barrels of oil produced from the different leases before the oil is commingled and sent to the stock tanks. Sales oil is measured by the Lease Automatic Custody Transfer (LACT) meter and shipped through the Crimson Pipeline to area refineries, or is sent by tanker truck to the Lunday-Thagard Oil Refinery in South Gate, California (subsidiary of World Oil Corp).

1.3.2 Water Processing: Water separated from oil at the free water knock outs is sent to the skim tanks. There, residual oil is skimmed off and routed to the wet oil tanks. The produced water that comes from the skim tanks is sent to the Wemco flotation units. A Wemco flotation unit uses mechanical agitation to remove dispersed oil droplets and suspended solids from the produced water. This removal is necessary to keep from plugging the injection zones. Currently one of two skim tanks and Wemco units are in service. If increased production should warrant, both skim tanks and both Wemco units could be put in service. Produced water from the Wemco units is sent to and held in the drain tanks and the Skim Oil Separator (SOS). From these tanks, produced water is then sent to the injection charge pumps where the discharge pressure is increased to 100 psig. The injection fluid is next sent to Plant #4 injection pumps. Water Plant #4 has three pumps in service and one spare. The water injection pumps deliver approximately 150,000 barrels of high-pressure (1,385 psig) water per day. Produced water from Plant #4 is then routed into seven injection zones e.g., Lower and Upper Aston water injection wells (6), Lower and Upper Main water injection wells (29), Lower and Upper Jones water injection wells (8), and A37 water injection wells (2) as part of the waterflood program.

After acquiring the Huntington Beach lease, Oxy implemented a drilling program that included four new injection wells to debottleneck the existing capacity of the Water Plant. Cone bottom tanks are used on the lease to eliminate any solids from the rainwater runoff that is collected. This runoff is then routed to the drain tanks and finally re-injected into the field.

1.3.3 Gas Processing: All field gas from the platform and the onshore sites is sent to several units for processing to reach sales quality. These units include a Stretford Unit for hydrogen sulfide removal, the Gas Plant for additional removal of hydrogen sulfide, the Amine Unit for removal of carbon dioxide, and finally the Glycol Unit for the final stage of removal of water and natural gas liquids.

The Stretford process employs an aqueous alkaline solution containing a water-soluble salt of anthraquinone disulfonic acid (ADA) and a water-soluble vanadium compound to remove the hydrogen sulfide from the gas stream. It uses a reduction oxidation reaction (redox) to remove the hydrogen sulfide and produce elemental sulfur. In this process, sour field gas containing 250-330ppm of H2S enters the wet gas inlet scrubber (V-1) which removes any liquids. The gas then enters the contactor towers (V-2, V-3 & V-5). Normally two towers are online while the third acts as a backup in the event of tower plugging. As the gas travels through the contact towers, the hydrogen sulfide becomes entrained in the solution. The solution is sent to the oxidizer where the vanadium compound carries the needed oxygen. The redox reaction then produces elemental sulphur. Air is used to regenerate the solution and to float the elemental sulfur to the top in a slurry. The regenerated solution is returned to feed the contactors while the slurry at the top travels to the flotation cell (T-2). There, the sulfur is skimmed off and moved into the sulfur slurry holding tank (T-1). Accumulated elemental sulfur in T-1 is then manually pumped to a Baker Tank for sales. Hydrogen Sulfide in the gas stream is reduced to less than 1ppm before the gas stream enters the Gas Plant.

After removal of hydrogen sulfide at the Stretford Unit, the process gas enters the Gas Plant's main compressor K-601 suction drum (V-601) to remove any liquids before entering the main compressor K-601. The compressor increases the gas pressure before the gas enters the SulfaTreat Towers (V-604 & V-605) for final removal and polish of the remaining H2S in the gas. The SulfaTreat towers are in a lead/lag configuration that permits change-out of the spent media in one vessel while the gas stream is processed through the other tower without interruption. Sweetened gas (85°F) (i.e., a gas free of hydrogen sulfide) then flows to the Amine Unit for CO_2 removal.

At the Amine Unit, a filter-separator (F-1001) removes liquids and solids from the Gas Plant exit gas stream. Lean amine is fed to the top of an amine contactor) where it meets the natural gas stream. The lean amine removes CO_2 from the natural gas through absorption and chemical reaction. Upon exiting the contactor, the rich amine stream is thermally regenerated before being pumped back to the contactor. The wet natural gas leaves the top of the contactor column and is fed via pipeline to the glycol unit.

The Glycol Dehydration Unit is the final step removing water and natural gas liquids from the gas stream. During this process, lean glycol is fed to the top of an absorber (also known as a (glycol contactor) where it contacts the wet natural gas stream. The glycol removes water from the natural gas by physical absorption and carries the water with it out the bottom of the column. Upon exiting the absorber the glycol stream is referred to as "rich glycol". The rich glycol is thermally regenerated which releases the liquids and the glycol returns to the glycol contactor where the cycle begins again. Once the natural gas leaves the top of the absorption column it is fully processed and ready to be used. The natural gas is distributed to facility systems (e.g., fuel gas and makeup gas) that require it and as “sales gas” to the Southern California Gas Company pipeline system.

Facility Condition Audit

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May, 2015

2.0 FACILITY CONDITION AUDIT

2.1 Goals and Methodology

The primary goal of the Facility Condition Audit Team was to evaluate the current maintenance and integrity of SoCal Holding's onshore facilities. The on-site inspection involved a systematic evaluation of the different systems, equipment, and facilities using various checklists and methods that the team has developed over years of auditing. A variety of codes and standards apply in addition to CSLC regulations. Initial tasks to accomplish this goal included field verifications of the key drawings/plans, overall condition inspection and evaluation, a review of system and equipment maintenance histories, further evaluation of specific systems and equipment using checklists, and technical review of safety systems design. The layout of the audit report generally follows a "system by system" method that includes a description and assessment of the facilities with any significant observations. The report addresses safety of personnel as well as facility or process safety. The assessments of both areas of safety are important when identifying an organization's current level of safety development.

2.2 General Facility Conditions

2.2.1 Workplace Housekeeping: Facility work areas were clean and orderly, free of slip and trip hazards, waste materials (e.g., refuse, oilfield wastes) and fire hazards. The warehouse shipping and receiving areas were clearly marked and well organized. There was an adequate supply of clearly marked refuse containers throughout the entire facility and all refuse appeared to be well controlled. Regular collection of waste contributes to good housekeeping practices. Employee facilities are adequate, clean and well maintained. Washrooms are cleaned once a day and have a good supply of soap and hand towels. Portable units were in satisfactory condition with no obvious health or sanitation concerns.

Drip pans and splashguards are used throughout the facility to prevent spills and pollution. If a substance accidently drips onto the ground, personnel clean it up immediately. Absorbent materials are stored in an emergency trailer located near the electrical personnel office and on all facility work vehicles. They are readily available for wiping up greasy, oily or other liquid spills. Tools are available and stored in suitable fixtures for easy access. They are promptly returned after each use and regularly inspected, cleaned and taken out of service if visibly worn or damaged. Management policies require workers to pay attention to good housekeeping practices as a basic part of accident and fire prevention.

2.2.2 Stairs, Walkways, Gratings and Ladders: Stairs, walkways, gratings and ladders throughout each of the facilities appeared to be of a safe design and construction. Safeguards were in place wherever there was a need to transition between levels and for routine access to equipment. The aisles, passageways, stairs, and gratings had sufficient safe clearances, were in good repair, and were clear with no obstructions across or in the aisles to create a hazard. Portable ladders and other necessary work equipment appeared to be in good working order and free from oil and grease. Fixed metal ladders and appurtenances were painted to resist corrosion. SoCal Holding's safe work practices cover the use and care of ladder equipment on the facility.

2.2.3 Escape / Emergency Egress / Exits: Escape / Emergency Egress / Exits are clearly posted and accessible. Evacuation routes are explained during initial worker orientation, safety meetings, and are reviewed as part of the work permit system. They are clearly identified with signs posted throughout each of the facilities.

2.2.4 Labeling, Color Coding and Signs: The design, application, and use of signs and symbols within the facility define specific workplace hazards. SoCal Holding adheres to Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) recommendations. All employees receive instruction on what the signs signify and what, if any, special precautions are necessary to perform their task safely. Workplace hazards (e.g., slip, trip) are marked in yellow, and fire safety equipment is red.

Warning signs were posted at the entrance to each facility. They were clearly visible and identified safety hazards. Signs are also posted at each well to identify the owner/operator, well number and type of well.

Fire diamonds were visible on all tanks, vessels, buildings, and chemical storage totes. The posting of fire diamonds is an indication of good facility emergency planning and conformance with the Uniform Fire Code.

2.2.5 Security: Physical and operational security measures are in place to prevent unauthorized entry into the SoCal Holding facilities. Process facilities are manned twenty-four hours a day, seven days a week with at least two operators present at all times. In addition, a private security guard is present at the main gate during normal business hours. SoCal Holding's also uses a system of colored placards placed on vehicles entering the lease. These placards are used to determine who is authorized to be on the property and who is not. Lease surveillance cameras, fencing, facility lighting, locked doors, and electronically controlled gates at access locations are also used as a deterrent to unauthorized entry and vandalism. Facility personnel also provide monitoring with normal surveillance activities of the pipelines and process facilities.

2.2.6 Hazardous Material Handling and Storage: Flammable and combustible liquids were found properly stored in safety cans and drums in accordance with CAL-OSHA and NFPA 30 regulations. The bulk chemical totes were correctly labeled, appeared structurally sound, and had adequate containment in the event of a leak. There was a minor concern regarding sun-faded labels on several chemical totes on the facility. The fading has made it difficult to read the label and identify the contents in the tote. No loose combustible material or empty drums were left on the premises.

Compressed gas cylinders were secured and legibly marked to identify the gas content. Empty and unused cylinders had closed valves with protection caps in place. Cylinders were stored in places where they would not be knocked over or damaged.

Material Safety Data Sheets (MSDS) containing information on all chemicals used in the workplace were up-to-date and accessible to all employees.

2.3 Field Verification of Plans

2.3.1 Process Flow Diagrams (PFD): The PFD drawings are considered a part of the necessary design documentation for a facility. The PFD drawings for the each of the facilities were up-to-date and showed the flow through the plant processes and equipment. The drawings were accurate and displayed the information typically included in PFDs; however, the material balance sheet appeared to be inaccurate and needed to be updated.

2.3.2 Piping and Instrumentation Diagrams (P&ID): A comprehensive field verification of P&IDs was performed for all onshore production and process facilities. The majority of drawings provided, including those for the Stretford Unit, Steam Generator, Tank Farm and Gas Processing facilities were incomplete and in need of revision. Several action items where generated regarding this issue.

2.3.3 Fire Protection Drawings: The fire protection drawings for all locations were mostly accurate with only minor updates or corrections needed. These drawings show important information about the fire-fighting system including the diesel fire pump or source of firefighting water pressure, the fire main or distribution system, the location of main valves, stationary monitors, portable extinguishers, and hydrants. These drawings are posted in the tank farm control room to comply with the requirement for providing required emergency information.

2.4 Condition and Integrity of Major Systems

2.4.1 Piping: An external visual inspection of the piping systems at all locations in this facility was performed in conjunction with P&ID verification. This visual inspection and evaluation work observed the outside condition of the piping, painting and coating, and checked for signs of misalignment, vibration, or leakage. The evaluation also included the condition of pipe hangers and supports as well as any field modifications or temporary repairs not recorded on the piping drawings. The evaluation considered other key information such as material selection, piping design and maintenance practices. The condition and maintenance of piping throughout the facility was found to be generally good, with very few action items. One Priority 2 action item was generated due to a broken pipe support clamp on the relief line of a pressure vessel, allowing it to sag. (EFI – 2.4.1.02) It was brought to the attention of operators and was repaired almost immediately. The selection of piping materials and components, e.g., valves, flanges, bolts, welds are compatible with the process, operating parameters and environment.

SoCal Holding uses a combination of ongoing routine and risk based piping inspections to achieve a desired level of facility safety, environmental protection, and unscheduled downtime. Inspection frequencies are set up according to regulatory requirements and established guidelines, e.g., API RP 570 and DOT pipeline inspections. Results from thickness measurements, inspections, repairs and other tests are readily available and recorded within a computer-based maintenance system (Maximo). This maintenance management system stores and generates maintenance activities as well as saving inspection data.

2.4.2 Tanks: Facility tanks are subject to SoCal Holding's written inspection and maintenance plan. The maintenance plan follows API recommended practices, applicable safety, and industry standards. The maintenance strategy also conforms to applicable State regulations, and uses appropriate work practices and procedures. Routine external/internal maintenance inspections occur on a five-year cycle and more often if conditions require it. Tank documentation includes inspections, repairs, alterations and reconstruction records. In addition, tank shell ultrasonic thickness data showing locations and results are completed as part of the inspection process. This inspection method searches for flaws and service induced damage as part of determining the suitability of the tank for the intended service.

Tank exterior coatings, piping, valves, walls, anchor bolts, and labeling appeared to be in good condition with no evidence of recent damage or active leaks. Only one minor action item was generated due to missing anchor bolts and surface spalling of the concrete foundation on the south facing Wemco flotation cell.

Safety devices for the stock tanks are complaint with MRMD regulations. A high level in the tanks will cause shut-in of all oil and water processing. The design and capacity for secondary tank battery containment meets EPA Spill Prevention Containment and Countermeasures (SPCC) requirements. The concrete containment system is designed to be impermeable to crude oil, can hold a 110 percent of the contents of the largest tank, and provides the required containment. The required high and low level sensors are displayed on the tank farm process computers and provide the required alarms to alert operators to significant tank conditions.

2.4.3 Pressure Vessels: There are a variety of pressure vessels at the facility, ranging from air receivers to three phase separators that are used on the lease in order to process the oil, gas, and produced water. These pressure vessels are built according to American Society of Mechanical Engineers (ASME) Codes and have appropriate controls and safety devices. In order to improve maintenance efficiency, SoCal Holding has tailored inspection cycles to match the safety risks posed by particular classes of pressure vessels. SoCal Holding uses a maintenance management program called CREDO to determine vessel inspection frequencies. CREDO uses vessel wall thickness, corrosion allowance and minimum thicknesses (t-mins) as well as operating temperature and pressures to determine the inspection frequency. Vessel inspections (external and internal) are completed within 5-year intervals using non-destructive examination techniques.

Analysis of tank inspection records determined that inspection frequency is being achieved in accordance with API 510 guidelines. Inspection recommendations, maintenance activities, and design information is documented and recorded within the pressure vessels permanent record. However, a review of these records found that several pressure vessels had passed their due dates for inspections. This finding was communicated to SoCal Holding personnel and they are currently reviewing each of the vessels to determine what action is required. (EFI – 2.4.3.06 – 08, 2.4.3.13 – 16, 25, 26, 28, 40, 42 & 43).

External inspection of the pressure vessels found no evidence of leakage, distortion or cracks at welds or at structural attachments, corrosion or defects of vessel connections. Internal inspection records show corrosion to be low and at a predictable rate with no major concerns. Inspection of the pressure vessels found no major problems or defects but did identify some minor concerns regarding anchoring and foundations. These were addressed with action items.

2.4.4 Relief System: The main purpose of the pressure relief system is to ensure protection for facility personnel and equipment from overpressure conditions that may happen during process upsets, equipment failure and external fires. The relief system serves the major process vessels and components while other relief devices may be located on smaller ancillary components. The relief system components were evaluated for installation, design, maintenance and functionality. They included:

- Relief Devices and Piping
- Flare Header System
- Liquid Knockout Drums
- Ground Flare

A visual inspection of the system determined that all laterals and headers are arranged so that the outlet from each relief valve does not form a liquid trap. Similarly, the sizing of the discharge piping and the relief manifold provide adequate relieving capacity and protection to the corresponding vessel(s) from overpressure. In addition, the knockout drums are designed for vapor-liquid separation and prevention of liquid carryover. As with many older installations, the relief valves and associated piping were sized for a much higher production rate than present.

Isolation valves are installed on the inlet lines to pressure safety valves (PSVs) and on the outlet lines for ease of maintenance. During normal operations, these valves on the inlet and outlet are opened and locked or car sealed in that position. Rupture disks are also used to protect against corrosion and reduce fugitive emissions on the upstream side of relief valves in the Gas Plant and Amine facilities. These disks are used in conjunction with computerized sensors to alert operators of an abnormal increase in pressure via tank farm monitors.

The maintenance and servicing records for all PSVs comply with applicable regulations and recommended standards (e.g., API RP 520, 521 and Cal OSHA 6551). PSVs are tested and serviced by an outside contractor. The inspection frequency is normally every six months and up to five years in some cases depending on the application of the relief valve. Service records were in order with no action items identified.

The ground flare is sized to take into account the number of relief valves discharging into the flare header. Analysis of the flare found that it was designed to comply with all safety, environmental and regulatory mandates. Additional design considerations included the relationship between the facility and its neighbors (e.g., smoke suppression, flame radiation, noise and visibility).

2.4.5 ESP, Pump Units, Wellhead Equip. & Well Safety Systems: The onshore wells are considered incapable of flow or after flow, once artificial lift is stopped. Therefore, subsurface safety valves (SSSV's) or other automated shut down valves are not required on production flow lines. Since gas can flow from the casings, block and bleed systems have been provided at the wellheads. Onshore electrical submersible pump (ESP) wells can be shutdown remotely via the tank farm lease emergency shutdown (ESD).

2.4.6 Fire Detection Systems: MRMD regulations and other facility fire protection requirements include fire detection and alarm systems. These systems are intended to provide early warning and notification of a fire situation. Systems typically include:

- Smoke Detectors
- Flame Detectors
- Combustible Gas Detectors
- Fusible Links

An audit of the smoke detectors in the control rooms and occupied office spaces found them energized, free of excess dust and overall in physically good condition. Records showed these smoke detectors are visually inspected on a routine basis and smoke entry tested semiannually according to NFPA 72 inspection frequencies by facility technicians.

Temperature safety elements (e.g., fusible link and plug loops) within the tank farm and the Gas Plant were visually inspected and found to be in good working order. The fusible plug system was pressurized, constructed of noncorrosive materials and in good condition. Inspection, maintenance, and testing records showed SoCal Holding technicians inspect the temperature safety elements annually according to NFPA 72.

Fire detection in the tank farm relies on surveillance from operating personnel rather than a dedicated detection system. The tank farm has fusible links at the vapor recovery unit but no types of flame detectors for the oil storage or production areas. A response to a fire at the tank farm rests on the operator who after observing a fire, must initiate the notification to the local fire department and try to secure the source of fuel. In a worst-case scenario, there is the possibility that a fire within the tank farm could grow in intensity or involvement before operating or surveillance personnel could detect it. A HAZOP could be of benefit to determine if the current fire protection in the tank farm or other areas is satisfactory to the operator. Currently all fire protection components and related safety systems have been approved and deemed adequate by the City of Huntington Beach Fire Department. In addition, a local fire department station is located less than two miles from the facility.

The fire detection systems on the Stretford, Amine, Gas Plant and Micro Turbine units meet CSLC regulations 2132(g) (4) and are appropriate in design and scope. The fire detection systems in use at these units consist of UV/IR flame detectors, and combustible gas/vapor detectors. The Gas Plant also employs a deluge system triggered by fusible plugs in its active fire protection system. These systems appear to be well maintained and in good operating order with no deficiencies noted.

2.4.7 Firefighting Equipment: The primary firefighting system required by CSLC regulations and the local fire authority consists of a city water pressurized loop system supplying water to hydrants, deluge sprinklers, stationary monitors, and foam stations. The equipment is located within the tank farm, Gas Plant and Stretford Unit. A previous test of the system hydraulics, by a fire protection engineer, showed that the fire pump had the capacity to supply the Gas Plant deluge system and stationary monitor streams with adequate flow and pressure. Weekly test results are recorded and retained for comparison purposes as required by NFPA 25, 5-4. The firefighting system appears to meets the minimum fire equipment requirements found in NFPA 11, 13, 15 and 20 guidelines.

The original basis of design for the fire protection system used area risk management to determine the total capacity of the fire water system. Based upon the risk rankings more protection is provided to the area of the facility requiring the greatest amount of protection (e.g., Gas Plant). The Huntington Beach Fire Department (HBFD) approved all detailed plans along with equipment types and locations. The fire department also reviewed hazard, operability study's (HAZOPS) and safe charts for the tank farm before approval was given for the tank farm modernization project and construction of the Gas Plant. Fire response depends on early hazard detection and the ability of the local fire department to contain and extinguish a flammable liquid or gas fire. In addition to the primary fire main system, the facility is equipped with portable fire extinguishers as required by the Huntington Beach Fire Department.

Visual inspection of the firewater piping and fittings found that they were in good condition with no missing or damaged paint or coating, rust, and free of mechanical damage. Pipe to soil interface was minimal with no corrosion present. Fire loop supports, hangers and braces were secure and undamaged. Hydrants were protected from vehicle impact with adequate barriers and valve handles appeared to be in good condition with hydrant wrenches securely attached.

The fixed water monitors used throughout the processing areas were inspected for leaks and nozzle range of motion. As part of SoCal Holding's maintenance program, pivot points on the monitor are regularly greased, ensuring proper operation in the event of a fire.

A foam system (3% aqueous film forming foam, AFFF) is employed within the tank farm for controlling liquid hydrocarbon fires in the oil stock tanks. The foam storage vessel is adjacent to the tank farm control room and requires operator activation. The system is designed to provide an air-excluding continuous blanket of foam to the surface of the oil stored in the stock tanks. Dyne Technologies test the foam concentrate for contamination and dilution on a regular basis. Records show a history of continuous testing.

The City of Huntington Beach Fire Department has primary authority regarding firefighting requirements. Huntington Beach Fire Department personnel inspect and verify that the firefighting equipment provided meets their requirements.

2.4.8 Combustible Gas and H_2S Detection Systems: Combustible and H_2S gas detection systems are intended to provide warning of a hazardous condition that could lead to a fire or toxic gas release. Combustible gas detection systems are installed within the Gas Plant, Micro Turbine, Stretford, and Amine unit. These gas detection systems alert personnel to the presence of low-level concentrations (20% of LEL) of flammable gas/vapor by a computer generated alarm and a local beacon. As the concentration of the gas approaches 60% of LEL, emergency shutdown (ESD) of these units occur. H_2S gas detection systems are also installed in units where there is a presence of H_2S gas and the potential for release (e.g., Stretford, and Gas Plant Units). These detectors do not initiate shut-in/isolation actions but provide audible and visual alarms when the concentration of H_2S reaches 10ppm.

All H_2S and combustible gas detection systems were inspected and found to be in good working order and met CSLC requirements. Calibration, testing, and maintenance of this system is conducted and recorded monthly by SoCal Holding personnel. Sensor histories and test results are kept electronically in Maximo and available upon request.

Hydrogen sulfide dispersion modeling assessed the risk of a gas release to the public and nearby housing tracts. The model predicted a radius of exposure (ROE) for varying hydrogen sulfide concentrations for both continuous and instantaneous releases to determine whether additional safeguards are needed. Computer modeling determined that no significant exposure risks were present and that H_2S detection system along the perimeter wall was not needed.

2.4.9 Emergency Shutdown System (ESD): Manual pull ESDs can be found in the Gas Plant and Stretford Units. When activated, all plant gas feeds are blocked in and diverted to the ground flare. Individual lease ESDs are available through the Wonderware operator interface. The interface allows operators to shut down individual leases as necessary to stop oil production and gas flow in the event of an emergency.

The ESD system was found to effectively alarm, shutdown process activity and close shutdown valves (SDVs) as designed. The safety system also permits the continued operation of the firefighting systems during an emergency. These stations were clearly identified and made of corrosion resistant materials to ensure reliable operation. Optical flame detectors, e.g., Lower Explosive Limit (LELs) and Infrared/Ultraviolet Flame Detectors (IR/UVs), have the ability to shutdown individual process units, while a high-high level alarm (LAHH) on the stock tanks will initiate a full facility shutdown. These safety detectors and tank level alarms can be found within each of the onshore facility's process units (Tank Farm, Stretford, Gas Plant, Micro Turbine and Amine Units). The sensors and level instrumentation are tested and documented semi-annually.

2.4.10 Safety and Personal Protective Equipment (PPE): SoCal Holding has a written workplace safety program for identifying, evaluating, analyzing, and controlling workplace safety and health hazards. This program has systematic policies, procedures, and practices that are fundamental to creating and maintaining a safe and healthy working environment. This includes the specification of PPE. SoCal Holding considers the prevention of occupational injury and illness to be of such importance that it is given precedence over production.

SoCal Holding regularly assesses the workplace to determine if hazards are present that require the use of PPE when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. Hazards are communicated to the employees, appropriate PPE is selected, and workers are trained in its use. Employees were observed using appropriate PPE as required by company policy or where hazards are known to exist. PPE commonly used include hard hats, steel-toed boots, fire resistant clothing, hearing protection, safety glasses, and other specialty items like face shields, rubber gloves, aprons, and fall protection as needed.

2.4.11 Lighting: SoCal Holding has implemented a "good neighbor" policy onshore that entails turning off some non-essential process area lighting that could be a nuisance to nearby residences. They have achieved this balance through combining general and local lighting by providing the minimum required light with general lighting, adjusting lighting levels at specific locations and providing portable task lighting to its employees. Fixtures installed throughout the facilities appear to be placed in a manner that provides adequate lighting levels for safely performing tasks. Pole-mounted fixtures with high-pressure sodium vapor lamps provide the area lighting. This method of artificial light appears to conform to work area lighting and hazardous conditions requirements. The electrical (ELC) portion of the safety audit evaluates lighting levels as sampled in several locations.

2.4.12 Instrumentation, Alarm and Paging: The process instrumentation has evolved to digital control through previous facility upgrades. Production controls and instrumentation are part of a Digital Control System (DCS) that is connected to the tank farm by digital networks. Within the DCS, programmable logic controllers (PLCs) are used to control and monitor all the process equipment and instruments in the various plants. Operations management software (Wonderware) provides the operator interface displaying plant wide status and events. The software also has the ability to detect instrument malfunction and equipment failure. This capability, in combination with optimizing features of process control, makes both startup activity and operational routines much easier and more efficient for operators. Wonderware also supports information management that shows historical information which can be used to improve process efficiency and plant performance.

The computer screens used by the operators to operate the facility are known as Human Machine Interfaces (HMI). They are simple graphic display that mimics the process on the operator's console, located in the tank farm control room. The HMI displays at this facility allow the operator to access information and control the process in an uncomplicated manner. Common operator actions possible from the displays include:

- Setpoint Change
- Mode (Auto or Manual)
- Output Change
- Trending
- Alarm Management
- Report(s)
- Shutdown of Selected Processes

The integrated alarm systems give an audible indication to alert the operator that an alarm has been activated. The visual indication is then used for alarm identification and evaluation. These audible tones are different for each process location. This difference in sound is used to help operators identify the origin of the alarm. Computer generated process alarms are not only displayed and audible in the control room; they are also sent to a paging system that alerts operators who may be away from the control room.

The display methods and components are consistent throughout the HMI screens. Adequate information is contained in each of the video displays and all functions are labeled for quick assessment of key information. The graphic displays are concise and clear-cut which reduces the possibility of confusion and operator error.

The facility alarms are tested, maintained, and calibrated annually. Records are readily available and the device history can be tracked through Maximo. All local instrumentation (e.g., pressure gauges, temperature gauges and recorders) appeared to be properly maintained and in good operating condition. Design and logic of these systems is further addressed in the Production Safety Systems section of this report.

2.4.13 Auxiliary Generator / Prime Mover: Uninterruptable power supply (UPS) systems and portable generators provide emergency power on the onshore facilities. The UPS systems provide approximately ½ hour of backup power to the individual facility PLCs. If needed, additional power to the PLCs can be supplied by portable generators. These generators are sized to supply power to a few vital circuits and their operation is only limited by the amount of fuel available. In the event of a power failure, manual transfer switches isolate circuits from incoming electrical service. If the generator is running and power is restored, these switches keep the power company's electricity from traveling to isolated circuits until the generator is turned off and the switch is reset to the non-backup position. This method of operation allows for the safe transfer and operation of emergency power.

Facility emergency lighting is restricted to handheld flashlights and truck-mounted spotlights. In the event of a power outage, safe shutdown of the facilities can be accomplished using the backup instrument air compressor.

2.4.14 Spill Containment: The secondary containment provided around tanks and fluid handling equipment meets the EPA's Spill Prevention Control and Countermeasure (SPCC) regulations. This system coupled with routine visual inspections by operating personnel reduces the consequences if a leak or rupture were to develop. The containment volumes provided by the spill containment walls for the tank farm were also carefully reviewed. The assessment found that containment for the stock tanks as well as for the skim tanks is adequately sized to meet regulatory requirements. The containment volumes provided will contain more than the volume of the largest tank plus the recommended allowance for precipitation while excluding the volumes occupied by other tanks.

2.4.15 Spill Response: Oil spill response for the onshore facilities is outlined in SoCal Holding's Oil Spill Contingency Plan (OSCP). The plan satisfies both federal and state regulations and is discussed in more detail in the Safety Management Section of this report. Spill response equipment identified in the plan is stored in an emergency trailer located near the electrical personnel office. The trailer is stocked with a variety of pollution control equipment that exceeds minimum requirements. An outside contractor maintains these inventories monthly. The inventory consists of spill booms, absorbent pads, generator, shovels, rakes, hand tools, flashlights, tape, etc. Contract personnel are considered the primary responders to minor onshore spills with SoCal Holding personnel available if needed. For larger onshore spills, the same outside contractors mentioned above can and will respond if called on with the addition of Ecology Control Industries (ECI) environmental services vacuum trucks. In addition, SoCal Holding schedules Qualified Individual notification checks, facility spill boom deployment drills and tabletop drills annually to test the incident command system. The entire response plan is tested on a triennial basis by either conducting a worst-case discharge drill or by ensuring that other portions of the plans components are exercised at least once during other drills occurring within the same three-year period.

2.5 Preventive Maintenance and Mechanical Reliability

The Preventive Maintenance and Mechanical Reliability section provides a general overview of SoCal Holding's corporate philosophy and approach to implementing a successful reliability program. The section also provides findings when appropriate. Preventative maintenance and job scheduling is controlled by a "maintenance planner". The maintenance planner reviews new work orders daily and assigns an in-house craft or outsources the task to a contractor/vendor depending upon workload and specific job requirement. The planner also stages commonly used parts and supplies while critical spare parts are located in the warehouse. This approach provides SoCal Holding with maintenance task optimization and decreases the chance of equipment failure. However, during the change of ownership between Oxy and AERA, the equipment maintenance transition was less than optimal. Gaps were found in the migration of equipment from SAP to Maximo. These gaps have caused certain equipment to be excluded from routine maintenance and testing. SoCal Holding is aware of the situation and working towards repopulation of maintenance program data.

In addition, the computerized maintenance management system (Maximo) is utilized to manage and track activities. Operating personnel have the capability to access Maximo to generate a work order. These work orders can range from a simple filter change to major equipment repair. Maximo gives the SoCal Holding maintenance planner flexibility to schedule and record these activities based upon manufacturer's recommendations, operating history, and recognized and generally accepted good engineering practices. Tank and pressure vessel reliability is maintained through regularly scheduled internal, external and ultrasonic inspections and repairs. Reliability inspections are also standard for all rotating equipment.

Facility engineers have developed a risk management system to decrease the incident rate of piping leaks for the various piping systems. These piping systems or sections of piping connect the wells via headers to the processing equipment. A risk level is established for the various sections of piping based on service and consequence of failure. When the risk level for a particular section of piping reaches an unacceptable level, engineers implement a corrective or mitigating action on that section of piping to lower the risk level to an acceptable level. This proactive approach to piping integrity and risk control has been enhanced in recent years and has produced positive results. A number of different methods are being used to improve the life of the various piping systems that include:

- Primer, Paint and Tape Wrap Coatings (External)
- Epoxy Coatings (Internal)
- Cement Lining
- Cathodic Protection
- Chemical Treatment

A chemical vendor provides the facility with a chemical treatment program that satisfies the operational needs of the onshore facilities. A main component of the program is corrosion inhibitor. The chemical protects the pipe's internal surface and metal components by forming a protective film. Additionally, the program incorporates corrosion coupons at critical points in the piping for monitoring the effectiveness of the chemical treatment program.

Sacrificial anodes are used in conjunction with other forms of corrosion control such as protective coatings, wherever systems are exposed to a corrosive environment. This means of corrosion control is provided for select pressure vessels and tanks. Appropriate record keeping from regularly scheduled internal, external and ultrasonic inspections and repairs provide historical data and often provide signs as to the source of a detected deficiency.

Evaluation of the maintenance condition resulting from SoCal Holding's management practices found that the facility is designed, operated, and maintained in a manner that permits safe, reliable operation. It's success is due to operational groups (management, engineering, operations and maintenance) being fully integrated into an effective team committed to following inspection, testing, and preventive maintenance "best practices". There was one Priority 2 action item generated asking SoCal Holding to evaluate the condition and safety of the concrete pipe trench roadway crossing located at the east end of the facility. (EFI – 2.5.01) Degradation of the concrete slab is exposing rebar with surface cracks, spalling, and delamination that can lead to corrosion of the rebar and possible failure of the roadway crossing. This crossing is heavily traveled and stress from vehicles and/or truckloads may cause additional damage or failure of the structure. The SoCal Holding team was aware of this situation and was developing a plan to address this problem.

2.6 Production Safety Systems

The Tank Farm and Stretford Unit Cause-and-Effect Charts were compared with facility drawings to determine if all plant safety devices were listed along with their related control actions in the chart. The analysis determined that the Cause-and-Effect Charts for both facilities were not current and in need of revision. (EFI – 2.6.01 & 02) The remaining facilities (Amine, Stretford, Micro Turbine, Gas and Water Injection Plants) Cause-and-Effect Charts were unavailable for analysis but had been reviewed with Aera Energy LLC. Development of the missing charts for SoCal Holding use would serve to effectively communicate, document, and manage the purpose and functional relationship of the safety devices. Such a chart is commonly available at other state lease facilities. The audit team believes this documentation should be retained as part of the facility process safety information as described in the industry recommended practices such as API RP 14J, RP 51 and RP 75. (EFI – 2.6.03)

Further analysis of facility drawings and PLC logic found that the design of process controls and safety systems is adequately documented, has the appropriate level of safety controls, and is consistent with the previous logic and operation by Aera Energy LLC. The automated control and safety systems have been designed using the applicable codes, standards and industry practices.

Plant status, controls and alarms are displayed in real-time via HMI displays located in the tank farm control room. The automated control system (PLC) monitors and controls facility processes in the separate operating areas. The automated displays help minimize effects of undesirable events and mitigate consequences from upsets. When hazards cannot be eliminated or controlled through design, SoCal Holding uses a hierarchy of health and safety controls (e.g., Administrative and Engineering Controls) to eliminate hazards or reduce exposure to hazards.

Facility Production Safety Systems also include pressure safety devices (PAHHs) which are capable of shutting down the processes associated with individual FWKOs. There are LELs and IR/UV detectors in the Amine, Gas Plant and Stretford Units that have the ability to shut in these specific process areas. Finally, a total facility shut down can be activated by the stock and skim tank high level shut down safety devices, (LAHH). All systems are functional and appear to be properly designed and maintained.

Electrical System Audit

SoCal Holding, LLC
Onshore Facility
Huntington Beach

May, 2015

3.0 ELECTRICAL AUDIT

3.1 Goals and Methodology

The primary goal of the Electrical Team (ELC) was to evaluate the electrical systems and operations of the SoCal Holding Huntington Beach Unit onshore and offshore facilities to determine if they conform to the recognized codes and industry standards. The ELC System Audit included the electrical equipment located at onshore sites, Highlands, Stretford Unit, Gas Processing Unit, Tank Farm, and Fort Apache.

Specific tasks to accomplish this goal at each location included a proven process of field verification of electrical single-line diagrams, plan drawings, area classification drawings, and operation and maintenance practices. Comprehensive use of inspection checklists, code and standard compliance checklists, and review of electrical system design for conformance to codes and standards was utilized to complete the electrical audit. This report includes a summary of the electrical systems addressed by this audit.

3.2 Hazardous Area Electrical Classifications Drawings

API RP 500 and NFPA 70, the National Electrical Code (NEC) requirements provide specific guidelines for the electrical classification of hazardous areas and installation practices for electrical equipment and materials within classified areas. Areas that contain, or may contain, flammable gases and vapors in normal operations can form an explosive environment that is ignitable by hot surfaces, electrical arcs, and sparks. To prevent this from happening, facilities are classified according to the hazard present in the different areas. This is done so that all electrical equipment and systems are properly selected and installed. The hazardous area electrical classification diagrams (HAECD) are generally representative of the existing conditions and revised when process systems are modified except as noted in the matrix. (ELC - 3.2.01 thru 06)

Oil and gas production operations require the use of various chemical additives, some of which are flammable. The storage and dispensing of these chemicals is accomplished using portable totes. The area classification diagrams include identification of the planned locations of totes but due to the changing needs of production, the proper placement of totes requires periodic verification with the hazardous area classification diagrams.

Portable chemical injection totes for oil and water treatment are located throughout the facilities. The totes are portable, but the locations of the tote installations, are permanent. The lines, pumps, and fittings associated with the tanks are a source of hazard and require classification of the areas affected. These areas were generally found to be classified correctly.

All equipment enclosures, raceways, conduit sleeves, metal totes, and well casings are required to be electrically bonded in classified areas. Bonding was observed to be in place with no specific problems noted.

General-purpose electrical enclosures (Load Centers, MCC’s, control panels, etc.) are not suitable for use in classified areas. In general, electrical equipment in classified areas was found to be explosion proof, purged or otherwise suitable for use in classified areas. No action items were identified.

Junction box and conduit fitting covers were checked to insure they were not missing or not properly seated against box flanges to provide an adequate seal in classified areas. In these locations covers must be flange-face to flange-face or box if bolt-on type or five full threads engaged if screw-cover type. No significant action items were identified.

Conduit seals are required at classification boundaries. Locations where conduits originate outside of classified areas and travel through classified areas without the use of a box, fitting, or coupling may cross boundaries of areas where the hazardous material has a low probability of producing an explosive or ignitable mixture and is present only during abnormal conditions for a short period of time without a seal (Division 2 only per API RP 500 / NFPA 70 / NEC). No action items were identified.

3.3 Electrical Power Distribution System, Normal Power

3.3.1 Electrical Single Line: Electrical single-line drawings available for the facilities in this audit accurately represent the electrical power system configuration. The configuration is essentially radial feed configuration. The audit focused on the 12,000V, 4160V and 480V distribution systems and excluded lower voltage systems. The Gas Plant and Water Injection Plant 4 use 4160V power for their largest loads. The rest of the onshore facilities have 12kV to 480V transformers and 480V MCCs that supply local loads. The drawings were generally available and located at the site library. The high voltage single-line is up to date but could be improved by including more detailed equipment rating information and capturing operational notes that are presently taped to the equipment. (ELC - 3.3.1.01) Single-lines for 480V MCCs throughout the facility should be updated to better represent recent system modifications. (ELC - 3.3.1.02 thru 09)

3.3.2 Electrical Service Capacity: The facility receives power from Southern California Edison (SCE) at 66kV. The main service transformer rated at 22.4 MVA transforms voltage to 12.47kV for facility distribution from the main switchgear. A single 12kV feeder is dedicated to service for Platform Emmy. The main 12kV switchgear is identified to be rated at 2000A but a notice posted on the equipment indicates the maximum load should not exceed 1000A due to construction of the bus. The limitation to 1000A, 21.6 MVA at 12.47kV should be identified on the single-line. (ELC - 3.3.2.02) The service transformer maximum rating is 22.4 MVA, which is slightly higher than the posted capacity of the main switchgear.

The power system capacity, in general, appears to be adequate. During the April visit the main 12kV switchgear loading was approximately 660A, 14.25 MVA but it is our understanding from conversations with SoCal Holding personnel that planned growth will be moving beyond the capacity of the existing main transformer and switchgear in the near term. The significant amount of equipment and load additions in progress of installation suggests that a new load forecast should be prepared to represent the planned load changes. Load flow studies should be performed for each substation to verify feeders and equipment are adequately rated for the load changes. (ELC – 3.3.2.01)

3.3.3 Electrical System Design: The power distribution system is essentially a radial feeder configuration. A radial feeder configuration consists of a single circuit to supply the load, much like the hub and spoke configuration of a wheel. If a fault occurs on one feeder or a feeder needs to be taken down for maintenance in a radial system there is no alternate path to feed the normal loads of that feeder. Loss of the transformer supplying the load will also result in loss of power. Loads normally supplied from that transformer could not be supplied with power until repair or replacement is completed. Distribution system components could be added that would provide better operational flexibility and maintenance opportunities. It may be worth evaluating whether the potential operational, safety, and cost impacts of losing individual feeders and their associated loads warrants upgrading the distribution system from a radial to a loop configuration to improve operational reliability and maintenance flexibility.

Reliability of the electric system depends on the condition and operation of each system component. It also depends on the availability of one SCE 66kV feeder to supply. At one time in the past, the on-shore facilities were supplied from two (2) SCE 66kV feeders. The second SCE 66kV feeder and substation were removed from service. However, provisions exist to restore the second SCE 66kV service, which may be necessary to accommodate future peak loads, and improve electric power reliability.

Some of the items that need to be kept in mind when adding or relocating equipment include providing adequate working clearance, securing and supporting raceways, conduit and cable and providing clear identification of purpose with item numbers on control switch nameplates. Several action items were identified because of this issue. (ELC - 3.3.3.01, 05 & 07)

3.4 Electrical Power Equipment Condition and Functionality

The overall condition of the electrical equipment appears to be good. The existing equipment is a mix of original and new. The original equipment is approaching the end of its design life and appears to be maintained on a regular basis. The marine environment and operating conditions are harsh but overall, the equipment is adequately maintained and serviceable. The original equipment will require replacement in the near term. Reportedly, plans have been proposed to replace the existing 12kV main switchgear.

Outdoor electrical equipment enclosures that are not marine grade, 316 stainless steel exhibit significant corrosion or deterioration. (ELC - 3.4.01) Examples of equipment that exhibit the effects of corrosion caused by the harsh costal environment include are transformer 3A and the transformer adjacent to Building 4.

Transformer 3A has a significant oil leak; fiberglass safety switch lockout positions are broken and unusable; corroded metal safety switches appear to be inoperable due to excessive corrosion; the transformer adjacent to Building 4 is also showing signs of an oil leak. (ELC - 3.4.02, 03, 05 & 14)

Arc flash hazard warning labels on electrical equipment are generic and not specific to energy levels at equipment. These types of labels were acceptable based on older editions of the CEC, but are no longer adequate. Where older labels are posted, the labels refer to requirements of NFPA 70E apparently leaving workers to inquire about arc flash energy levels and appropriate PPE before proceeding with work. A comprehensive arc-flash hazard study is required with the results of energy levels specific to each equipment and PPE requirements provided on labels affixed to equipment. (ELC - 3.4.16)

SoCal Holding has implemented a comprehensive training program to educate and inform all workers of the hazards associated with electrical systems. Personnel are required to complete regular, periodic training and hazard awareness training regarding the proper and mandatory use of personal protective equipment.

The electricians follow a mandatory set of procedures designed to enhance personnel safety and reduce the potential for shock and injury. Electricians are responsible to complete a task checklist prior to beginning any work. The checklist includes identification of hazards that might be associated with the task and the measures to be employed to minimize the hazard, risks. A lockout/tagout program is well documented and implemented. The use of three-way and four-way gas detectors is required for entry to cellars and confined spaces and for hot work in classified areas.

The working clearance required around electrical equipment is generally maintained, however, there were a few instances where trip hazards or inadequate clearance was observed. (ELC - 3.3.3.01 & 03)

Panel schedules have been well maintained. SoCal Holding has made a concerted effort to update the panel schedules. This is an ongoing effort. It is also recommended that equipment identification labels be made consistent with process diagrams and electrical single-line diagrams, as well as the established naming convention. (ELC - 3.3.1.05 thru 08)

3.4.1 Equipment Maintenance Practices: The Huntington Beach facility used SAP software to track and generate maintenance work orders up until the acquisition of the lease by Oxy. Because of the purchase, the SAP database was mapped over to the Maximo database. The server for the Maximo database is located in Long Beach, CA.

Access to the database is restricted based on user credentials. However, authorized users have full access. Field personnel have limited access to create work orders and update work order status. New equipment records are documented and assembled in an Asset Addition Form, which is reviewed by engineering lead personnel. These records are transferred to the Facility Operations Supervisor (FOS) for review and approval prior to delivery to the Maintenance Planner. The Maintenance Planner assigns an asset number and completes the asset record in Maximo including preventative maintenance procedures and their frequencies. All new equipment requires a Pre-Startup Safety Review (PSSR) that identifies action items for documentation including maintenance procedures. At the time of this assessment, there were 344 preventative maintenance procedures in the system. Once the asset is created and entered into the system, Maximo generates work orders automatically. The orders are generated 30 days or less prior to work being required. Work orders are scheduled and tracked for each asset and will include activity required weekly, quarterly, semi-annually, annually, five-years, etc. Material required to complete the task is identified in the work order. A warehouse located on-site maintains commonly used consumables and certain renewable parts. The planner scheduler or FOS can issue purchase orders for items not in stock up to a certain dollar limit.

In addition to Maximo generated work orders, personnel generate corrective work orders. Corrective work orders document malfunctioning equipment or unsafe conditions and are submitted to the FOS for review and implementation. Personnel also submit recommendations to the FOS for any changes to a work order. Completed work orders are given to the FOS for review and then input into Maximo. Final documentation includes notes, test reports, photographs, third party paperwork, procedures, and any other information deemed critical or beneficial regarding the asset.

Third party and contractor provided equipment is not tracked in Maximo. SoCal Holding implements a program of Level 3 audits for all non-owned equipment. SoCal Holding supervisory personnel complete these audits biweekly. Checklists are used to document the weekly inspections. In addition, a safety auditor is assigned to monitor and observe all work activity on a daily basis.

Hot work permits, operations issues, safety devices, and personnel protective equipment are identified on the work orders. All work permits and reports are submitted to Health, Environmental and Safety (HES) for review and tracking purposes. HES responds to any issues identified and monitors any safety issues until they are resolved.

The migration of detailed information from SAP to Maximo is incomplete. Recommendations include devoting additional resources to complete the high priority processes. (ELC - 3.4.1.01) In addition, many of the asset records reviewed lacked equipment specific data, as well as information on regular and periodic maintenance. Verify that all assets numbers have records in Maximo and that preventative maintenance procedures are included. (ELC - 3.4.1.02) Some of the closed work orders reviewed in Maximo did not have records of completed activity. In order to maintain proper records sufficient work detail must entered into the maintenance program. (ELC - 3.4.1.03) Similarly, preventative maintenance tasks for electrical equipment should be more specific and comprehensive. Many of the work orders reviewed did include basic tasks such as “dust and clean”. They lacked direction regarding more quantitative activities such as insulation resistance tests, oil tests, lubrication, operation/exercising, infra-red and partial discharge tests, and other best practices included in industry publications, such as the Standard for Maintenance Testing Specifications (MTS) for Electrical Power Equipment and Systems from the International Electrical Testing Association (ANSI/NETA MTS) and NFPA 70B. (ELC - 3.4.1.04) The paper files, drawings, reports, and records from prior years, have been moved to the new Temporary Trailer. The archives require organization by system (i.e. electrical, mechanical, process) and then by asset and location. The records are a valuable reference for engineering and operations and require organization and cataloging. (ELC - 3.4.1.05)

3.5 Grounding

Three types of grounding are required at oil and gas processing facilities; power system grounding, equipment grounding, and static bonding. Power system grounding at the facility is well designed and the conductors and connections appear to be in good condition overall. All equipment enclosures, raceways, conduit sleeves, metal totes and well casings are required to be electrically bonded in Class I areas. In general, grounding system installations observed were found to be adequate at the facility except as noted in the matrix. (ELC - 3.5.01, 03 & 04)

Class I chemical dispensing and storage areas require a static ground bonding conductor connection between the metal totes and the plant ground grid as well as an accessible, exposed, ground loop around all chemical storage areas for connection of temporary bonding jumpers for individual tanks and delivery trucks. The ground bonding provisions for chemical storage tanks require regular verification. While there is a written procedure for regular verification of temporary and static bonding on chemical totes, it is essential to ensure that the chemical contractor and facility personnel consistently follow the safe work practices for static bonding control of metal totes when moving them in and out of place.

A written equipment grounding program for monitoring and testing of temporary cords and cables exists and is being implemented by electric shop personnel according to CEC 590.6(B)(2). Facility personnel who ensure all grounding conductors for temporary cord sets are properly installed and maintained continuously, enforce the program. In addition, SoCal Holding has its own written program with quarterly (90-day) color codes assigned for ease of identification. Contractors are also required to establish and maintain their own programs and enforcement. However, it was observed that the SoCal Holding program and third party programs utilize different color codes, thereby making it more complicated to confirm that a particular cord has been tested as required by the Code. To help verify testing, SoCal Holding should require third parties to utilize the same color code for marking temporary cord sets, in addition to any other markings that establish ownership and responsibility. (ELC - 3.5.05) In order to confirm the monitoring and testing of temporary cords and cables a Maximo preventative maintenance procedure should be created to verify cord set testing records and marking every 90 days for both SoCal Holding and third party cord sets. (ELC - 3.5.06)

3.6 Emergency Electrical Power

There are a number of UPS systems distributed throughout the SoCal Holding facility to power the Automation System PLC's and related equipment. Emergency generator power supply at the onshore facility is limited to the PLC and safety systems. Small gasoline generators are available for temporary installation and connection as an alternate source of power to supply 120V for the battery charger to maintain battery power levels needed for operation of PLC and safety systems at the Tank Farm and gas processing units and similar systems at MCC-400. There is no backup power source to supply production or process equipment.

3.7 Electric Fire Pumps

The firewater pump is diesel engine driven. The engine has an electric jockey pump to maintain fire water line pressure. The firewater pump, battery charger, and battery bank are regularly testing and periodic maintenance is performed. However, control wiring for the diesel engine requires repair or replacement and physical protection. (ELC - 3.7.01)

3.8 Process Instrumentation

A SCADA system is installed on-shore for the remote monitoring of producing wells. The SCADA system monitors voltage, amperage, power factor, and pump status with annunciation for over/under voltage and overload conditions. Data acquisition for a 30-day period is available for trend analysis of individual wells. This system provides enhanced capability for operator surveillance of producing wells. The process control wiring generally complies with the code. Intrinsically safe systems comply with CEC Article 504 requirements.

3.9 Standby Lighting

The recommended illumination levels are provided in API RP 540, Electrical Installations in Petroleum Processing Plants. The light levels should be a minimum of five foot-candles for manifolds, pump-rows and valves. Active stairs, operating platforms, gauge glasses, instruments, and separators should have a minimum of five foot-candles per API RP 540. SoCal Holding staff should conduct a comprehensive lighting audit and take corrective action to eliminate areas with low lighting levels. A mix of incandescent, fluorescent, high-pressure sodium, and metal halide lighting is used throughout the facility.

Emergency lighting is limited and there are very few area lights that are connected to a standby or emergency source. Battery pack "bug-eye" lighting exists in electrical equipment buildings. However, this type of lighting is intended for emergency egress purposes, and not for task lighting. Battery pack lighting is intended to provide minimal illumination (less than 2 foot-candles) for up to 90 minutes. It is recommended that an evaluation should be conducted to evaluate areas that need improved emergency lighting.

Wiring between the final junction box and the light fixture must have a temperature rating at least as high as the light fixture nameplate requirement. Numerous light fixtures require wire to have insulation with a 125°C rating but have 75°C wiring installed. SoCal Holding should verify wire insulation rating during fixture installation and include the requirement to use properly rated wire as a standard note to be included in all work orders.

3.10 Special Systems

3.10.1 Safety Control Systems: Safety control systems are required to be a collection of devices arranged to effect plant shutdown. Electrical safety control systems are normally operated energized and fail-safe. Failure of external power to a safety control circuit requires an audible or visual alarm to be initiated. Process emergency shutdown system logic is programmed in a PLC system. Facility controls and safety features are designed to be fail-safe and have redundant capabilities. ESD at the Recovery Substation is hardwired to breaker controls and has a contact for remote shutdown via the Automation PLC system.

3.10.2 Gas Detection Systems: Combustible Gas detection systems, LEL and H2S, are employed to detect combustible gas leaks from equipment and piping and to warn personnel of possible toxic concentrations. The gas detection systems are located at the Gas Plant, Amine, Micro turbine and Stretford Units. These are all powered from a battery back-up power supply located at the PLC Cabinet in the Stretford Control Room or from the Gas Plant MCC PLC UPS. All of these detectors are checked periodically to ensure the alarm sounds locally and in the control room.

3.10.3 Fire Detection Systems: UV/IR detection systems are also located at the Gas Plant, Amine, Micro turbine and Stretford Units. There is also a burn plug system at the Gas Plant compressor and Gas Plant Glycol Skid. All have UPS back up power as stated above in 3.6. All detectors have clean lenses and are checked with a UV-IR test lamp periodically to ensure alarms are actuated locally and at the control room.

3.10.4 Aids to Navigation: Not applicable to onshore facilities.

<u>3.10.5 Communication:</u> Communications systems are established to provide for normal and emergency operations. Onshore facilities make use of portable radios, phones, cell phones, and computers via Ethernet based networks. Two Motorola XPR 8400 repeater units located in the server room with UPS support and multiple portable radios support the radio system. There are two types of phone systems in use onshore. In the Tank Farm control room there is a POTS (Plain Old Telephone System aka landline). The majority of phones throughout the site are IP based off a dedicated Cisco Voice System located in the server room at the refurbished training building. The Ethernet based communications use a star configuration. The Cisco Voice System and the Network Equipment have an APC 3000 UPS for each rack with ~4-hour capacity. There is a provision to manually hook up a portable generator to power this communications equipment at the training building.

Systems used for emergency communication should have battery-operated power supplies with amp-hour capacity to supply the load for at least four hours of continuous operation. Landlines, microwave, wireless radio, cellular phones, and computer networks are available for communication between facilities.

<u>3.10.6 General Alarms:</u> The onshore facility has a horn and beacon light at the Gas Plant, beacon alarm at the Drain Tanks (for H2S), and beacons at the Stretford Unit as well as Electric Buildings 1, 2, 3, & 4. Audible alarms are on the HMI screens for the Automation System. Each of these devices are powered by UPS systems associated with the Automation PLC System.

<u>3.10.7 Cathodic Protection:</u> A portion of the onshore cathodic protection equipment appears to be out-of-service. It is our understanding that a decision has been made to discontinue onshore Pulse Rectifier production for well casing cathodic protection. Pulse Rectifiers will continue to be operated until their end of life. No upgrades or repairs are planned for the onshore Pulse Rectifier system. As Pulse Rectifier units fail, they will be disconnected and abandoned. Systems that are not functional should be removed. It is recommended that SoCal Holding provide details of the corrosion control and monitoring program, and future plans to modify the program, to CSLC for information and review. (ELC - 3.10.7.1)

Safety Management Programs

SoCal Holding, LLC
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4.0 SAFETY MANAGEMENT PROGRAMS

4.1 Goals and Methodology

The goal of the safety management program audit was to verify that SoCal Holding has required programs, plans, and manuals in place and that the company uses a safety management approach to manage hazards and thereby reduce the frequency and severity of undesirable events. SoCal Holding's safety management programs are composed of organizational and operational procedures, design management, audit programs, and other methods defined by OSHA and the Environmental Protection Agency. The audit began with the review of the Operating Manuals, other required emergency and spill response plans, training programs, and other key elements before considering the specific other programs that SoCal Holding uses to fill out the remaining areas that are addressed by their Safety and Environmental Management Program for the Huntington Beach lease.

4.2 Operations Manual

SoCal Holding has a system in place for determining what procedures or processes need to be documented. Individuals knowledgeable with the process and its hazards write the Standard Operating Procedures (SOPs). These individuals are also familiar with the subject matter and typically have performed the work and operated the process. The SOPs are written in a concise, systematic, easy-to-read format with sufficient detail so that trainees with limited experience or knowledge of the procedure can successfully carry out the task with minimal supervision. The information presented in the operations manual was found to be clearly written and not overly complicated.

The SOPs are maintained via the company intranet system with hard copy versions located in the control room at each operating facility. A comprehensive review of the SOPs determined that, in most cases, pertinent operating information was available within the different manuals. However, some of the operating information does not appear to be current and/or up-to-date, including company and personnel references. (SMA – 4.2.01) The SOPs should be systematically reviewed annually, with hard copies being updated every 1-2 years, to ensure that the policies and procedures remain current. It does not appear as though this is occurring.

4.3 Spill Response Plans

The SoCal Holding Oil Spill Contingency Plan (OSCP) was developed in accordance with Federal and State Facility Response Plan requirements. The document defines procedures and plans for responding to discharges of oil into navigable waters and seeks to minimize damage to the environment, natural resources, and facility installations. The plan covers the onshore facilities, Platform Emmy, and associated pipelines. The following elements are addressed within the plan:

- Incident Command Organization
- Facility description
- Hazards Evaluation Study and potential worst case spill scenario evaluation
- On-water containment and recovery procedures

- Shoreline protection and clean-up
- Wildlife Care and Rehabilitation procedures
- Response procedures

Also contained within the OSCP are operating procedures the facility implements to prevent oil spills, control measures installed to prevent oil from entering navigable waters or adjoining shorelines and countermeasures to contain, cleanup, and mitigate the effects of an oil spill. The OSCP was reviewed and noted to have a long approval history. It meets Federal (40 CFR Section 112.5) and State Office of Spill Prevention and Response (OSPR) requirements. SoCal staff is familiar with the OSCP and holds annual spill drills to increase the effectiveness of their spill response.

4.3.1 EPA Spill Prevention Control and Countermeasure (SPCC): The SPCC Plan is an Environmental Protection Agency (EPA) requirement. An electronic version of the SPCC Plan was reviewed for compliance and appears to meet the EPA Rule. SoCal Holding SPCC Plan is prepared in accordance with good engineering practices. The plan provides engineering, operation, maintenance, and management strategies to minimize the potential of a spill or release of oil products (e.g. fuel and petroleum/lubricating oil) from certain storage and operational equipment and activities, and in the event of a spill, to prevent the spill from entering a navigable waterway or adjoining shorelines. The SPCC Plan is approved by management and certified by a licensed professional engineer.

4.4 Training and Drills

SoCal Holding has a comprehensive initial training program for new workers and ongoing training for experienced employees that includes optional and mandatory training for all personnel. A computer based training matrix known as Training Mine alerts personnel to upcoming training requirements and maintains a history of all training activities. Topics of some of the basic and annual training that is conducted to satisfy mandatory OSHA and spill response requirements include: Hazardous Communications, Personal Protective Equipment (PPE), Incipient Firefighting, Control of Hazardous Energy (Lockout/Tagout), Confined Space Entry, Hot Work, Respiratory Protection, Hydrogen Sulfide (H2S), First Aid/CPR Medic Inclusive, Work Authorization Permitting, Hazardous Waste Operations and Emergency Response (HAZWOPER), DOT Pipeline Operations, Oil Spill Drills, and Process Safety Management.

Facility operations training consist of on-site facility instruction. There is a job task qualification program where operators are trained and tested for competence on the safe operating procedures for the process they operate. The on-the-job training process is a strict testing and evaluation method. Both the lead operator and operation’s supervisor must sign off on the training and qualification. Next level promotion is based on progression through these operating requirement elements. Each level of training requires successful completion and a field competency demonstration before advancement to the next level can occur. Situational awareness training helps employees recognize abnormal operating conditions as well as what to do in the event of an incident.

Spill response team members are trained in the procedures developed for the facility spill plan. This training consists of classroom instruction, exercise evaluation briefings, tabletop and equipment deployment drills. Exercises range from a discussion about how things would occur to deployment of equipment and mobilization of staff. SoCal management reviews the lessons learned during oil spills and exercises to revise and improve contingency plans.

The Health, Environmental and Safety (HES) Coordinator uses Training Mine to track employee training requirements and job description. Training and drill records are maintained and available to regulatory agencies upon request. SoCal Holding's training program appears to meet all requirements for safety management systems and spill response. No action items were identified.

4.5 Safety Management Programs

A SoCal Holding corporate program that parallels the OSHA Process Safety Management (PSM) standard, is used to control workplace hazards. While the Huntington Beach facilities are not currently subject to OSHA PSM regulations, SoCal Holding has voluntarily integrated their corporate safety management program into the facility. This practice has improved their operating reliability, system operating efficiency and reduced incidents involving the release of hazardous materials beyond the facility boundaries.

SoCal Holding's safety policy sets a clear direction for the organization to follow and is a part of their established business performance goals. The objective of their safety policy is to set down in clear-cut terms management's approach and commitment to health and safety at their facilities. Audit team observations and interviews with employees and contractors confirmed that SoCal's senior management has defined, documented and endorsed its safety policy. Safety management functions within the organization are connected with the safety of their personnel. This connection can be seen in the planning, developing, organizing and implementing of SoCal Holding's safety policy; together with the measuring and auditing of the performance of those functions.

Additional assessment and feedback regarding SoCal Holding's safety management programs will be afforded by the CSLC's Safety Assessment of Management Systems (SAMS) that is conducted subsequent to the safety audit. The SAMS also provides significant benefits regarding human factors observations and assessments described in the next section of this report. The SAMS is a separate effort from this safety audit and the results are kept confidential between CSLC and the operating company.

Human Factors Audit

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Huntington Beach

May, 2015

5.0 HUMAN FACTORS AUDIT

5.1 Goals of the Human Factors Audit

The primary goal of the Human Factors Audit is to evaluate the operating company's human and organizational factors by using the Safety Assessment of Management Systems (SAMS) interview process. The SAMS is planned to follow the safety and spill prevention audit of the SoCal Holding Huntington Beach lease facilities. Interview results are considered confidential between CSLC and SoCal Holding, and will be contained in a separate report.

SAMS was developed under the sponsorship of government agencies and oil companies from the United States, Canada, and the United Kingdom to assess organizational factors, enabling companies to reduce organizational errors, reduce the risk of environmental accidents, and increase safety. The assessment was divided into nine major categories to examine the following areas (The number of sub-categories or areas of assessment for each category are included in parentheses.):

- Management and Organizational Issues (9)
- Hazards Analysis (9)
- Management of Change (8)
- Operating Procedures (7)
- Safe Work Practices (5)
- Training and Selection (14)
- Mechanical Integrity (12)
- Emergency Response (8)
- Investigation and Audit (9)

Assessment of each of the sub-categories is derived from one main question with a number of associated and detailed questions to help better define the issues.

The SAMS process is not intended to generate a list of action items. Its purpose is to provide the company with a confidential assessment of where it stands in developing and implementing its safety culture and a benchmark for future assessments.

5.2 Human Factors Audit Methodology

The CSLC Mineral Resources Management Division will schedule the SAMS interviews with SoCal Holding staff and sub-contractors after this report is issued. Interview responses will be evaluated according to SAMS guidelines and a separate confidential report summarizing the results will be generated. The MRMD staff will provide the confidential report accompanied by a formal presentation that summarizes the report to SoCal Holding management.

Action Item Matrix

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Appendices

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Appendix A
Acronyms

ADM	Administration
ANSI	American National Standards Institute
API	American Petroleum Institute
BAT	Best Achievable Technology
CEC	California Electrical Code
CFC	California Fire Code
CSLC	California State Lands Commission
EFI	Equipment Functionality and Integrity
ELC	Electrical
ESD	Emergency Shutdown
ESP	Electric Submersible Pump
FSL	Flow Safety Low
FSV	Flow Safety Valve
HF	Human Factor
H_2S	Hydrogen Sulfide
kVA	KiloVolt Amperes
kW	Kilowatts
LACT	Lease Automatic Custody Transfer
MCFD	Manufactured Standard Cubic Feet per Day (Gas)
MOC	Management of Change
MRMD	Mineral Resources Management Division
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHA	California Occupational Safety & Health Administration
OSPR	Office of Spill Prevention and Response
PHA	Process Hazard Analysis
P&ID	Piping and Instrumentation Diagrams
PM	Preventative Maintenance
PPE	Personal Protective Equipment
PRC	Public Resources Code
PSH	Pressure Safety High
PSHL	Pressure Safety High-Low
PSI	Pounds per Square Inch
PSL	Pressure Safety Low
PSM	Process Safety Management
PSV	Pressure Safety Valve
RP	Recommended Practice
SAC	Safety Analysis Checklist
SAFE	Safety Analysis Function Evaluation
SAMS	Safety Assessment of Management Systems
SCADA	Supervisory Control and Data Acquisition
SCBA	Self Contained Breathing Apparatus
SCE	Southern California Edison
SMP	Safety Management Programs
SoCal	SoCal Holding LLC
SSV	Surface Safety Valve
TEC	Technical
UBC	Uniform Building Code
UFC	Uniform Fire Code
VSD	Variable Speed Drive

Appendix B
Best Practices

1.0 BEST PRACTICES

1.1 Best Achievable Protection/ Best Achievable Technology	PRC 8750
Inspection of Marine Facilities	PRC 8757
MRMD Oil & Gas Operations	CSLC 2 CCR Art. 3 - 3.6

2.0 FACILITY CONDITION AUDIT

2.1 Methodology for Audit	
2.2 General Facility Conditions	
2.2.1 Housekeeping	CSLC 2123 & 6539
2.2.2 Stairs, Walkways, Gratings, & Ladders	CAL OSHA Title 8 CCR
2.2.3 Escape/ Emergency Egress/ Exits	CAL OSHA 3215, 22, 25 & 6577
2.2.4 Labels, Placards, & Signs	CAL OSHA & API RP 14J
2.2.5 Security	CSLC 2123
2.2.6 HAZMAT Storage	OSHA 29 CFR 1910.1200
2.3 Field Verification of Plans	
2.3.1 PFDs	API RP 14J
2.3.2 P&ID	API RP 14J
2.3.3 Fire Protection Drawings	API RP 14J (6.4.3)
2.4 Condition and Integrity of Major Systems	
2.4.1 Piping	ANSI 31.3
2.4.2 Tanks	CSLC 2132(g)(2), API Spec 12 R1 & API RP 653
2.4.3 Pressure Vessels	CSLC 2132(g)(2), ASME Boiler & PV Code Sect. VIII & API RP 510 PV Insp Code
2.4.4 Pressure Relief, PSVs and Flare Sys	CSLC 2132(g)(3), API RP 14J, 520, 521 & 576
2.4.5 ESP, Pump Units & Wellhead Equip	CSLC 2132(a)(4)
2.4.6 Fire Detection	CSLC 2132(g)(1)(C) & NFPA
2.4.7 Fire Fighting Equipment and Systems	CSLC 2132(g)(4) & NFPA
2.4.8 Combustible Gas & H_2S Detection	CSLC 2132(g)(5) & (6)
2.4.9 Emergency Shutdown Device	CSLC 2132(g)(1) & API RP14J
2.4.10 Safety & Personnel Protective Equip	CAL OSHA
2.4.11 Lighting	CAL OSHA
2.4.12 Instrumentation, Alarm, & Paging	CSLC 2132(g)(1)&(2), API RP 14J & 8 CCR 5189
2.4.13 Auxiliary Generator/Prime Mover	CSLC 2132(g)(7)
2.4.14 Spill Containment	CSLC 2139 & 2140, 40 CFR 112.7(c) & GOV CODE 8670
2.4.15 Spill Response	CSLC 2139 & 2140 & GOV CODE 8670
2.5 Mechanical Integrity	CSLC 2129(c) & CAL OSHA 8 CCR 5189 (j)
2.6 Offshore Production Safety Systems	CSLC 2132 (g)(1), API RP 14C, 14J, 75 & 29 CFR 1910
Onshore Production Safety System	CSLC 2132 (g)(1), CAL OSHA 8 CCR 5189, 29 CFR 1910 & API RP 51

3.0	**ELECTRICAL AUDIT**	
3.1	Goals and Methodology	
3.2	Hazardous Area Electrical Classification Dwgs	RP 500, NFPA 70, 496 & CEC 500 & 501
3.3	Electrical Power Dist. System, Normal Power	
3.3.1	*Electrical Single Line*	API RP 540, NFPA 70 & CEC 110 & 500.5
3.3.2	*Electrical Service Capacity*	API RP 540, NFPA 70 & CEC 408.4
3.3.3	*Electrical System Design*	API RP 540, NFPA 70 & CEC 110, 240 & 408.4
3.4	Elec. Power Equip Condition and Functionality	
3.4.1	*Equipment Maintenance Practices*	API RP 540, NFPA 70 & CEC 110, 314, 490 & 501
3.5	Grounding	API RP 540, NFPA 70 & CEC 250, 408.40 & 501.30
3.6	Emergency Electrical Power	API NFPA 70 & 110 & CEC 110 & 700
3.7	Electric Fire Pumps	API RP 14F, NFPA 20, NEC 696 & CEC 110 & 700
3.8	Process Instrumentation	API RP 14F& 540 & NFPA 70
3.9	Standby Lighting	API RP 14F
3.10	Special Systems	
3.10.1	*Safety Control Systems*	API RP 14C & CEC 110
3.10.2	*Gas Detection System*	API RP 14C
3.10.3	*Fire Detection System*	API RP 14F & 14G & API 2001
3.10.4	*Aids to Navigation*	Coast Guard & CEC 110
3.10.5	*Communication*	API RP 14F & CEC 110
3.10.6	*General Alarm*	API RP 14F & CEC 760
3.10.7	*Cathodic Protection*	API RP 651, NACE RP 01-76 & 0675 & CEC 110 & 250
4.0	**SAFETY MANAGEMENT AUDIT**	
4.1	Goals and Methodology	API RP 75 SEMP, OSHA 29 CFR 1910.119 & CAL OSHA 8 CCR 5189
4.2	Operations Manual	CSLC 2173, OSPR PRC 8758
4.3	Facility Oil Spill Response Plan	CSLC 2139, OSPR GOV CODE 8670
4.3.1	EPA – SPCC	40 CFR 112.7
4.4	Training and Drills	CSLC 2175 (b)(6)(C, D) & (b)(7)(A,B,C,D) & OSPR GOV CODE 8670
4.5	Safety Management Programs	API RP 75 SEMP, OSHA 29 CFR 1910.119 & CAL OSHA 8 CCR 5189
5.0	**HUMAN FACTORS AUDIT**	
5.1	Goals of the Human Factor Audit	
5.2	Human Factors Audit Methodology	CAL OSHA 8 CCR 5189, API RP 75 & CSLC Safety Audit of Mgmt Systems (SAMS)

Appendix C
References

GOVERNMENT CODES, RULES, AND REGULATIONS

CSLC	California State Lands Commission
2123	*Lease Operations on Uplands*
2129	*Article 3.3 -Oil and Gas Production Regulations*
2132	*Production Regulations*
2139	*Oil Spill Contingency Plan*
2140	*Pollution Control and Removal Equipment*
2173	*General Requirements – Operations Manual*
2174	*Manual Review*
2175	*Manual Content*
Cal OSHA	California Occupational Health and Safety
3215	*Means of Egress*
3222	*Arrangement and Distance to Exits*
3225	*Maintenance and Access to Exits*
3308	*Hot Pipes and Hot Surfaces*
3340	*Accident Prevention Signs*
5189	*Process Safety Management of Acutely Hazardous Materials*
6533	*Pipe Lines, Fittings, and Valves*
6551	*Vessels, Boilers and Pressure Relief Devices*
6556	*Identification of Wells and Equipment*
CCR	California Code of Regulations
1722.1.1	*Well and Operator Identification*
1774	*Oil Field Facilities and Equipment Maintenance*
2101-2175	*California State Lands Commission, Mineral Resources Management Division Regulations*
CFR	Code of Federal Regulations
29 CFR	*Part 1910.119 Process Safety management of Highly Hazardous Chemicals*
30 CFR	*Part 250 Oil and Gas Sulphur Regulations in the Outer Continental Shelf*
33 CFR	*Chapter I, Subchapter N Artificial Islands and Fixed Structures on the Outer Continental Shelf*
40 CFR	*Part 112, Chapter I, Subchapter D Oil Pollution Prevention*
49 CFR	*Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standard*
49 CFR	*Part 195, Transportation of Liquids by Pipeline*

INDUSTRY CODES, STANDARDS, AND RECOMMENDED PRACTICES

ANSI	American National Standards Institute
B31.3	*Petroleum Refinery Piping*
B31.4	*Liquid petroleum Transportation Piping Systems*
B31.8	*Gas Transmission and Distribution Piping Systems*

Y32.11 *Graphical Symbols for Process Flow Diagrams*

API American Petroleum Institute

RP 14B *Design, Installation and Operation of Sub-Surface Safety Valve Systems*
RP 14C *Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms*
RP 14E *Design and Installation of Offshore Production Platform Piping Systems*
RP 14F *Design and Installation of Electrical Systems for Offshore Production Platforms*
RP 14G *Fire Prevention and Control on Open Type Offshore Production Platforms*
RP 14H *Use of Surface Safety Valves and Underwater Safety Valves Offshore*
RP 14J *Design and Hazards Analysis for Offshore Production Facilities*
RP 51 *Onshore Oil and Gas Production Practices for Protection of the Environment*
RP 55 *Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide*
RP 500 *Classification of Locations for Electrical Installations at Petroleum Facilities*
RP 505 *Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2*
API 510 *Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration*
RP 520 *Design and Installation of Pressure Relieving Systems in Refineries, Part I and II*
RP 521 *Guide for Pressure-Relieving and Depressuring Systems*
RP 540 *Electrical Installations in Petroleum Processing Plants*
RP 550 *Manual on Installation of Refinery Instruments and Control Systems*
RP 570 *Piping Inspection Code*
RP 651 *Cathodic Protection of Aboveground Petroleum Storage Tanks*
Spec 6A *Wellhead Equipment*
Spec 6D *Pipeline Valves, End Closures, Connectors, and Swivels*
Spec 12B *Specification for Bolted Tanks for Storage of Production Liquids*
Spec 12J *Specification for Oil and Gas Separators*
Spec 12R1 *Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Production Service*
Spec 14A *Subsurface Safety Valve Equipment*

ASME American Society of Mechanical Engineers

Boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels," Div. 1 and 2

ISA Instrument Society of America

55.1 *Instrument Symbols and Identification*
102-198X *Standard for Gas Detector Tube Units – Short Term Type for Toxic Gases and Vapors in Working Environments*
S12.15 *Part I, Performance Requirements, Hydrogen Sulfide Gas Detectors*
S12.15 *Part II, Installation, Operation, and maintenance of Hydrogen Sulfide Gas Detection Instruments*
S12.13 *Part I, Performance Requirements, Combustible Gas Detectors*
S12.13 *Part II, Installation, Operation, and Maintenance of Combustible Gas Detection Instruments*

NACE National Association of Corrosion Engineers

RPO169	*Control of External Corrosion on Underground or Submerged Metallic Piping Systems*

NFPA — National Fire Protection Agency

20	*Stationary Pumps for Fire Detection*
25	*Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*
70	*National Electric Code*
704	*Identification of the Hazards of Materials for Emergency Response*

CEC — California Electric Code

Appendix D
Team Members

FACILITY CONDITION TEAM

CSLC – MRMD	Mark Steinhilber David Rodriguez P.W. Lowry Steve Staker David Calderon
SoCal Holding	Mike Conway

ELECTRICAL TEAM

CSLC – MRMD	Mark Steinhilber David Rodriguez
PES	Doug Effenberger
SoCal Holding	Jason Fox

TECHNICAL TEAM

CSLC – MRMD	Mark Steinhilber David Rodriguez P.W. Lowry Steve Staker David Calderon
SoCal Holding	Robert Schaaf

SAFETY MANAGEMENT TEAM

CSLC – MRMD	Mark Steinhilber David Rodriguez P.W. Lowry Steve Staker David Calderon
SoCal Holding	Clint Harris