Safety and Oil Spill Prevention Audit

California Resources Corporation

Platform Emmy

March 2021

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EXECUTIVE SUMMARY

Safety Audit of California Resources Corporation (CRC), Platform Emmy

A Safety and Oil Spill Prevention Audit of the California Resources Corporation (CRC) Platform Emmy was started in September 2019. The audit was delayed for many months due to pandemic precautions related to Covid-19. During the delay period the safety and oil spill prevention audit of the Huntington Beach Onshore facility was conducted. Fieldwork for the audit was completed in December 2020.

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

Company Background

CRC is an oil and natural gas exploration and production company with operating properties exclusively in the state of California. CRC explores for, produces, gathers, processes, and markets crude oil, natural gas, and natural gas liquids in each of California's four major oil and gas basins: San Joaquin, Los Angeles, Ventura, and Sacramento.

Description of the Facilities

Platform Emmy is situated in state waters approximately 1.3 miles off the Huntington Beach shoreline, west of the Huntington Beach onshore facilities, in 45 feet of water. Produced crude oil is transported to the onshore Huntington Beach facility through a subsea pipeline for treating. No oil and gas separation is performed on the platform.

Thirty-four active wells produce from state lease PRCs 392, 425 and 426. There are no water injectors on the platform since the injection line was converted to gross oil service. Currently, Platform Emmy produces 1,060 Barrels of Oil per Day (BOPD), 40,200 Barrels of Water per Day (BWPD), and 230 Thousand Cubic Feet of Natural Gas per Day (MCFD).

The oil producing formations are typically below hydrostatic pressure and need artificial (mechanical) lift to produce. Thus, the potential for a well blowout is small. The offshore wells are produced using electric submersible pumps and rod pumping units.

Safety Audit Results

The Safety and Oil Spill Prevention Audit found that Platform Emmy complies with applicable safety and regulatory requirements. An adequate level of safety and environmental protection has been achieved for facility operation activities. The established safety culture also ensures the protection of workers, the public, and the environment.

The facilities were found to be in an acceptable state of repair, clean, and well organized. CRC appears to have well-established safety, health, and environmental programs. A consistent safety and environmental awareness culture has developed from these programs. Employee safety program participation identifies and reduces workplace hazards, increases job performance, and promotes teamwork to reach organizational key performance indicators (KPIs). Personnel have sufficient knowledge and training in their jobs which ensures they can perform their tasks effectively and efficiently. Their skills and knowledge provided valuable assistance to the safety audit team.

Safety systems and equipment remain fit for service. Inspection and condition assessments of equipment ensure that pressure vessels meet the intended requirements under operating and upset conditions. Risk reduction and environmental compliance can only be ensured through scheduled inspections, testing, and preventive maintenance practices.

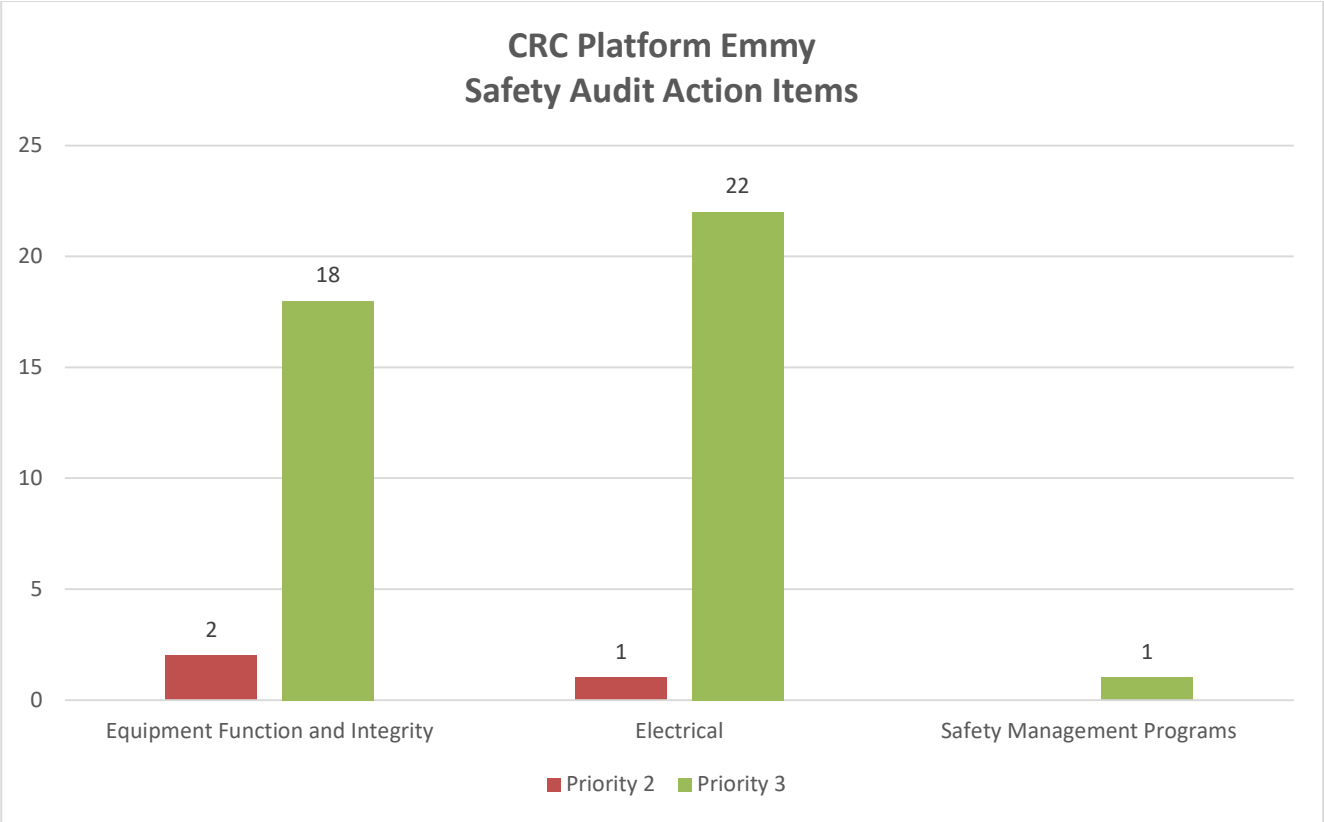
Firefighting, life safety, and spill response equipment meet National Fire Protection Association (NFPA) and regulatory requirements. Firefighting equipment and extinguishers are regularly serviced, maintained, and tested. Fire extinguishers are mounted, located, and identified so that employees can make use of them when needed. In addition, employees are required to take an online fire extinguisher refresher course yearly and must achieve a passing score.

Corporate safety programs are in place and fully implemented. CRC uses a software system to record, manage, and analyze safety-related data. The facility process control and safety shutdown systems are designed, installed, and maintained according to applicable codes and standards. Employees are appropriately trained in operating procedures, safe work practices, and the use, care, and limitations of all required personal protective equipment (PPE).

Action items from the audit are categorized into three subject areas: equipment function and integrity (EFI), electrical (ELC), and safety management programs (SMP). Each of these action items are assigned a priority ranking from one to three: priority one action items pose a high or immediate risk to personnel, the facility, or the environment and must be resolved within 30 days of this report; priority two action items pose a moderate risk potential and must be resolved within 120 days; and, priority three action items pose a low-risk potential and must be resolved within 180 days.

The Mineral Resources Management Division (MRMD) Safety Audit Team identified a total of 44 action items, a 33% reduction from the previous audit. The current audit found no priority one action items. The number of priority two action items went down to three from seven in the previous audit. The number of priority three action items decreased from 59 to 41. The reduction in the number of action items is partly due to combining multiple instances of a specific item at a common location into a single action item.

The following chart displays the distribution of the action items by subject areas. This distribution is similar to other facilities in California where the items identified are typically related to process equipment, maintenance practices, and electrical systems.


CRC Platform Emmy
Safety Audit Action Items
25
20
15
10
5
0
2
18
1
22
1
Equipment Function and Integrity
Electrical
Safety Management Programs
Priority 2
Priority 3

Introduction

California Resources Corporation

Platform Emmy

March 2021

1.0 INTRODUCTION

1.1 Safety Audit Background

The California State Lands Commission (Commission) Mineral Resources Management Division (MRMD) conducts safety audits of operators and/or contractors for lands in which the State has an interest. Commission 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 or permits, as well as industry standards and practices. The Commission 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 6103, 6108, 6216, 6301, 6873(d), 8755, and 8757 provide authority for Commission regulations, as well as 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. Under the legislation, marine facilities must provide the Best Achievable Protection (BAP) of the coast and marine waters.

Frequent monitoring and inspections by MRMD staff of onshore and offshore oil and gas drilling and production facilities ensure that BAP is in place to safeguard the public and environment. The MRMD Safety Audit Program, in conjunction with the monthly inspection program, helps prevent oil spills and other accidents with an on-site inspection and verification activities. The Safety Audit Program also aids prevention through review of facility design, maintenance policy and procedures, human factors, and other aspects of safety management.

During a safety and oil spill prevention audit, MRMD team members systematically assess an organization's facilities, review safety management programs, identify action items to be addressed, and provide feedback for improvement in preparation of a written report. Their areas of emphasis include:

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

Appropriate company contacts and resources are identified prior to the start of the safety audit. Progress reports are communicated to MRMD management personnel and the company throughout the safety audit process and an "action item matrix" is used to categorize and track action items. The matrix provides a priority ranking for identified action items and contains recommended corrective actions. A graph and table are generated showing the breakdown of the facility's identified action items by area of emphasis.

Draft copies of the report and the action item matrix are provided to the company during the safety audit. The final report is presented to company management formally, which affords the opportunity to discuss the findings and the corrective actions proposed. Throughout the

clearance phase of the safety audit, the MRMD team continues to communicate with the company in resolving the action items and tracks the 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 oil spills. Previous experience shows safety assessments help increase operating effectiveness, efficiency, and lower operating costs.

1.2 Facility Background

California Resources Corporation (CRC) currently operates the Huntington Beach state leases that include Platform Emmy and the Huntington Beach Onshore facility. CRC is an oil and natural gas exploration and production company with operating properties exclusively in the state of California. CRC explores for, produces, gathers, processes and markets crude oil, natural gas, and natural gas liquids in each of California's four major oil and gas basins: San Joaquin, Los Angeles, Ventura, and Sacramento.

Platform Emmy is located 1.3 miles offshore from Huntington Beach. The state leases are part of the Huntington Beach Field originally discovered by Standard Oil Company on May 4, 1920, when oil was struck at 2,199 feet in Huntington Beach. This field has produced more than one billion barrels of oil in its history.

Signal Oil & Gas Company originally announced plans in February 1961 to construct a $2,000,000 offshore platform to be named "Emmy". The platform was installed to complete offshore development of heavy oil reserves. The proposed structure was to be located in 45 feet of water offshore from the Huntington Beach, California coastline on State Lease PRC 425. Permits were approved and construction of Platform Emmy was completed with drilling operations beginning in March 1963.

Platform Emmy produces roughly 1,060 Barrels of Oil per Day (BOPD), 40,200 Barrels of Water per Day (BWPD), and 230 Thousand Cubic Feet of Natural Gas per Day (MCFD). Onshore injectors support waterflooding of the reservoir.

1.3 Facility Description

Platform Emmy has eight steel-jacketed support legs. The platform consists of a lower deck, a production deck (53 ½-feet above the waterline), a small mezzanine deck found above the north end of the production deck, and a drill deck that is 83 feet above the waterline. Platform Emmy was originally designed to accommodate 42 wells using up to 26 rod pumping units. The number of rod pumping units was reduced and approval was given in 1967 to change the design to allow a maximum of 52 wells.

In 1980, Aminoil installed a satellite platform immediately adjacent to the original platform for a steam stimulation project. Shell bought both platforms in 1986 from Phillips Petroleum, the owner at the time. After the steam drive project was terminated, Shell received approval in 1988

for the addition of two decks to the satellite platform. A major structural upgrade was completed in 1991, adding a quarters building, motor control center, and heliport to the satellite platform.

Platform Emmy currently has 19 production wells: 18 active electric submersible pumps (ESPs) and one active rod pumping unit. These wells produce from state leases PRC 392, 425, and 426. Production fluids from these wells flow directly into a 12-inch pipeline to shore relying only on the wellhead pressure to push the fluid through the pipeline, eliminating the need for a shipping pump. All separation and processing of oil, water, and gas occurs at the Huntington Beach Onshore facility.

Facility Condition Audit

California Resources Corporation

Platform Emmy

March 2021

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 California Resources Corporation's (CRC) Offshore Emmy Platform. 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 the years of auditing. A variety of codes and standards apply in addition to Commission 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 the 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 program development.

2.2 General Facility Conditions

2.2.1 Workplace Housekeeping: Platform work areas were clean and orderly, free of slip and trip hazards, waste materials (e.g., refuse, oilfield wastes), and fire hazards. Access to various areas of the platform was limited during the course of the audit: to the production deck area during a well cellar reconditioning project and to the drilling deck during an annual crane inspection. Acceptable refuse containers were provided, and no noticeable waste was on the platform. Scheduled collection of waste contributes to good housekeeping practices. Employee toilet facilities are adequate, clean, and well maintained. Portable units were in satisfactory condition with adequate handwash stations and paper towels available and no obvious health or sanitation concerns.

Drip pans and splash guard containment are used throughout the platform to prevent spills and pollution. If a substance accidentally drips onto the deck, personnel clean it up immediately. Absorbent materials are stored in quickly accessible drum containers or bins and are available for wiping up greasy, oily, or other liquid spills. Tools are available and stored in suitable fixtures for easy access. They are quickly 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 found on Platform Emmy appeared to be of 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 were observed to be in good usable condition and free from oil and grease. Fixed metal ladders and appurtenances have been painted to resist corrosion against environmentally harsh conditions. The fixed ladder guardrail on CVR Knockout Scrubber V-101

has corroded and the welding appeared compromised. CRC's safe work practices cover the use and care of ladder equipment in the facility.

2.2.3 Escape / Emergency Egress / Exits: Emergency Egress/Exit points are clearly posted, accessible, and are covered as part of the initial orientation training to access Platform Emmy. Evacuation routes are explained during initial worker orientation, safety meetings, and are reviewed as part of the work permit system. They are identified with signs posted throughout the platform. The audible difference in the alarm tones as well as announcements over the public-address system (PA) directs personnel to the proper safe briefing area.

During the previous safety audit on Platform Emmy, helicopter or boat was the means of transport for both operating and contract personnel working on the platform. Since CRC stopped regular helicopter service to Platform Emmy, crew boat transportation is now the primary means to access Platform Emmy. The design of Platform Emmy's primary and secondary or emergency boat landings are considered adequate for their use.

2.2.4 Labeling, Color Coding and Signs: The design, application, and use of signs and symbols on the platform define specific workplace hazards. CRC adheres to the 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 tasks safely. Workplace hazards (e.g., slip, trip, overhead clearance) are marked in yellow, and fire safety equipment is red.

Warning signs were posted properly to identify known safety hazards. They were visible and identified safety hazards. Signs are also posted at each wellhead to identify the lease and well number.

Fire diamonds were visible on all tanks, vessels, and chemical storage totes. The posting of fire diamonds is an indication of good facility emergency planning and conformance with the National Fire Protection Association (NFPA) 704 & Uniform Fire Code (UFC).

2.2.5 Security: Physical and operational security measures are in place on Platform Emmy to prevent unauthorized entry. The platform is staffed twenty-four hours a day, seven days a week with at least two operators. There is a limited route of access from the boat landing and restricted access signs are posted which are visible from all sides. Approved personnel traveling to the platform must be prelisted on an approved boat log before boarding. Ship Services deckhands check that each person's name appears on the boat log, as well as checking for proper identification and swing rope certification.

2.2.6 Hazardous Material Handling and Storage: Flammable and combustible liquids were found properly stored and documentation readily available as required by California Occupational Safety and Health Administration (Cal/OSHA) and NFPA 30 regulations. The bulk chemical totes and diesel storage were correctly labeled, appeared structurally sound, and had adequate containment in the event of a leak. No loose combustible material or opened empty totes/drums were seen on the premises.

Stored compressed gas cylinders were secured and legibly marked to identify the gas content. Cylinders were placed where they would not be knocked over or damaged. Most empty

and unused cylinders had closed valves with protection caps in place. However, some gas cylinders not in use or connected located near V-101 and T-210 A/B were missing valve protection caps. *(EFI – 2.2.6.2)*

Safety Data Sheets (SDS) containing information on all chemicals used in the workplace were up-to-date and accessible to all employees. SDSs are provided at the site of chemical use (chemical injection skids, individual totes) by storing copies in document boxes throughout the facility.

One emergency eyewash and shower combination unit on the Lower Deck did not provide adequate flow to properly flush employee's eyes. This finding was communicated to CRC personnel and work orders were generated to schedule repairs. *(EFI – 2.2.6.01)*

2.3 Field Verification of Plans

2.3.1 Process Flow Diagrams (PFD): The PFDs are considered a part of the necessary design documentation for a facility. The PFDs for each of the facilities showed the flow through the plant processes and equipment were up to date with some minor changes needed to service stream charts and surface facility plan drawings.

2.3.2 Piping and Instrumentation Diagrams (P&ID): A comprehensive field verification of P&IDs was performed for Platform Emmy. Several drawings required revisions with some minor updates to include text changes, sizing errors or modifications to valves and piping connections, missing equipment, and out of service or removed equipment.

2.3.3 Fire Protection Drawings: Firewater / Foam Utility Flow Diagram and the Platform Station Bill were available and reviewed for accuracy with some updates or corrections needed. These drawings show important information about the firefighting system including the electrical and diesel fire pumps, the fire main or distribution system, the location of main pipeline valves, monitor stations, deluge system, foam system, hose reels, and emergency connections. All are clearly identified.

2.4 Condition and Integrity of Major Systems

2.4.1 Piping: An external visual inspection of the piping systems at all locations on this platform was performed in conjunction with P&ID verification. This visual inspection and evaluation work observed the outside condition of the piping, painting, coating, and checked for signs of misalignment, vibration, or leakage. The evaluation also included the condition of pipe hangers and supports with some brackets observed during field survey to be broken or missing. The evaluation considered other key information such as material selection, piping design, maintenance practices, as well as any field modifications or temporary repairs not recorded on the piping drawings. The condition and maintenance of piping throughout the facility were found to be generally good. However, the field survey identified some corrosion present on the firefighting pipeline system. *(EFI – 2.4.1.01)* The selection process of piping materials and components (e.g., valves, flanges, bolts, welds) are compatible with the operating parameters and environment.

CRC uses a combination of ongoing routine and risk-based piping inspections to achieve the desired level of facility safety, environmental protection, and reduce unscheduled downtime. Inspection frequencies and condition changes are set up according to regulatory requirements and established guidelines (i.e., American Petroleum Institute (API) 570, Department of Transportation (DOT) pipeline inspections, NFPA & National Association of Corrosion Engineers (NACE) guidelines etc.). 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. Inspection history, data, and scheduling is managed in CREDO mechanical integrity management software.

2.4.2 Tanks: There are only three active tanks on Platform Emmy: the atmospheric drain tank, pressure drain tank, and satellite drip tank. Externally, the three tanks are in good condition. Facility tanks are subject to CRC's written inspection and maintenance plan. The maintenance plan follows API Recommended Practices (RPs), 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. 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.

2.4.3 Pressure Vessels: Platform Emmy pressure vessels are also maintained following a program of external and internal examination for compliance with applicable regulations, recommended practices, (e.g., API 510 and CSLC 2132(g)(3)), and recordkeeping. These pressure vessels are built according to the American Society of Mechanical Engineers (ASME) Codes and have appropriate controls and safety devices. To improve maintenance efficiency, CRC has tailored inspection cycles to match the safety risks posed by particular classes of pressure vessels. CRC also uses a mechanical integrity 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 pressure vessel inspection records determined that inspection frequency is being achieved following API 510 guidelines. Inspection recommendations, maintenance activities, and design information are documented and recorded within the pressure vessel's permanent record. External inspection of the pressure vessels found no evidence of leakage, distortion, or cracks at welds or structural attachments, or defects of vessel connections. Internal inspection records show acceptable corrosion rates with no major concerns or defects of the pressure vessels. Records are well maintained and are easily accessible.

2.4.4 Relief Systems: 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.

The relief vent systems on Platform Emmy were evaluated for condition, maintenance, and functionality. These relief vent systems are used to release process vapor to the atmosphere when needed. The system is designed to remove any liquid within the gas before venting to the atmosphere. Activated charcoal canisters impregnated with potassium hydroxide have been added upstream of the southeast vent stack for H_2S control. These canisters were added instead of installing a flare and are designed to lower the H_2S content of vented gas to 0 ppm. In addition, flame arrestors are installed in locations where gas can be vented to the atmosphere. Each device allows gas to pass through it but stops a flame to prevent a larger fire, back flash, or explosion from occurring. Flame arrestors are inspected for clogging yearly as part of the preventive maintenance program.

The maintenance and servicing records for all pressure safety valves (PSV) comply with applicable regulations and recommended standards (e.g., CSLC 2132(g)(3), API Standard (Std) 520, API Std 521, and Cal/OSHA 6551). PSVs are tested and serviced by an outside contractor. The required inspection frequency ranges from every six months to five years, depending on the service of the relief valve. Service records were in order with no action items identified.

2.4.5 ESP, Pump Units, Wellhead Equip.& Well Safety Systems: Safety devices were verified to be installed on producing wells and flow lines. Monthly safety inspections as required by Commission regulations of oil and gas production on Platform Emmy are performed between Commission staff inspectors and CRC Emmy operators to verify the safe function and operation of all safety devices and to verify production systems integrity. Surface safety valves (SSVs) and surface controlled subsurface safety valves (SCSSVs), flow safety valves (FSVs) and shutdown valves are commonly used to shut down and isolate a line if a leak were to occur. Emmy daily production reports identified a total of 34 wells with 19 active wells and 15 wells out of service. To block the flow of produced fluid from the wellbore, individual SCSSVs are installed in the tubing strings of each well. No problems were noted.

2.4.6 Firefighting Detection Systems: Mineral Resources Management Division (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. The fire alarm to warn personnel may be activated manually or automatically by the detection sensors. Systems typically include:

- Smoke Detectors
- Heat Detectors
- UV/IR Detectors
- Gas Detectors
- Fusible Plugs

Smoke detectors are found in the Control Room and Living Quarters, the Main MCC Room, PLC Room, Mezzanine Electrical Room and in the drill rig quarters on the main platform. Any detection of smoke or products of combustion will sound the fire alarm. In addition, smoke

detectors in the MCC and PLC rooms not only sound a fire alarm but will also shut down the platform. Heat detectors in the quarters building and change room will alarm if the temperature exceeds 135 degrees Fahrenheit. The Ultraviolet/Infrared (UV/IR) detectors found in the Well Bay and production area of the platform will activate the fire alarm, emergency shutdown (ESD) system and the deluge system.

Temperature safety elements (e.g., fusible link and plug loops) are located in the Well Bay, Automatic Well Tester, Prover and Pressure Drain Tanks. They have been visually inspected and found to be in good working order. The fusible plug system is pressurized, constructed of non-corrosive materials, and strategically located with fusible elements used to protect process equipment. Melting the plug, by extreme heat or fire, releases air from the fusible loop through the plug, which then activates the fire alarm and ESD. Loss of instrument air to the fusible plug system will have the same effect as detection of a fire. Inspection, maintenance, and testing records showed CRC technicians inspect the temperature safety elements monthly by Commission regulations and annually according to NFPA 72.

The fire detection systems on Platform Emmy meet Commission regulations (CSLC 2132(g)(1), 2132(g)(4), 2132(g)(5), and 2132(g)(6)(A)) and are appropriate in design and scope. These systems appear to be well maintained and in good operating order with no action items identified.

2.4.7 Firefighting Equipment: The main firefighting system required by Commission regulations and the local fire authority consists of a pressurized fire main system with two pumps, fixed monitor stations, hose reel stations, and a well-bay deluge system. Platform Emmy's primary firewater pump is a 2000 GPM Sulzer vertical shaft turbine-type pump with a 200 HP electric motor. The secondary firewater pump is a 1500 GPM Worthington vertical shaft turbine-type with a 120 HP Detroit diesel engine. Other firefighting equipment includes a 50-gallon foam tank for the fixed monitor stations, hose reels, and portable fire extinguishers located throughout the platform. The firefighting systems are installed and maintained under NFPA 20 and 25 standards per CSLC 2132(g)(4).

Annual and five-year State Fire Marshal testing of Platform Emmy's firefighting systems are mandated under California Code of Regulations (CCR), Title 19 and were last performed by a contractor, Vallen Safety Services, in December 2020. Testing of the foam system (3% aqueous film-forming foam (AFFF)) is performed regularly to determine concentrate for contamination and dilution. Additionally, the firewater system can apply foam directly to the Atmospheric Drain Tank.

The firewater monitors are positioned in the well-bay of the Production Deck to provide maximum wellhead coverage while a deluge system is used on the Lower Deck. As part of CRC's maintenance program, pivot points on the monitor are regularly greased, inspected for leaks and nozzle range of motion to ensure proper operation in the event of a fire. The firewater hose stations are strategically located throughout the platform and arranged to provide coverage of the target area from two different directions. Portable fire extinguishers are the dry chemical type and appear to comply with CSLC 2132(g)(4)(F), NFPA standards and Cal/OSHA regulations. Portable fire extinguishers are visually inspected monthly, maintained in a fully charged and operable condition, kept in their designated places and subject to an annual

maintenance check. However, several extinguishers commonly exposed to outside conditions did not have their required protective covers. *(EFI – 2.4.7.01)*

Visual inspection of the firewater piping and fittings appears to be properly supported and adequately maintained. However, some isolated areas were found to have excessive surface corrosion damage. *(EFI – 2.4.1.01)*

2.4.8 Emergency Shutdown System (ESD): The platform is equipped with 14 manual ESD stations that comply with CSLC 2132(g)(1)(A) and API RP 14C. Activation of an ESD will cause shut-in of all wells and pipelines as well as the complete shutdown of the production facility in the event of fire, pipeline failure, or other catastrophe. The 14 manual ESD stations on Platform Emmy are tested monthly in bypass mode to ensure automatic shutdown systems are functioning properly. Commission inspectors witness and record the results of the tests. During semi-annual testing, one of the manual ESD stations or process shutdowns is fully tested with an actual live test to ensure the platform will shut down as designed.

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, Infrared (IR) & Ultraviolet (UV) flame detection systems are located at key locations on the platform. Additional gas detection is located within the MCC/PLC building, living quarters building, and safe welding area. These lower explosive limit (LEL) gas and detection systems each produce a distinct audible alarm. They 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, the emergency shutdown of these units occurs.

Commission regulations, including CSLC 2132(g)(6), require a detection system for offshore production facilities where production is known to contain H_2S. These detectors do not initiate shut-in/isolation actions but provide distinct audible and visual alarms when the concentration of H_2S reaches 10 ppm. When H_2S concentrations reach 20 ppm, the audible alarm becomes solid tone and personnel follow procedures to move to safe briefing areas. All H_2S and combustible gas detection systems were inspected and found to be in good working order and met Commission requirements. Calibration, testing, and maintenance of this system are conducted and recorded monthly by CRC 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 on Platform Emmy. 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. No action items were identified.

2.4.9 Safety and Personal Protective Equipment (PPE): CRC has a written policy to provide a safe and healthy workplace and to comply with all applicable federal and state regulations about occupational safety and health. All personnel entering a CRC facility must at a minimum wear hard hats, safety glasses, hard toe boots, fire resistant clothing (FRC) and personal H_2S monitors. Additional PPE, such as hearing protection, face shields, rubber gloves, aprons, and fall protection that may be needed are found in the CRC Safety Manual, safe work

permit, or Job Safety Analysis (JSA). No issues about the use of PPE were noted while on the platform.

2.4.10 Instrumentation, Alarm and Paging: The process instrumentation has evolved into digital control through previous facility upgrades. Production controls and instrumentation are now part of a Digital Control System (DCS) that is connected to the platform by digital networks. Within the DCS, programmable logic controllers (PLCs) are used to control and monitor all the process equipment and instruments on the platform. Operations management software, Wonderware, provides the operator interface displaying plant-wide status and events. The software can also 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 that can be used to improve process efficiency and plant performance.

The computer screens used by the operators to operate the facility are also called human machine interfaces (HMI). There are simple graphic displays that mimic the process on the operator's console, located on the platform in the main 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:

- Mode (Auto or Manual)
- Setpoint change
- Output change
- Trending of important process variables
- 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 audible tones are different for each process location. This difference in sound is used to help operators identify the origin of the alarm. A visual indication is also used for alarm identification and evaluation. Computer-generated process alarms are capable of not only being displayed and audible in the control room; the system will also send a text alert to the 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, reducing the possibility of confusion and operator error.

The facility alarms are tested and calibrated each month. 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. The design and logic of these systems are further addressed in subsection *2.6 – Production Safety Systems*.

2.4.11 Auxiliary Generator / Prime Mover: Platform Emmy's diesel generator provides backup electrical energy 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 primary power 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.

The diesel generator is exceptionally clean and appears well maintained. The generator provides 12 hours of power, without refueling, for the office/quarters, emergency lighting system, HVAC system for the Switch Gear Building, air compressors, utility/rescue/boom deployment boat launching system, navigation lights, shutdown valves, and several critical pumps. The generator is tested monthly as part of the Commission safety inspection to verify the operational reliability of the system. Historical data shows that routine maintenance is being performed on generating system components and that load tests are acceptable.

2.4.12 Spill Containment: Spill containment on Platform Emmy appears acceptable. A contractor, Clark Engineering, is utilized by CRC to perform regular general/project maintenance work on Emmy. The Commission staff observed project work on the containment section of the well-bay cellars located on the production deck. The portion of the work completed on the west cellars appeared exceptional and produced a satisfactory condition. Rainwater spills and leaks are handled by deck drains found throughout both the main and satellite platforms. The lower deck and satellite open deck drains flow to the Satellite Drip Tank T-207 before being pumped to Atmospheric Drain Tank T-203. Deck drains from the drill deck, production deck, and the helicopter deck all flow directly to T-203. Pumps operating on level control transfer the fluid from T-203 into the production header where the fluid commingles with the production emulsion flowing through the 12-inch oil production pipeline to shore.

Seven drums of assorted sorbent pads are available for use on the platform, as well as two 750-feet sections of Series 4300 Expandi-Boom to help contain any spill that might get into the ocean. CRC operating personnel conduct inventory and maintain spill response materials monthly as part of the platform safety inspection. Platform Emmy's containment system meets the requirements of the Spill Prevention, Control, and Countermeasure (SPCC) Rule.

2.4.13 Spill Response: The CRC Oil Spill Contingency Plan (OSCP) was developed following Federal and State facility response plan requirements and is discussed in more detail in the Safety Management Programs section of this report.

Platform Emmy emergency response keeps an 18-foot boat with an outboard motor for immediate launch to allow rapid boom deployment should the crew or workboat not be on-site. Other equipment kept on the platform specifically for spill response includes marine radios, company radios, phone lines, tracking flags and electronic tracking buoys. In general, the equipment appears to be well kept and is part of the Commission staff monthly safety inspection. However, some minor issues with the tracking flags were identified.

The entire response plan is tested on a triennial basis by either conducting a worst-case discharge drill or by ensuring that each portion of the plan's components are exercised at least once during other drills occurring within the same three-year period. Spill response readiness is tested by CRC with scheduled Qualified Individual notification checks, facility spill boom

deployment drills, and tabletop drills conducted annually to test the incident command system. Federal and State agencies are regularly invited to participate in spill response exercises.

CRC is a member of a cooperative of oil producers, refiners, transporters, and shippers that provide funding to Marine Spill Response Corporation (MSRC). MSRC is a national nonprofit United States Coast Guard classified Oil Spill Response Organization (OSRO) with a large inventory of vessels, equipment, and trained personnel. Locally, MSRC operates three oil spill response vessels, two boom boats, two deployment boats, and a shallow water barge from Berth 57 at the Port of Long Beach. Boom deployment drills occur semi-annually with MSRC. The last Office of Spill Prevention and Response (OSPR) spill drill and boom deployment occurred on April 25, 2019 and was witnessed by a Commission representative. Spill boom deployment drills were postponed in 2020 due to Covid-19 precautions.

2.4.14 Cranes: Platform Emmy is equipped with two cranes. The crane on the west side of the platform is an electric driven Weatherford Model G-20F crane with a 100-ft. boom. The crane on the east side of the platform is a diesel driven Mariner Model 480 H crane with an 80-ft. boom. Cal/OSHA regulations require that cranes over three-ton capacity be load tested every four years and after major repairs. A contractor, Sparrows, performed quadrennial load tests with both cranes on April 10, 2020, and annual inspections on April 6-7, 2020.

Crane inspection records (monthly, quarterly, yearly) were easily accessible and comply with Cal/OSHA 5031 requirements and API RP 2D Operation of Offshore Cranes. Inspection recommendations were completed satisfactorily. Slings are inspected monthly by CRC operators and records of condition and certification are safely stored. CRC operators are trained and certified to safety operate both cranes on Platform Emmy. No action items were noted.

2.5 Mechanical Integrity / Preventive Maintenance Program

The Mechanical Integrity and Preventive Maintenance section provides a general overview of CRC's corporate philosophy and approach to implementing a successful reliability program. The section also provides findings when appropriate. Preventive maintenance and job scheduling are 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 the workload and specific job requirements. The planner also stages commonly used parts and supplies while critical spare parts are located in the warehouse or stored on Emmy. This approach provides CRC with maintenance task optimization and decreases the chance of equipment failure. Also, the recordkeeping process was updated by migrating the PSV, tank, and pressure vessel records from paper files to electronic copies.

The computerized maintenance management system, Maximo, is utilized to manage and track activities. Operating personnel can access Maximo to generate a work order. These work orders can range from a simple filter change to major equipment repair. Maximo gives the CRC maintenance planner flexibility to schedule and record these activities based upon the manufacturer's recommendations, operating history, and recognized and generally accepted good engineering practices. Tank and pressure vessel reliability are 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. Offshore and onshore facilities use several different methods 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 offshore facility. A main component of the program is a 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. This means of corrosion control is provided for select pressure vessels and tanks. Appropriate recordkeeping from regularly scheduled internal, external, and ultrasonic inspections and repairs provide historical data and often give signs as to the source of a detected deficiency.

Evaluation of the maintenance condition resulting from CRC's management practices found that Platform Emmy is designed, operated, and maintained in a manner that permits safe, reliable operation. Its 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".

2.6 Production Safety Systems

Analysis of Platform Emmy 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 Commission staff audit of the HB Offshore facility. The automated control and safety systems have been designed using applicable codes, standards, and industry practices in accordance with Commission regulations and API RP 14C.

Platform Emmy status, controls, and alarms are displayed in real-time via HMI displays located in the main control room. The automated control system monitors and controls platform processes in separate operating areas. The automated displays help minimize the effects of undesirable events and mitigate consequences from upsets. The safety systems are

independent of the DCS alarm system on the platform in case of loss to the communications link.

This equipment allows operators to control the process within authorized parameters. Uniformity in process settings among the different operating crews is carried out through a strict safety systems procedure that restricts operator access to the program control code. Separation of safety-related functions from process control reduces the risk of common cause failures and assures the safety system will function properly. Bypass switches for functional testing provide "no interruption" to the normal process operation. System safety integrity is maintained when a device is placed in bypass by procedures and the use of an alarm to signal an active bypass. Additionally, facility controls and safety features are designed to be fail-safe and have redundant capacities.

Safety Analysis Function Evaluation (SAFE) Charts described in API RP 14C are utilized as an analysis technique to document the effects of and determine the requirements for components in the safety system. All safety devices and their functions were analyzed by comparing the SAFE Chart and facility P&IDs. The comparison matched all safety and shutdown devices and emergency support systems with their functions and verified that the required level of protection is being maintained in compliance with API RP 14C.

All platform wellheads have SSVs that are inspected, installed, and tested in accordance with CSLC 2132(a)(9)(A) & (D) and API RP 14C. Surface safety valves on all the wells will automatically close to isolate the well and prevent oil and gas from escaping into the environment. Any SSV that does not operate properly, or fails the fluid flow leakage test, is either repaired or replaced.

Extensive fire and safety systems are installed throughout the platform. Included in these systems are safety devices that automatically shut down oil and gas production if an emergency occurs. Every operator/contractor on the platform is authorized to shut down the platform should they detect an unsafe condition. As part of the surface production safety system, automatic shutdown valves are installed per Commission regulations and API RP 14C to isolate the various process systems and lessen the environmental impact should a system problem be identified. Should evacuation be necessary, platform personnel can leave the platform by helicopter, crew, utility, or other boat, and also by using the available life rafts.

CRC's process hazard analysis (PHA) and hazard and operability study (HAZOP) assessments are used to identify potential hazardous scenarios and recommend corrective actions. Platform personnel are authorized to conduct mini-HAZOPs on different platform processes and equipment to help prevent possible hazards from becoming serious problems. PHAs are performed as part of the management of change (MOC) process and before any construction can begin on a new project. This systematic approach for identifying, evaluating, and controlling the hazards of the process helps build in additional safety and can help evaluate the contribution of each safety device or system protection. When hazards cannot be removed or controlled through design, CRC uses a hierarchy of health and safety controls (elimination→substitution→engineering controls→administrative controls→PPE) to eliminate hazards or reduce exposure to hazards.

Electrical System Audit

California Resources Corporation

Platform Emmy

March 2021

3.0 ELECTRICAL SYSTEM AUDIT

3.1 Goals and Methodology

The primary goal of the Electrical Team (ELC) was to evaluate the electrical systems and operations of the California Resources Corporation (CRC) Huntington Beach Platform Emmy facilities to determine if it conforms to recognized and appropriate electrical Codes and industry standards. The ELC System Audit included the electrical equipment located at Platform Emmy.

References used in review of facilities include documents published by the American Petroleum Institute (API), National Fire Protection Association (NFPA), the State of California Electric Code (CEC) and State Lands Commission (Commission) regulations. The ELC Team review comments are based on those publications, which primarily include API Recommended Practice (RP) 500, API RP 540, CEC documents, and other applicable industry standards. The drawings used in support of the audit were electrical single-lines, site plans, and hazardous area classification drawings provided by CRC for the facility.

Specific tasks to accomplish this goal at each location included a systematic process of field verification of electrical single-line diagrams, plan drawings, hazardous area classification drawings, and maintenance practices. Inspection checklists, code and standard compliance checklists, and review of the electrical system design for conformance to codes and standards were utilized to complete the audit. This report includes a summary of the electrical systems included in the audit.

Section 3.0 of the action item matrix provides a detailed listing of the locations and items identified for correction. The matrix is organized into subsections that correspond to this report. Each section is discussed below along with examples of typical items encountered.

3.2 Hazardous Area Electrical Classification Drawings

The API RPs and CEC requirements provide specific guidelines for the electrical classification of hazardous areas and installation practices for electrical equipment and materials within classified areas. The basis for observations and review comments for all hazardous areas are API RP 500, CEC Articles 500, 501, and 504, and NFPA 70E. The hazardous area electrical classification drawings (HAECD) are generally representative of the existing conditions and area class elements.

The purpose of an HAECD is to define the locations of boundaries and areas where specific electrical materials and installation practices are required to manage the explosive properties of flammable liquids, vapors and other volatile materials. Installation and maintenance of electrical systems requires attention to the type of hazard and the level of the hazard in order to ensure compliance with CEC requirements. HAECDs are required to include the information necessary for designers, electricians, and other personnel, to perform work in and around classified areas.

The nature of oil and gas production has evolved with the use of various chemical additives, which in some cases, are flammable. The storage and dispensing of these chemicals is accomplished using portable totes. The HAECDs include identification of the planned

locations of totes but due to the changing needs of production, the proper placement of totes will require regular verification with the HAECDs.

Areas that contain walls, depressions, and barriers to natural ventilation where flammable liquids or vapors may be present require evaluation and identification of the appropriate electrical area classification. All areas known to contain flammable liquids or vapors are required to be identified on an HAECD. These areas are generally found to be classified correctly.

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, by definition, permanent and have pumps which operate continuously. Many of the portable tanks contain flammable liquids 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 in classified areas are required to be electrically bonded for static energy control. Refer to section 3.5 for more details.

General purpose electrical enclosures (load centers, motor control centers (MCCs), control panels, etc.) are only suitable for use in unclassified areas. In general, electrical equipment installed in classified areas was found to be explosionproof, National Electrical Manufacturers Association (NEMA) 4, purged or otherwise suitable for use in classified areas. Purged enclosures must have purge systems monitored and equipped with an alarm when purge pressures drop below a minimum level.

Some junction box and conduit fitting covers are missing or not properly seated against box flanges to provide adequate seal in classified areas. Covers must be flange-face to flange-face or box if bolt-on type or five full threads engaged if screw-cover type.

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 Division 2 areas without a seal. Drawings need to reflect latest equipment locations and any process system changes that might affect the area classification. The extensive use of metal clad (MC) cable and jacketed cables in cable tray has resulted in a reduction in the quantity of conduit seals. However, MC cable must be constructed to be inherently blocked, and not capable of transmitting hazardous and explosive gas, vapor, and liquid from a hazardous source to ignition source.

3.3 Electrical Power Distribution System, Normal Power

Electrical System Configuration: Electric utility service is supplied by Southern California Edison (SCE) for the facility. The Huntington Beach Onshore facility receives power at 66kV from an SCE oil-filled transformer. The facility utilizes power at 12.47kV, 4160V, or 480V through a radial distribution system to supply plant loads. The Fort Apache service is supplied from the HB Strip at 12.47kV via underground cable and conduit. The Fort Apache site utilizes power at 480V. Platform Emmy is supplied power at 12.47kV from the HB Strip 12.47kV main service switchgear, via underground conduit and cable, and armored submarine cable.

3.3.1 Electrical Single-Line: SCE provides electric utility service at 66kV onshore and CRC distributes power from there for all of the onshore and offshore Huntington Beach facilities. SCE provides a single 66kV overhead line to their substation located on CRC lease property. The SCE 16.8/22MVA main transformer steps the voltage down to 12.47kV for service to the CRC Huntington Beach 12.47kV Main Service Substation. From there 12.47kV is distributed to CRC facilities in Huntington Beach. Platform Emmy receives its power at 12.47kV from a single submarine cable fed from the CRC Main Service Substation. On the platform, the voltage is stepped down for local utilization to 2400V, 600V, 480V, as well as lower commercial and residential voltages. SCE available fault current is noted on the power system drawing for use in short circuit, arc flash, harmonic and other power system studies.

Emergency power is limited to one 175kW, 480V generator at Platform Emmy which does not support production or process equipment. Various small battery and uninterruptible power supply (UPS) systems are provided at facilities to handle emergency lighting, alarms and controls. Emergency power systems are discussed in Section 3.6.

The electrical single-line drawings used for audit review were last revised April 3, 2015, and generally match the installed facilities. The audit focused on the normal power system 480V and above and the emergency power system 480V and below. The single-line diagrams were compared to the existing installation. The drawings were found, in general, to be accurate, however some discrepancies were identified and are listed in the matrix. The single-line drawings of the existing facility were available on the platform for use by personnel.

3.3.2 Electrical Service Capacity: The power system capacity, in general, appears to be adequate for the existing platform loads. Overcurrent protection and wire sizes were found to be appropriate. The application of overcurrent devices with respect to equipment ratings is generally satisfactory. A 2400V MCC was installed to accommodate the transfer of certain producing wells presently supplied from twelve-pulse variable frequency drive (VFD) and step-up transformers to single voltage 2400V across the line starters. This new design approach was implemented as a space saving and equipment weight reduction measure.

3.3.3 *Electrical System Design*: Power feeder and control circuit wiring and installation, in generally, utilize type TC tray cable, type MC cable and cable tray, and listed fittings and seals. Installation of cable tray with type TC and type MC cable generally conforms to CEC section 330, 336, 392, 501 requirements. Cable trays must be installed as a complete system with sufficient access to maintain and install cables. Cables operating at over 600V, under 600V, and for control and communication are required to be separated by a solid fixed barrier by CEC 392.20(B). CEC 392.22, Table 392.22(A), lists the allowable fill area for ladder and solid bottom type cable tray. Tray fill needs to be reviewed for Code compliance. The tray system design includes a gap or “slip joint” to allow for differential movement between the Main Platform and Satellite Platform.

The arc flash hazard study for Platform Emmy should be updated based on NFPA five year requirements and include all electrical system additions and deletions made since the last study was completed. *(ELC – 3.3.3.03)* It is also recommended that Code compliant labels including flash hazard category boundary, incident energy, short circuit duty, and personal protective equipment (PPE) requirements be provided for all labels to provide the required arc flash hazard information.

All panel schedules have been entered into MS Excel spreadsheets and are revised, printed, and replaced by CRC electricians when loads are modified. CRC electricians have 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 for ease of reference and to avoid confusion.

3.4 Electrical Power Equipment Condition and Functionality

3.4.1 Equipment Condition: CEC 110-13, Mounting Electrical Equipment, requires all electrical equipment to be firmly secured to the surface on which it is supported. CEC Article 300-11, Securing and Supporting, requires all electrical raceways, cable assemblies, boxes, cabinets, and fittings to be secured or fastened in place. Additional securing requirements are also provided in the CEC for individual types of installations and conditions. Securing and supporting of electrical equipment, cables and materials needs to be consistently addressed and managed throughout the platform.

Abandoned electrical equipment and components should be removed or marked as out-of-service. Given the limited available space and platform weight restrictions, it is recommended the out-of-service panels, junction boxes, switches, light fixtures, cabinets, and cables be removed.

3.4.2 Safety Procedures: 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 lock-out tag-out program is well documented and implemented. The use of H_2S three-way and four-way gas detectors is required for entry to confined spaces and for hot work in classified areas.

Lock-Out/Tag-Out practices are established by CRC, and by observation, are being implemented. Energy control (procedure) permits are available for completion using computers on the platform. They indicate the procedure to be taken and sign-offs required to safely perform maintenance tasks.

Electrical systems shall be designed to minimize the risk of hazards to operating personnel. CEC 110.16 requires that arc flash hazard warnings be provided on electrical equipment to warn personnel of the potential electric arc flash hazards. NFPA 70E-2018, Standard for Electrical Safety in the Workplace, provides guidance for labeling and selecting PPE. Arc flash hazard warnings and labeling is, in general, provided on all energized equipment. The CRC electrical safety program describes the training, qualifications, and PPE necessary to perform live electrical work. It was confirmed with CRC that the studies for arc flash hazard are being updated every five years. However, an update of the arc flash hazard study was due in 2020. Many of the existing warning labels are deteriorated and require replacement. The requirements for arc flash hazard notification and information to be included on arc flash hazard labels continues to be changed with each Code cycle. The existing labels require replacement to comply with the Code or due to being illegible due to deterioration. An Arc Flash Hazard study

update is also needed at this time based on recent electrical system changes that have been completed that will impact both short circuit duty and fault clearing times.

CEC article 590.6(B)(2) requires a written assured grounding program that is continuously enforced at the site by one or more designated personnel. CRC has such a program that is being enforced. CRC also requires third parties to implement their own programs. It is recommended that CRC require all third parties to comply with the color code sequence being implemented by CRC in order to avoid confusion and the unintentional use of a cord set (a cord with a molded electrical plug attached to one end and a molded electrical receptacle at the other, similar to an extension cord) that has not been tested quarterly, as required.

CRC 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 personnel protective equipment.

The working clearance required around electrical equipment is generally maintained.

No life safety systems are installed that require permanent emergency electric power sources.

3.4.3 Equipment Maintenance Practices: Platform Emmy maintenance work orders are separately generated using the Maximo database by CRC. The server for the Maximo database is located in CRC facilities in Long Beach, CA. CRC generates work orders for the electrical system in Maximo.

Reliability of the Platform Emmy electric system is primarily dependent on the availability of the SCE power supply in addition to the condition and operational readiness of the on-shore facility distribution system and submarine cable. A sound maintenance and inspection program, properly implemented, is key to assuring the highest level of reliability. Electrical maintenance is integrated into the new Maximo computer database and tracking.

Access to the Maximo database is restricted based on user credentials. Super-users have full access. Production foremen and operators 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 Field 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 preventive maintenance procedures and their frequencies. All new equipment requires a Pre-Startup Safety Review (PSSR) that identifies action items for documentation including maintenance procedures. Once the asset is created and entered into the system, work orders are generated automatically by Maximo. The orders are produced 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, corrective work orders are generated by personnel. Corrective work orders document field observations 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 by one of the Super-users. Final documentation includes notes, test reports, photographs, third party paperwork, procedures, and any other information deemed critical or beneficial regarding the asset.

The Emmy main switchgear protective relays were last tested and calibrated in September 2017. NFPA 70B, Recommended Practice for Electrical Equipment Maintenance, and the International Electrical Testing Association (NETA) recommend visual inspection of switchgear every twelve months and electrical testing and calibration at twenty-four month intervals. *(ELC – 3.4.3.04)*

3.5 Grounding

CEC Articles 250 and 501 provide the requirements for power system grounding and bonding in oil production facilities. Significant portions of the requirements for grounding are established to prevent or reduce the possibility of injury to personnel from shock. The rules of grounding also contribute to reduction of equipment damage either from induced voltages or during fault conditions. The three types of grounding required at the facility are power system circuit grounding, equipment equipotential grounding, and static control grounding.

Separately derived systems for 480Y/277V and 208Y/120V transformer secondary windings are both solidly grounded and impedance grounded on Platform Emmy, but in all cases, they were observed to satisfy Code requirements for power system grounding.

Article 501-16, Bonding in Class I Areas, states that all non-current carrying metal parts and enclosures associated with electrical components shall be connected together, bonded, and be continuous between the Class I area equipment and the supply system ground. That is, ground circuit bonding shall be continuous from the load all the way back to the power transformer grounding electrode system. The best way to achieve ground circuit continuity is to include properly sized (CEC 250) equipment grounding conductors with each set of power conductors from the source of power to the load.

Power circuits supplying submersible electric driven pumps are connected to the power system using type MC (Okonite CLX) armored cable. MC cable includes a metallic corrugated sheath that can be used as an equipment grounding conductor in accordance with CEC 250.118(10). In the absence of a dedicated ground conductor or metallic sheath, the ground return path depends on the metallic raceway system to provide adequate circuit continuity. The raceway system alone is generally not the most reliable type of equipment grounding conductor since it includes multiple locations where ground circuit continuity can be interrupted by loose fittings, transition from each raceway type and missing or inadequate bonding jumpers. A good example of missing or inadequate bonding jumpers is the cable tray system. Metallic cable tray systems shall be listed and bonded in accordance with CEC 250.92(B)(4).

The chemical totes located on the Lower Deck and Drilling Deck at the southeast corner require the installation of a ground bonding conductor for control of static discharge. *(ELC – 3.5.02)*

3.6 Emergency Electrical Power

3.6.1 System Configuration: Safety systems are required to perform under normal conditions and in emergencies, including power failures. The gas, fire, emergency lighting, general alarms, PA, PLC and emergency shutdown systems are powered by a combination of 24VDC battery, a 1.8kVA uninterruptible power supply (UPS) and a 175kW/225kVA, 480Y/277V, emergency power diesel generator to provide continuous power in the event of a main supply power failure.

The Essential Loads MCC receives power either from the normal supply or the generator through an automatic transfer switch (ATS). Both the normal source and emergency source are impedance grounded. Single-Line Diagram Drawing 078-87-514 of the Essential MCC shows a connected load consisting of 235hp of motor load, plus 161kW of various other loads for a total load of 336kW. Most of the loads are not expected to operate simultaneously. Generator loading should be monitored and recorded to prevent inadvertent overload. Generator testing records show that routine operational tests are being performed and that the Essential MCC is switched to the generator during testing.

API RP 14F recommends that AC electrical safety control systems be supplied through a battery charger-inverter system and that DC controls have a reliable DC supply. This is achieved on Platform Emmy with a combination of UPS and 24VDC battery backup systems.

The Computer Room UPS, located in the main electrical room, is rated 120VAC, 15A, 1.8kW output. Drawing 078-87-323 identifies the UPS load as a control system computer believed to be PLC1 and PLC2. PLC1 and PLC2 provide the alarm and control logic for all process and emergency shutdown functions.

Power to actuate PLC emergency shutdown relays and solenoid valves, as well as, PA system, gas, fire, and general alarms on Platform Emmy is provided by the 24VDC battery system through Panel DCP-1. The 24VDC battery is charged by one of two float and equalize battery chargers that are powered from Panel EDP-1 and the 175kVA generator, in the event of a loss of utility power. The battery bank serves Panel DCP-1. Battery testing should be conducted periodically in accordance with Institute of Electrical and Electronics Engineers (IEEE) Standard 450 to determine the remaining useful life.

Platform Emmy 12kV switchgear protective relays and MCC-3 shunt trips are powered by the dedicated 48VDC switchgear battery system. The 48VDC battery is charged by one of two float and equalize battery chargers that are powered from the Essential Power MCC. 48VDC Battery Chargers 1 and 2 charge the battery through Panel DCP-2 bus. The battery serves Panel DCP-2.

3.6.2 Equipment and Component Ratings: The rating of emergency power system equipment and components was found to be satisfactory based on the measured operating loads. Load recordings should be taken prior to adding any new loads. The existing generator has limited capacity and is only capable of supplying motor loads of 25hp or less.

3.7 Electric and Diesel Fire Pumps

A diesel firewater pump and an electric firewater pump are provided to pressurize the firewater system on Platform Emmy whenever the water pressure from the shore supply drops below a set value. The diesel engine driven firewater pump is primary and the electric firewater driven pump is secondary. The electric firewater pump P-200 motor is fed from normal power without emergency power backup.

The power supply to the electric driven fire water pump P-200 has been redesigned to comply with NFPA 20 and CEC 695 requirements. Power to the electric driven firewater pump is taken ahead of the 12.47kV electric service power main. Supply conductors are directly connected to the UL listed fire pump controller located adjacent to the firewater pump on the lower platform through a primary fused switch and dedicated 300kVA pad-mount type transformer located on the electrical building roof. Medium voltage disconnect switch on the electrical building roof and feeding the 300kVA pad-mount transformer serves as the primary disconnecting means.

3.8 Process Instrumentation

The process control system uses a combination of pneumatic, hydraulic, and electrical instruments and controls. Process control includes the use of computers, PLCs, and relay logic to control and interface with valves, solenoids, and pump controllers. Alarms are produced from level, temperature, pressure, and flow sensors advising operators of process conditions. Local annunciators or displays are then used to troubleshoot the cause of a general alarm or shutdown.

All electrical instrumentation and wiring materials are installed in either Class I, Division 2, or Unclassified locations. Class I, Division 1 locations such as pits and production deck vent locations are void of electrical instrumentation and wiring materials.

Type MC cable is the prevalent wiring method for instrumentation. It is used between individual instruments and local marshalling boxes where circuits are terminated and grouped into multipair cables. Multipair MC cables run between marshalling boxes and the PLC or local control panel. Conduit is used to a lesser extent for instrumentation wiring. Class I, Division 2 area instrumentation includes the use of factory sealed devices in appropriate enclosures and intrinsically safe wiring.

3.9 Lighting Systems

In general, fixtures are installed in conformance with the CEC and appear to be located to provide adequate lighting levels. Fixtures are appropriate types and designs for the environmental and hazardous area conditions. A mix of incandescent, fluorescent, high-pressure sodium, low-pressure sodium, metal halide, and light emitting diode (LED) lighting are used on Platform Emmy.

Emergency lighting is supplied power from the Essential Power MCC, which in turn receives power from the emergency generator in the event of main power failure. Review of the layout of emergency light fixtures indicates adequate coverage of areas for the purpose of safe egress. OXY should perform an illumination survey for the entire platform. New equipment has been installed including the 2400V MCC on the lower deck of the Satellite Platform, cat walks

on the lower deck of the Main Platform, drill rig operators' offices on the Production Deck, and drill rig equipment on the Drill Deck. Two studies are required: one for normal nighttime task illumination levels and one for loss of shore power and emergency egress illumination levels. Illumination levels should be verified to comply with Illumination Engineering Society (IES) and API recommendations.

3.10 Special Systems

Special system requirements for offshore production facilities are described in API RP 14F. The ELC Team review comments for special systems are based on API RP 14F, API RP 540, and CEC documents.

3.10.1 Safety Control Systems: Safety control systems consist of multiple devices arranged to detect an abnormal condition and 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. All safety control systems were found operational and tested on a regular basis. In addition to the Platform ESD stations there is a shore activated shut-in control In the event of an on-shore shut-in or process control shutdown, an analog signal control that is activated from on-shore will shut-in Platform Emmy production. The shore activated shut-in is configured in a fail-safe design.

3.10.2 Gas Detection Systems: Combustible gas detection systems, lower explosive limit (LEL) and H_2S, are employed to detect combustible gas leaks in equipment and piping, to warn personnel of possible toxic concentrations and to initiate remedial action. General Monitors LEL detectors and H_2S detectors are installed on Platform Emmy Drilling Deck, Production Deck, Lower Deck, and on the Quarters Deck Main Switchgear Room Deck.

3.10.3 Fire Detection Systems: Fire detection and smoke detection is usually employed to detect and warn personnel of possible fire and to initiate remedial action. Smoke and heat detectors are installed in the Control Room and Living Quarters, the Main MCC Room, and in the Mezzanine Electrical Room and drill rig quarters on the main platform.

3.10.4 Aids to Navigation: The US Coast Guard has deemed platform illumination as sufficient for platform identification and no longer requires aids to navigation in offshore facilities close to the shore to include obstruction lights. However, Platform Emmy has four obstruction lights placed at the extreme corners (perimeter) of the platform. Each navigation beacon appears to be out-of-service. Platform Emmy has a foghorn on the northeast corner of the platform which is operational. The foghorn is supplied from emergency power and is functional.

3.10.5 Communication: Communications systems are established to provide for normal and emergency operations. Systems used for emergency communication should have battery-operated supplies good for at least four hours continuous operation as required by API RP 14F. Landlines, microwave, wireless radio, and cellular phones are available for communication between Platform Emmy and shore to maintain good communication at all times.

3.10.6 General Alarms: General Alarms are audible in all parts of the facility to notify personnel to abandon the facility or respond to an emergency. Beacons and warning lights are

used in conjunction with the audible alarms. All General Alarm sounding devices shall be identified by a sign at each device in red letters at least one inch high describing required personnel response. The central paging system is used to supplement instructions of a general alarm. Visual and audible alarms are tested on a regular basis and were found to demonstrate adequate performance.

The platform also includes H_2S warning beacons and signs that are to be initiated and deployed in the event of an H_2S leak. The beacons and signs are to warn personnel on approaching vessels to stay clear of the platform.

3.10.7 Cathodic Protection: Platform Emmy cathodic protection system rectifiers are producing positive current flows to the platform structure. Sacrificial zinc anodes are also attached to cables that are hanging from the platform and submerged in sea water.

Safety Management Programs

California Resources Corporation

Platform Emmy

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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 CRC 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. CRC's safety management programs are composed of organizational and operational procedures, design management, audit programs, and other methods defined by American Petroleum Institute (API) Recommended Practice (RP) 75. The audit began with the review of the required operations manuals, emergency and spill response plans, training programs, and additional specific programs that CRC provided to demonstrate safe operation of the Huntington Beach leases.

4.2 Operations Manual – (Emmy Operations and Emergency Planning)

CRC 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 in prior safety audit reviews were found to be clearly written and not overly complicated.

The SOPs are maintained and accessible via the company intranet system to all CRC personnel and available for print. Hard copy versions are located on the platform in the main office control room building. A comprehensive review of the SOPs is performed to determine that pertinent operating information is readily available within the different manuals. The SOPs are reviewed annually and updated by authorized CRC personnel to ensure that they remain current. When applicable, a review date is recorded in each SOP that has been reviewed. If an SOP describes a process that is no longer followed, it is removed from the file and/or manual.

However, some of the Operation and Emergency Planning Manual information does not appear to be up-to-date. It was last revised on July 21, 2016. The Operations Manual should be systematically reviewed yearly, with hard copies being updated every 1-2 years, to ensure the policies and procedures remain current. *(SMP – 4.5.01)*

4.3 Spill Response Plans

The CRC Oil Spill Contingency Plan (OSCP) was developed following 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 HB 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, clean up, and mitigate the effects of an oil spill. The OSCP was reviewed and noted to have a long approval history. It appears to meet Federal (40 CFR §112.5) and State (14 CCR §817.02) requirements. CRC staff is familiar with the OSCP and holds annual spill drills to increase the effectiveness of their spill response. The last comprehensive update of the OSCP was on June 15, 2017. CRC is currently reviewing and updating the OSCP which was identified in the 2019 HB Onshore safety audit report. The plan should be reviewed regularly and when other related plans, such as the Spill Prevention, Control, and Countermeasures (SPCC) Plan, are updated. Changes should be managed by authorized CRC personnel to ensure new or different operating conditions are contemplated, qualified staff is available to perform necessary functions, operator and personnel certifications are current, and information relating to regulatory agencies is up to date.

4.3.1 EPA Spill Prevention Control and Countermeasure (SPCC) Plan: The SPCC Plan is an EPA requirement. An electronic version of the SPCC Plan was reviewed for compliance and appears to meet the EPA Rule. CRC's SPCC Plan is prepared following 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. No action items were identified for this plan.

4.4 Training and Drills

CRC has a comprehensive initial training program for new workers and ongoing training for experienced employees that includes mandatory and optional 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 (H_2S), 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 consists of on-site instruction. There is a job task qualification program where operators are trained and tested for competence in the safe operating

procedures for the process they operate. The on-the-job training process utilizes 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. 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 the deployment of equipment and mobilization of staff. CRC management reviews the lessons learned during oil spills and exercises to revise and improve contingency plans.

The Health, Safety, and Environmental (HSE) 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. CRC'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 CRC corporate program that parallels the OSHA Process Safety Management (PSM) standard is used to control workplace hazards. While the Huntington Beach onshore and offshore facilities are not currently subject to OSHA PSM regulations, CRC has voluntarily integrated its corporate safety management program into the facility. This demonstrates CRC's commitment toward responsible operation of the platform and protection of employees and the environment. This practice has improved its operating reliability, system operating efficiency, and reduced incidents involving the release of hazardous materials beyond the facility boundaries.

CRC'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 CRC'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 CRC's safety policy; together with the measuring and auditing of the performance of those functions.

Additional assessment and feedback regarding CRC's safety management programs will be afforded by the Safety Assessment of Management Systems (SAMS) that is conducted after 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 the Commission and the operating company.

Human Factors Audit

California Resources Corporation

Platform Emmy

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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 CRC Huntington Beach lease facilities. Interview results are considered confidential between the Commission and CRC 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 several 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, identify areas of relative strength and weakness, and serve as a benchmark for future assessments.

5.2 Human Factors Audit Methodology

The Commission's Mineral Resources Management Division (MRMD) will schedule the SAMS interviews with a cross-section of CRC staff and sub-contractors, including operators, engineers, supervisors, and others 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 a confidential report accompanied by a formal presentation that summarizes the report to CRC management.

Action Item Matrix

California Resources Corporation

Platform Emmy

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Appendices

California Resources Corporation

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Appendix A
Acronyms

A	Amperes
AFFF	Aqueous Film-Forming Foam
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ATS	Automatic Transfer Switch
BAP	Best Achievable Protection
BEP	Business Emergency Plan
BOPD	Barrels of Oil Per Day
BWPD	Barrels of Water Per Day
CalGEM	California Geologic Energy Management Division
Cal/OSHA	California Occupational Safety and Health Administration
CCR	California Code of Regulations
CEC	California Electrical Code
CFC	California Fire Code
CFR	Code of Federal Regulations
Commission	California State Lands Commission
CRC	California Resources Corporation
DCS	Digital Control System
DOT	Department of Transportation
EFI	Equipment Functionality and Integrity
ELC	Electrical
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ESD	Emergency Shutdown
ESP	Electrical Submersible Pump
FOS	Field Operations Supervisor
FSV	Flow Safety Valve (commonly referred to as Check Valve)
HAECD	Hazardous Area Electrical Classification Drawing
HB Onshore	Huntington Beach Onshore Processing Facility
HF	Human Factors
HMI	Human Machine Interface
H_2S	Hydrogen Sulfide
IEEE	Institute of Electrical and Electronics Engineers
IR	Infrared
JSA	Job Safety Analysis
KPI	Key Performance Indicators
kV	KiloVolt
kVA	KiloVolt Amperes
kW	Kilowatts
LACT	Lease Automatic Custody Transfer
LED	Light Emitting Diode
LEL	Lower Explosive Limit
LLC	Limited Liability Company
MCC	Motor Control Center

MCFD	Thousand Cubic Feet per Day
MOC	Management of Change
MRMD	Mineral Resources Management Division
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFPA	National Fire Protection Association
OSCP	Oil Spill Contingency Plan
OSHA	Occupational Safety & Health Administration
OSPR	Office of Spill Prevention and Response
OSRO	Oil Spill Response Organization
P&ID	Piping and Instrumentation Diagrams
PA	Public Address
PFD	Process Flow Diagram
PHA	Process Hazard Analysis
PLC	Programmable Logic Controller
PM	Preventive 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
PSSR	Pre-Startup Safety Review
PSV	Pressure Safety Valve
ROE	Radius of Exposure
RP	Recommended Practice
RTU	Remote Terminal Unit
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
SDS	Safety Data Sheet
SMP	Safety Management Programs
SOP	Standard Operating Procedures
SPCC	Spill Prevention, Control, & Countermeasure
TEC	Technical
UV/IR	Ultraviolet/Infrared
UBC	Uniform Building Code
UFC	Uniform Fire Code
UPS	Uninterruptable Power Supply
UT	Ultrasonic Thickness
UV	Ultraviolet
V	Volt

Appendix B
Best Practices

1.0 BEST PRACTICES

1.1	Best Achievable Protection/ Best Achievable Technology	14 CCR 790(b)(5) & 815.07(c)
	Inspection of Marine Facilities	2 CCR 2129 through 2132
	Commission Oil & Gas Regulations	2 CCR 2129 through 2132

2.0 FACILITY CONDITION AUDIT

2.1	Goals and Methodology	
2.2	General Facility Conditions	
2.2.1	Housekeeping	2 CCR 2123, 8 CCR 6539
2.2.2	Stairs, Walkways, Gratings, & Ladders	8 CCR 3272, 3276, 3277, et al.
2.2.3	Escape/ Emergency Egress/ Exits	8 CCR 3215, 3225, & 6577
2.2.4	Labels, Placards, & Signs	API RP 14J, 8 CCR 3221 & 6556
2.2.5	Security	2 CCR 2123
2.2.6	HAZMAT Handling & Storage	8 CCR 5194; 29 CFR 1910.1200
2.3	Field Verification of Plans	
2.3.1	PFDs	2 CCR 2132(a)(2) & API RP 75
2.3.2	P&IDs	2 CCR 2132(a)(2) & API RP 75
2.3.3	Fire Protection Drawings	2 CCR 2132(g)(4)(G) & API RP 75
2.4	Condition and Integrity of Major Systems	
2.4.1	Piping	2 CCR 2129(b) & (c), 2132(h), API 570, ASME B31.3, 8 CCR 6533 &
2.4.2	Tanks	2 CCR 2129(b) & (c), API 650 & 653
2.4.3	Pressure Vessels	2 CCR 2129(b) & (c), ASME Boiler & PV Code Sect. VIII, API 510 & RP 572, 8 CCR 6551(c), 46 CFR 53
2.4.4	Pressure Relief, PSVs and Flare Sys.	2 CCR 2132(g)(3), API RPs 14J & 576, Stds 520/521
2.4.5	ESP, Pump Units & Wellhead Equip.	2 CCR 2132(a)(4)
2.4.6	Fire Fighting Detection Systems	2 CCR 2132(g)(4)(A) & NFPA 25-10.2.5.1
2.4.7	Fire Fighting Equipment	2 CCR 2132(g)(4)(A) & NFPA 25-10.2.5.1
2.4.8	Emergency Shutdown System (ESD)	2 CCR 2132(g)(1)
2.4.9	Safety & Personal Protective Equipment	2 CCR 2129(b) & (c), 2131(a), 2132(g) & (h), 8 CCR 3380 et seq.
2.4.10	Instrumentation, Alarm and Paging	2 CCR 2132(g)(1)&(2)
2.4.11	Auxiliary Generator / Prime Mover	2 CCR 2132(g)(7)
2.4.12	Spill Containment	2 CCR 2139 & 2140, 14 CCR 815.07(c) & 817.02(d)
2.4.13	Spill Response	2 CCR 2139 & 2140 14 CCR 817.02(f)
2.5	Mechanical Integrity/Preventive Maintenance	2 CCR 2129(c); API RP 75

2.6	Production Safety Systems	2 CCR 2129(a), 2132(g) API RP 75, 14 CCR 1747
	Onshore Production Safety System	2 CCR 2129(a), 2132(g) API RP 51R, 14 CCR 1712 - 1724

3.0 ELECTRICAL SYSTEM AUDIT

3.1	Goals and Methodology	
3.2	Electrical Hazardous Area Classification Dwgs. • Level of classification • Extent of classification	API RP 500, NFPA 70
3.3	Electrical Power Dist. System, Normal Power	API RP 540, NFPA 70
3.3.1	Electrical Single Line	
3.3.2	Electrical Service Capacity	
3.3.3	Electrical System Design	
3.4	Elec. Power Equip Condition and Functionality	API RP 540, NFPA 70
3.4.1	Equipment Condition	
3.4.2	Safety Procedures	
3.4.3	Equipment Maintenance Practices	
3.5	Grounding	API RP 540, NFPA 70
3.6	Emergency Electrical Power	NFPA 70, NFPA 110
3.6.1	System Configuration	
3.6.2	Equipment and Component Ratings	
3.6.3	Electrical System Design Safety	
3.7	Electric/Diesel Fire Pumps	NFPA 20, NEC 696
3.8	Process Instrumentation	2 CCR 2129 et seq. API RP 540, NFPA 70
3.9	Lighting Systems	2 CCR 2129 et seq. 14 CCR 1743 (a)-(c)
3.10	Special Systems	2 CCR 2129 et seq. API RPs 14J & 75 ISA RP 7.1, ISA 12.1, 12.2 ISA S7.4, S12.4 14 CCR 1743&1747
3.10.1	Safety Control Systems	See 3.10
3.10.2	Gas Detection Systems	See 3.10
3.10.3	Fire Detection Systems	See 3.10
3.10.4	Aids to Navigation	33 CFR Subcp. C, Part 67
3.10.5	Communication	33 CFR Subcp. C, Part 67
3.10.6	General Alarms	33 CFR Subcp. C, Part 67
3.10.8	Cathodic Protection	2 CCR 2132(h)(4), API RP 651, NACE RP 01-76, 0675

4.0 SAFETY MANAGEMENT PROGRAMS

4.0	Goals and Methodology	API RP 75 SEMP
4.1	Operations Manual	2 CCR 2173
4.2	Spill Response Plan	2 CCR 2139, 14 CCR 817
4.2.1	SPCC Plan	40 CFR 112.7

4.3	Training and Drills	2 CCR 2140, 2175 14 CCR 816.04(b)(3), 817.02(k), 820.01
4.4	Safety Management Programs	2 CCR 2139 & 2175 API RP 75 14 CCR 817

5.0 HUMAN FACTORS AUDIT

5.1	Process Safety Management	API RP 75 CSLC SAMS

Appendix C
References

GOVERNMENT CODES, RULES, AND REGULATIONS

CCR	California Code of Regulations
Title 2	*California State Lands Commission, Mineral Resources Management Division*
2129-2132	*Oil and Gas Production Regulations*
2133-2142	*Oil and Gas Drilling and Production Operations: Pollution Control*
2170-2175	*Operation Manual & Emergency Planning*
Title 8	*Cal/OSHA*
3215	*Means of Egress*
3225	*Maintenance and Access to Exits*
3272	*Aisles, Walkway, and Crawlways*
3276	*Portable Ladders*
3277	*Fixed Ladders*
5189	*Process Safety Management of Acutely Hazardous Materials*
5194	*Hazard Communication*
6533	*Pipe Lines, Fittings, and Valves*
6551	*Vessels, Boilers and Pressure Relief Devices*
6556	*Identification of Wells and Equipment*
6577	*Entrance and Exit*
Title 14	*CalGEM and Office of Oil Spill Prevention and Response*
815.01-820.01	Oil Spill Prevention and Response
1722.1.1	*Well and Operator Identification*
1774	*Oil Field Facilities and Equipment Maintenance*
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

API	American Petroleum Institute
RP 11ER	*Guarding of Pumping Units*
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 51R	*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 75	*Recommended Practice for a Safety and Environmental Management System for Offshore Operations and Assets*
	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*
	Std 520	*Design and Installation of Pressure Relieving Systems in Refineries, Part I and II*
	Std 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*
	API 570	*Piping Inspection Code*
	RP 574	*Inspection Practices for Piping Systems Components*
	API 650	*Welded Steel Tanks for Oil Storage*
	RP 651	*Cathodic Protection of Aboveground Petroleum Storage Tanks*
	Std 653	*Tank Inspection, Repair, Alteration, and Reconstruction*
	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
	B31.3	*Process Piping*
	B31.4	*Pipeline Transportation Systems for Liquids and Slurries*
	B31.8	*Gas Transmission and Distribution Piping Systems*
	Y32.11	*Graphical Symbols for Process Flow Diagrams*
	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 Association
	20	*Stationary Pumps for Fire Detection*
	25	*Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*
	70	*National Electric Code*
	70E	*Standard for Electrical Safety in the Workplace*
	704	*Identification of the Hazards of Materials for Emergency Response*
CEC		California Electric Code

Appendix D
Team Members

FACILITY CONDITION TEAM

CSLC – MRMD	David Rodriguez David Calderon Ryan Horton Steve Staker
CRC	Kathryn Sanders

ELECTRICAL TEAM

CSLC – MRMD	David Rodriguez David Calderon Ryan Horton
PES	Doug Effenberger
CRC	Alan McGraw

TECHNICAL TEAM

CSLC – MRMD	David Rodriguez David Calderon Ryan Horton
CRC	Senem Weaver

SAFETY MANAGEMENT TEAM

CSLC – MRMD	David Rodriguez David Calderon Ryan Horton
CRC	Clint Harris Senem Weaver