California State Lands Commission

Safety and Oil Spill Prevention Audit

Rincon Island Limited Partnership

July 2008

EXECUTIVE SUMMARY

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Safety Audit of Rincon Island Limited Partnership

The objective of the Safety Audit Program is to ensure that all oil and gas production facilities on State leases or granted lands are operated in a safe and environmentally sound manner complying with Federal, State, and Local codes/permits, as well as industry standards and practices. The Safety Audit of Rincon Island Limited Partnership was conducted from April 2007, through November 2007 with the final report being issued in July 2008.

Background

The Rincon Island Limited Partnership (RILP) is the operator of three state leases in Ventura County, California. RILP was acquired by Greka Energy of Santa Maria, California in 2002. Greka Energy is an independent oil and gas company with other California oil and gas properties including operations in Kern County and Santa Barbara County as well as the three RILP leases. Greka Energy also operates a 10,000 barrel per day refinery in Santa Maria that produces asphalt, light feedstock, kerosene distillate and gas oil.

The largest of the three state leases is PRC 1466, which is a 1175 acre offshore lease produced from Rincon Island. Rincon Island is a man made island located in 45 feet of water with approximately one acre of usable surface space and connected to the mainland by a 2700 foot causeway. The Island currently has 13 wells capable of being produced as well as 4 wells used for waste water disposal.

The other two leases are offshore leases that are produced from upland or onshore leases. The 50 acre PRC 410 lease and the 326 acre PRC 145 lease are produced from onshore locations south of the old Pacific Coast Highway and north of U.S. Highway 101 just west of the Seacliff exit. PRC 145 has 4 active producing wells and PRC 410 has 4 active producing wells and 1 water disposal well. The RILP onshore production office is located on the property.

Safety Audit Procedures

The Safety Audit followed established procedures to address five functional areas: Equipment and Functionality, Electrical, Technical, Administrative, and Human Factors. RILP personnel assisted CSLC staff during field activities and through direct consultation during the audit. The electrical team was comprised of personnel from Power Engineering Services, Inc.

Safety Audit Results

The safety audit identified a total of 208 action items. There were 12 Priority One action items with a high risk potential for injury, oil spill, adverse environmental impacts, or significant property damage that would require correction within 30 days. There were

25 Priority Two items that have moderate risk potential for injury, oil spill, adverse environmental impacts, or property damage and require correction within 120 days. Finally, there were 171 Priority Three action items identified which have a low risk potential for injury, oil spill, adverse environmental impacts, or property damage. These items normally include outdated drawings, manuals, and procedures and require correction within 180 days. The following table shows the Priority level and the nature of the Action Item as indicated by team:

Action Items
Priority

Team	1	2	3	Total
ADMIN			16	16
EFI	10	19	99	128
ELECT		5	48	53
TECH	2	1	8	11
Total	**12**	**25**	**171**	**208**

The Island exhibits a wide variety of maintenance, operational and aesthetic problems typically associated with an older facility. There are also upgrade and maintenance needs on the island and on the onshore grounds that require some older equipment be removed or replaced. Because Rincon Island upkeep has clearly fallen short, a significant number of items were housekeeping in nature.

The Equipment Functionality and Integrity Team accounted for 128 of the 208 Action Items or about 62%. By far, the majority of these items are Priority Three Action Items addressing changes not shown on mechanical drawings, physical condition or maintenance issues, or labeling of tanks, piping, and equipment. A higher than expected number of HAZMAT Storage deficiencies were noted due to a failure to properly dispose of chemicals that are no longer used. A large number of the EFI action items, 52%, concerned information that needed to be updated on Process and Instrumentation Drawings (P&IDs) and were assigned the lowest priority.

The external condition of tanks, pressure vessels, and piping and their paint coatings was observed to be in fair condition. The firefighting and other emergency and spill response equipment was also observed to be adequate except as noted by action items. The use of personal protective equipment was inconsistent at times and there was some question regarding the availability or supply of certain items. The Safety Program did not seem to be afforded attention from personnel and some training appeared overdue.

The Electrical Team accounted for 25% of the Action Item grand total and combined with the EFI Team, accounted for 87% of all Items. The number of electrical action items identified in this audit was notably lower than in other audits for several reasons. RILP was previously audited in the year 2000 and all of the identified electrical action items were addressed at that time.

At the time of this audit RILP was in the process of installing a LACT Unit and resizing their gas compressor at the onshore location. Six of the eleven Action Items identified in the TEC section or approximately 55% were directly related to a lack of engineering oversight regarding safety considerations. Of the six Action Items, two were priority one and one was priority two. The facility control systems and safety shutdown systems typically met the American Petroleum Institute (API) Recommended Practice (RP-14C) and the Mineral Resources Management Division (MRMD) requirements. There were some design issues where the Technical Team identified recommendations or action items involving safety devices listed on the safe chart.

Conclusion

The Audit Team assessed the RILP operation to be at minimum levels of compliance with MRMD regulations in certain areas and questionable levels of compliance with other applicable regulations, codes and standards. Although definitive improvements were made by the previous operator after the previous 2000 audit, it appears that Greka's attempts to continue with the programs and policies that were instituted at that time have not been effective and have not resulted in any marked improvement. Without a definitive commitment to improvement from Greka management, a sustained resolve by operating personnel to comply with both safety procedures and programs, and a more prominent safety culture demonstrated by personnel, it appears doubtful that meaningful improvement in compliance will occur in the foreseeable future.

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Introduction

1.0 INTRODUCTION:

1.1 Safety Audit Background

The California State Lands Commission (CSLC) Mineral Resources Management Division (MRMD) staff is conducting detailed safety audits of operators and/or contractors for lands in which the State has an interest. The objective of these safety audits is to ensure that all oil and gas production facilities on State leases or granted lands are operated in a safe and environmentally sound manner and comply with Federal, State, and local codes/permits, as well as industry standards and practices. The MRMD staff is tasked with providing for the prevention and elimination of any contamination or pollution of the ocean and tidelands, for the prevention of waste, for the conservation of natural resources, and for the protection of human health, safety and property by sections 6103, 6108, 6216, 6301, and 6873(d) of the Public Resources Code (PRC). These PRC sections provide authority for MRMD regulations as well as the existing inspection program and the safety audit program that augments it.

The Safety Audit Program was developed in response to PRC 8757 (a), which originated from the Lempert, Keene, and Seastrand Oil Spill Prevention Act. This legislation considered existing oil spill prevention programs inadequate in reducing the risk of significant discharges of petroleum into marine waters. This Act specifically required marine facilities to employ the best achievable technology or protection by stressing the prevention of oil spills. MRMD regularly inspects and monitors both onshore and offshore oil and gas drilling and production facilities to ensure the best achievable protection of the public health, safety and the environment. The Safety Audit Program was established to augment the existing inspection program, further preventing oil spills and other accidents. The Safety Audit Program enhances prevention efforts thorough a review of facility design, maintenance, human factors, and other evolving areas.

The MRMD uses five teams, each with specific focus, to conduct the safety audit. The five teams systematically evaluate the facilities, operations, personnel, and management from many different perspectives. The five teams and their areas of emphasis include:

1) Equipment Functionality and Integrity (EFI)
2) Electrical (ELC)
3) Technical (TEC)
4) Administrative (ADM)
5) Human Factors (HF)

Appropriate company contacts and resources are identified for each team. Progress and inspection deficiency reports are communicated periodically throughout the audit evaluations. Each team records findings on an “action item matrix” for its area with recommended corrective actions and a priority ranking for the specified corrective action. Because of the overlap of functions, more than one team may identify some items, but the duplication of findings across multiple teams has been reduced as much as possible.

The audit report highlights the findings of each team and the most significant action items and includes references to the complete matrix of action items. Draft copies of the audit report and the matrix of action items are provided to the company frequently throughout the audit. The final audit report is provided to company management during a formal presentation of the results. The presentation affords the opportunity to discuss the findings and the corrective actions proposed in the final report. The MRMD continues to assist the operator in resolving the action items and tracks progress of the proposed corrective actions. Adjustments to the inspection program can be made based on the finding of the Safety Audit.

This program could not be successfully undertaken without the cooperation and support of the operating company. It is designed to benefit both the company and the State by reducing the risk of personnel or environmental accidents, damage, and in particular, oil spills. Previous experience shows that the safety assessments help increase operating effectiveness and efficiency and lower cost. History has shown that improving safety and reducing accidents makes good business sense.

1.2 Rincon Island Limited Partnership History

Rincon Island was constructed by the Richfield Oil Corporation beginning in February, 1957, with completion in September, 1958. Forty-six wells were drilled and completed from Rincon Island between 1958 and 1960. The Richfield Oil Corporation later merged with the Atlantic Refining Company in 1966 to form the Atlantic Richfield Company (ARCO). ARCO sold their interest and assigned the lease to Norris Oil Company in 1982. Berry Petroleum Corporation purchased Norris Oil Company in 1987 and operated the property under the name of the Bush Oil Company. Berry Petroleum subsequently sold their interest and assigned the lease to the Rincon Island Limited Partnership (RILP) in 1995. RILP was owned and operated by Windsor Energy US Corporation. Windsor filed for bankruptcy in 2000 and was foreclosed on by its bank in 2001.

Greka Energy of Santa Maria, California acquired the Rincon Island Limited Partnership (RILP) in 2002 after the foreclosure proceedings and is the operator of record of three State leases. PRC 1466 is the offshore lease produced from Rincon Island while both PRC 410 and PRC 145 are referred to as upland or onshore leases. All three leases are located in northwestern Ventura County, California. Greka currently utilizes four operators and a foreman to monitor daily production operations on the three leases and has some management and a secretary-receptionist at the onshore production office located on old Pacific Coast Highway. The engineering, administrative, and safety functions are supported out of the Santa Maria office. In addition a Greka Energy well crew is available to the three leases as needed with contractors used to supplement its work force.

1.3 Rincon Island Limited Partnership Description

The 1175-acre PRC 1466 lease is produced from Rincon Island, a man made island located in 45 feet of water and connected to the mainland by a 2,700 foot wooden causeway on steel pilings. The causeway, wide enough for only one-way traffic, has two six inch pipelines, one for produced oil and one for natural gas, a high voltage power line, and telecommunication lines along the flanks of its deck. The Island is six acres at its seafloor base with approximately 2 1/2 acres at water level and one acre of usable surface area. It has a sand core surrounded by quarried stones on three sides and by 1,130 concrete tetra pods on the west-southwest side that effectively break up wave energy. The Island surface is sixteen feet above sea level.

The PRC 1466 lease has as many as 13 active producing wells out of a total count of 45 wells. The active producers include 4 wells produced by hydraulic rod pumps and 9 wells produced by electric submersible pumps (ESP's) with variable speed drive. Other wells included in the count are 1 source water well and 5 water flood injector wells all of which were part of a water flood system that is currently not in use. There are 4 injector wells utilized for waste water disposal. The production is piped to a two-phase (gas/emulsion) separator and the oil and water go to a 1,500-barrel wash tank. The oil is skimmed off to a 1,000-barrel stock tank (a second stock tank is maintained in reserve) from which the oil is shipped through a Lease Automatic Custody Transfer (LACT) unit through a 6-inch oil pipeline across the causeway that ties into the Venoco Pipeline. A truck loading connection is available for emergency use. The water siphons through a water leg to a 2000-barrel wastewater holding tank. From there, charge pumps feed wastewater to the water disposal injection pump to be injected into the water disposal injection wells.

The gas from the separators is combined with gas produced through well casing annuli and piped into the sales gas scrubber. After compression the gas goes into the 6" gas sales line crossing the causeway and running to Dos Cuadros Offshore Resources LLC. (DCOR) Rincon Onshore Facility (ROSF) that purchases the gas. If the gas is off specification, or the gas plant is forced to shut down, then the gas is diverted to the flare.

The 50-acre PRC 410 lease and 326-acre PRC 145 lease are produced from onshore locations south of the old Pacific Coast Highway and north of U.S. Highway 101 just west of the Seacliff exit. The surface working area has elevations varying from seven to fifteen feet above sea level. Los Sauces Creek, the drainage watercourse for the general area uphill from the leases, bisects the property west of the entrance gate. RILP's onshore production office is located on the property.

PRC 145 has up to 4 active producing wells out of 14 total wells and PRC 410 has up to 4 active producing wells and 1 active waste water disposal well out of 13 total wells. All of the onshore wells are produced by walking beam pumping units with sucker rod pumps. All fluids are piped to the PRC 410 tank farm, which has six 500-barrel stock tanks. The PRC 145 tank farm is out of service. Oil from the PRC 410 is piped through separators to one of two dedicated tanks until it reaches near capacity and then is switched to the other. Oil from the PRC 145 is piped through separators to two of four dedicated tanks until they reach near capacity and then are switched to the others. The oil is shipped from these two leases through a recently installed LACT unit to a tie-in on the Venoco Pipeline located on the north side of the old Pacific Coast Highway. A truck connection is still available for tanker truck shipment in the event of an emergency. Gas is shipped via compressor to the ROSF gas plant.

Equipment Functionality & Integrity Audit

2.0 EQUIPMENT FUNCTIONALITY & INTEGRITY

2.1 Goals and Methodology

The primary goal of the EF&I Team was to evaluate the physical condition and maintenance of the Rincon Island Limited Partnership (RILP) equipment, and review the supporting documentation. This was accomplished through a series of inspections that included the verification of Process Flow Diagrams (PFDs), Piping and Instrumentation Diagrams (P&IDs), and other key diagrams and plans. Inspection and evaluation was typically conducted on equipment within a system or category. The methodology incorporated is reflected in the layout of this report.

2.2 General Facility Conditions

2.2.1 Housekeeping: Rincon Island is one of the oldest offshore state lease oil and gas production facilities. The general condition and cleanliness is inadequate. The control room, rest room, and locker room on the Island were unsanitary and unkempt compared to other state lease facilities. Such unsanitary conditions discourage professionalism, good maintenance practices, good record keeping, and hamper ready access to operating procedures and documents. A Priority Two Action Item (EFI 2.2.1.19) was issued to address insects and sanitation in the control room. There were health and safety issues caused by backed up sewage, a lack of hot water, and a potential eye injury hazard to personnel observed in the restroom. (Priority Two Action Items, EFI 2.2.1.08 & 2.2.1.09) In addition there were two Priority Two Action Items for improperly stored oily waste and discarded equipment that posed fire and personnel hazards (EFI 2.2.1.11 & 2.2.1.12) Another seven action items were issued due to slipping / tripping hazards on the Island due to old equipment, discarded parts, trash and refuse. (EFI 2.2.1.05, 2.2.1.06, 2.2.1.07, 2.2.1.10, 2.2.1.14, 2.2.1.15 & 2.2.1.20) Action items were written for an improperly stored oil boom and a fire hazard posed by dry brush and weeds. (EFI 2.2.1.13 & 2.2.1.17) Lastly, an action item was issued for failure to maintain the irrigation system on the island which was adversely affecting the palm trees and landscaping. Lease regulations require that landscaping be maintained. (EFI 2.2.1.18)

The onshore production office was adequately clean and maintained. However, open areas adjacent to the production office and particularly around well heads and pumping units needed clearance of overgrown weeds and brush to reduce the fire hazard. These areas need routine cleaning, and maintenance. (EFI 2.2.1.01) Scrap metal, old tubing, dilapidated buildings, and materials that are unusable as spare materials should be removed and properly disposed. (EFI 2.2.1.02) The area around pumps, particularly the injection pump, and around chemical totes had excessive amount of oil on the ground. (EFI 2.2.1.04) Oil and grease have contaminated the soil around some of the pumping units and should be cleaned and controlled to avoid further environmental problems. (EFI 2.2.1.16) There are two Baker tanks and two frac tanks with waste material remaining in them that pose an environmental hazard. (EFI 2.2.1.03) It appears that contract sanitation services provide adequate refuse collection using dumpsters.

2.2.2 Stairs, Walkways, and Gratings & Ladders: The stairs, walkways, and gratings generally appear adequate. The stairway located at the East end of the well bay leading to Source Water Tank Tk-101 has a lower bent step that creates a definite fall hazard and needs to be repaired or replaced. (EFI 2.2.2.02)

The lack of a properly constructed platform to test levels at the Test Separator creates a fall hazard for operating personnel. A permanent structure meeting Cal OSHA guidelines needs to be utilized to provide safe working conditions especially during testing for the monthly CSLC inspection. (EFI 2.2.2.01)

*2.2.3 Escape / Emergency Egress / Exits***:** The primary escape route for Rincon Island is the causeway. Although RILP employs a red light/green light system to control the one-way vehicle traffic on the causeway, in an emergency, vehicles or pedestrians could depart from the island in a true emergency. Two spill response boats provide another option if the causeway becomes unavailable. One escape concern on all lease locations concerned the lack of labeling on tank and vessel man ways as “Confined Spaces.” (EFI 2.2.3.01 & 2.2.3.02) There were no other access or egress concerns identified.

*2.2.4 Labels, Placards & Signs***:** A majority of human errors can result from the design of the work environment. Clear labeling is one of the simplest ways to reduce selection errors and improve employee performance. While effective labeling may have been present in years past, these visual aids can be lost over time due to tearing off, painting over, be covered with insulation, or become outdated by changes in the equipment or process unless they are routinely maintained. When labels are missing, incorrect or misleading, workplace error becomes a higher risk and mistakes can occur.

Inadequate labeling has been a problem found on a number of state leases. Two action items generated were in response to the lack of labeling for well name and number creating safety and other hazards. (EFI 2.2.4.01 & 2.2.4.02) Although the labeling for the onshore leases was deemed marginal, the vast majority of piping on Rincon Island was not adequately labeled so operators must rely on memory or piping must be traced and/or retraced to identify its purpose. For this reason an action item was generated. (EFI 2.2.4.04) Although all the tanks and vessels had the NFPA 704 diamonds to inform responders to fires, spills or other emergencies of the hazards of the material contained in the facilities, the height of the lettering was often too small in reference to the size of the vessel to be easily read at a distance. The numbers should be visible from a minimum distance of 50 feet and there is a reference chart with recommended distance and letter height requirements within ANSI Z535.2-2002.

As previously discussed vessel and tank man-ways were not labeled as Confined Space. A chemical tank with no markings was observed onshore and is further addressed under HAZMAT Storage. The lack of proper signs at one of the ESD stations is further addressed in the Pressure Relief, PSV’s & Flare System section.

The CSLC staff recommends standardizing the labeling throughout the leases by using the “ANSI Pipe Marking Standard A13.1”, to identify the hazards within the workplace, to provide clear labeling and urges the use of this standard onshore as well as on the island.

2.2.5 Security: Security for Rincon Island is adequately afforded by an encoded entry gate for the causeway. Should unauthorized personnel gain access to the causeway, they would be asked to leave upon arrival at the island. RILP has posted a weight limit and speed limit for the causeway. The security at the onshore leases and production office appears adequate. An encoded entry gate is also employed during off hours and during normal business hours when the production office is unmanned. RILP indicates that a recent change in policy has been made requiring sign-in at the production office before traveling to the island to further monitor and control access to the island. One concern that arose during the course of the safety audit was the fact that telephone service was terminated for approximately one week for the onshore production office. The onshore production office phone number is the phone number shown on the emergency contact signs at the front gates of both Rincon Island and the onshore leases.

2.2.6 HAZMAT Storage: The storage of flammable and combustible liquids at RILP was checked for compliance with CAL-OSHA regulations and NFPA 30. A compressed gas cylinder was observed standing upright and unsecured near the Gas Compressor on Rincon Island creating fire, explosion and personnel hazards. In addition other cylinders on the island were observed either not in racks or properly capped. This resulted in a Priority One Action Item. (EFI 2.2.6.01) A chemical storage tank with no markings and no secondary containment was located between two out of service pumping units on the 410 Lease creating both fire and personnel hazards. (EFI 2.2.6.02) Another four action items were incurred on the island as a result of chemicals that are still stored but are no longer used. (EFI 2.2.6.06, 2.2.6.07, 2.2.6.08 & 2.2.6.09) Another two action items resulted from empty drums both onshore and on the island that create a potential fire hazard and need to be disposed of properly. (EFI 2.2.6.05 &2.2.6.10) The failure to properly dispose of contaminated soil on the east side of the onshore tank battery resulted in an action item. (EFI 2.2.6.03)

Chemical hazards in the workplace are identified and evaluated and that information concerning those hazards is communicated to employers and employees. This transfer of information is accomplished by means of a comprehensive hazard communication program, which includes container labeling along with proper warnings, Material Safety Data Sheets (MSDS) and employee training. Although Material Safety Data Sheets (MSDS) were maintained at both the Rincon Island control room and the onshore production office, the bulk of the MSDS sheets appear to be for chemical products that are no longer used, and individual MSDS sheets appear to have been added to the three ring binders in a haphazard manner. There were no indexes available so that a particular chemical product could be easily found. Finding a particular product required leafing through the binders page by page. MRMD staff recommends that once all chemicals that are no longer used have been removed from the leases, the MSDS books be updated so at the least these records will be more manageable for operating personnel. The lack of MSDS sheets for chemicals on hand and in use both onshore and on the island resulted in two action items. (EFI 2.2.6.04 & 2.2.6.11)

2.3 Field Verification of Plans

2.3.1 Process Flow Diagrams (PFD): Process Flow Diagrams (PFD) are simple illustrations that use process symbols to describe the primary flow path through a unit. A PFD includes all primary equipment and flows providing a quick snapshot of the operating unit. PFD’s are often used for visitor information and new employee training.

Process Flow Diagrams (PFD's) were not supplied at the onset of the safety audit; however, three PFD's were discovered while reviewing the Operations Manual. The three PFD's were prepared by the previous operator and are still accurate although one system is not in service. Simplified Facilities Flow Chart (oil, gas) identified as Figure 7 is a simplified flow diagram for Rincon Island to show the oil and gas flows throughout the facility. Water Injection Equipment Flow Diagram identified as Figure 16 is a simplified flow diagram for the Source Water Injection System although this system is not in service. Vapor Recovery System Flow Diagram identified as Figure 17 is a simplified flow diagram of the vapor recovery system.

*2.3.2 Piping and Instrumentation Diagrams (P&ID)***:** Piping and Instrumentation Diagrams (P&ID) are one element of Process Safety Information. Process Safety Information is used to identify and understand the hazards of a process and is necessary to develop a Process Hazard Analysis (PHA). Process Safety Information is also necessary to comply with other provisions of Process Safety Management such as Operating Procedures and Management of Change.

Comprehensive field verifications of all of the P&ID's were performed for Rincon Island as well as Onshore Leases 410 & 145. These drawings, which were supplied by RILP management at the inception of the Safety Audit, are reasonably accurate for Rincon Island but require more updating for the onshore leases due to the addition of the LACT unit and the replacement of the gas compressor along with the required piping modifications. Discrepancies in addition to the aforementioned included: sizing errors in valves, piping connections, and out of service or removed equipment. (EFI – 2.3.2.01 thru 2.3.2.52)

*2.3.3 Fire Protection Drawing Verification***:** The Map of Rincon Island Showing Facilities and Fire Fighting Equipment (Figure 52) and the Map of PRC 410 & PRC 145 Leases Showing Facilities and Fire Fighting Equipment (Figure 53) were field verified for fire fighting response, safety support function and location accuracy.

A review of the drawings revealed two discrepancies on Rincon Island and three discrepancies on the onshore leases. The discrepancies on the island included the failure to show the ESD shutdown located near the hydraulic skid as well as a drawing update to reflect the Verizon communications building. (EFI 2.3.3.01 & 2.3.3.02) The onshore discrepancies included updating the drawing to show the new LACT Unit and the relocation of the safety eyewash station. (EFI 2.3.3.03 & 2.3.3.05) Additionally one priority two action item required the replacement of two fire extinguishers shown on the drawing but missing from their location. (EFI 2.3.3.04)

2.4 Condition and Integrity of Major Systems

*2.4.1 Piping***:** The overall condition of piping on Rincon Island was rated as fair. A lot of the piping on the island makes good use of bracketed pipe ways along the perimeter walls. The brackets and support of piping appears adequate throughout the facility with some exceptions. A number of modifications were noted throughout the piping system. Some modifications appear to have used piping materials that were readily available on the lease resulting in some mismatched pipe sizes. A temporary repair clamp was noted on the Casing Head Gas Line on the North wall near the instrument air compressor resulting in a Priority One

Action Item. (EFI - 2.4.1.02) In addition to the required repair the action item recommends that ultrasonic testing of the line to ensure integrity be considered. A come-a-long was noted as being used in lieu of proper pipe supports near the South end of the well bay. (EFI – 2.4.1.04) A rubber hose was being used on the discharge of Waste Water Charge Pump B running to a portable filter that was not properly stabilized resulting in another action item. (EFI – 2.4.1.03)

RILP advises that a set of three rectifiers, which are located on the causeway, utilize an impressed current system to provide cathodic protection for the 6-inch oil pipeline and the 6-inch gas pipeline running along the causeway as well as the steel pilings in the causeway. RILP further advises that the onshore buried portions of the 6-inch oil pipeline, which ties into the 22-inch Venoco Oil Pipeline on the hillside north of U.S. 101, and the 6-inch gas pipeline, which runs up the hillside to DCOR's Rincon Onshore Facility (ROSF), are further protected by galvanic anodes at both the point where the pipelines go under U.S. 101 and at a valve box on the north side of U.S. 101. Oil is batch treated with corrosion inhibitor and wax inhibitor as it is shipped. The 6-inch oil pipeline and 6-inch gas pipeline are hydro-tested annually. MRMD staff observes these tests and ensures proper records are maintained. Farwest Corrosion Control Company is contracted to monitor these corrosion control systems. The Production Foreman indicates that RILP personnel check rectifier readings on the causeway's impressed current system monthly.

The condition of the piping on the onshore leases is more questionable. There are numerous pipe runs and gathering lines that appear to be abandoned or unserviceable posing a potential environmental hazard. (EFI – 2.4.1.01) Some of these are apparently permanently idled and may be deteriorating. Consideration should be given to the removal of all such lines. Vapor recovery piping atop the PRC 410 tank farm was utilizing 4"x4" wood for support in lieu of proper pipe supports resulting in an action item. (EFI – 2.4.1.05)

*2.4.2 Tanks***:** The records of the last external inspections and / or ultrasonic thickness readings for both the Island and the onshore tanks appear to be as a result of the previous safety audit in 2000. There are no records of internal inspections. All tanks on the Island and onshore require inspection, thickness testing, maintenance, and repair per API RP 12 R1 guidelines.

The tanks on the Island appear to be in fair condition. RILP advised that Wash Tank 1037 was replaced in January of 2007 and the Waste Water Tank was replaced approximately three years ago. As previously mentioned the lack of an ongoing tank inspection program resulted in an action item. (EFI 2.4.2.01)

The PRC 410 tank farm appears to be in slightly better condition. The RILP Production Foreman advised that during the August through October 2006 time period, RILP replaced the tops on Tanks 1223, 1224, 1225, 1679 and 1680 due to emission citations from the Ventura County Air Pollution Control District (APCD). One action item was incurred due to the failure to inspect tanks. (EFI 2.4.2.02)

The PRC 145 tank farm was out of service when the previous safety audit was performed in 2000 and remains so today. All fluids from the PRC 145 lease are sent to tanks within the PRC 410 tank farm. In the unlikely event that these tanks were to be considered for a return to service, they would need to be inspected and shown to be of adequate condition to return to service based on American Petroleum Institute (API) standards.

Tanks on Rincon Island were equipped with Level Safety High (LSH) shutdowns and Level Safety Low (LSL) shutdowns while most of the onshore tanks had a high level alarm that ties into a paging system. The TEC Team will further address the adequacy of level indication and shutdown safeguards as part of its production safety systems evaluation.

2.4.3 Pressure Vessels: Pressure vessels are utilized in the storage and processing of produced hydrocarbons and to provide controlled liquid flow to downstream equipment. These vessels operate at pressure in excess of atmospheric pressure and are subject to corrosion, erosion, and environmental cracking. External/internal inspections provide the information necessary to determine that all the essential sections or components of the vessel are safe to operate. Internal examination is also the preferred method of inspection for significant localized corrosion and other types of damage.

Similar to the tank inspections RILP has no records of recent internal inspections on the vessels. The only records are for external inspections and ultrasonic thickness readings performed as a result of the 2000 audit. Consequently priority two action items were incurred for Rincon Island and for the onshore leases for failing to perform pressure vessel inspections. (EFI 2.4.3.01 & 2.4.3.02)

2.4.4 Pressure Relief, PSV's and Flare System: The piping for the relief/flare system at Rincon Island was evaluated for condition, maintenance, and functionality. The system appears to have all the necessary Pressure Safety High (PSH), Pressure Safety Low (PSL), and PSV devices. This system will be reviewed in greater detail by the Tech Team.

One major concern for a flare system is the state of the flame arrestors and whether any maintenance has been performed. RILP advises that the flare system was rebuilt approximately two years ago, and the flame arrestors were replaced at that time. It appears that annual service and cleaning is due at this time. MRMD recommends that manufacturer's directives for flame arrestor maintenance be followed and documented.

Thornco of Santa Fe Springs, California has been used to test pressure safety valves (PSV) on both Rincon Island and the onshore leases. The frequency is six months per MRMD regulations regardless of the service of the relief valve. The maintenance and servicing records for all PSV's were examined and found to comply with applicable regulations and recommended standards. PSV set points will be addressed in the Technical Audit.

Block valves used to isolate the PSV's on the relief system are provided for maintenance purposes. During normal operations these valves are open and should only be used to isolate a pressure safety valve for inspection and/or repair while the facility is operating. Due to the critical nature of the safety system and the potential for a catastrophic failure should a valve be closed by accident, these isolation valves should be locked or car sealed in the open position. Visual on-stream inspections to verify that the isolation valves are locked or car sealed open is addressed in API RP 576. MRMD recommends that a car seal log be maintained and checked monthly to ensure compliance. The failure to car seal these isolation valves resulted in a priority two action item on Rincon Island and two priority two action items on the onshore leases. (EFI 2.4.402, 2.4.403 & 2.4.4.05)

In the event that a PSV relieves due to overpressure, it is imperative that the relieving gas or liquid be safely directed away from personnel. A priority one action item (EFI 2.4.4.01) was incurred at the inception of the safety audit when a PSV on a 1300 psig. Waste Water Pump was found that would relieve waste water at knee level. This action item was immediately corrected. A priority one action item was incurred onshore due to the fact that a PSV, which was located on the discharge of the Gas Compressor and relieved to atmosphere, did not have a properly designed tailpiece to divert any relief flow upward and away from personnel. Any gas relieved in this manner could injure personnel by direct contact as well as create a potentially explosive situation should a source of ignition be present. (EFI 2.4.4.04)

2.4.5 Fire Detection: The fire detection system on Rincon Island consists of twenty-seven fusible plugs over or near most key pieces of equipment. A fire must melt a plug to activate the Emergency Shutdown System (ESD) system and trigger the well bay deluge system. One concern for fusible plugs is the proper positioning of the plug so that fire detection is possible. One priority one action item was incurred at the onset of the safety audit for improper positioning of a fusible plug and was immediately corrected. (EFI 2.4.5.01) Operating personnel can also activate the fire system manually. The fire alarm has a horn with its own distinctive sound and also activates a red beacon on top of the control room.

The onshore leases are not required to have a fire detection and/or fire alarm system by the local fire authority and are consistent with other similar upland leases that are unenclosed areas.

2.4.6 Fire Suppression: Dry chemical canister fire extinguishers were checked and found to be in compliance with NFPA and Cal OSHA regulations that call for extinguishers to be kept fully charged, inspected monthly and serviced annually. Firemaster of Ventura, California has provided annual servicing of the fire extinguishers on both the island and onshore. MRMD recommends that covers be considered for the extinguishers. Cal OSHA regulations stipulate that training in the use of fire extinguishers be provided annually. The lack of such documented training for operating personnel resulted in a deficiency. (EFI 2.4.6.01)

Several hose station cabinets on Rincon Island were in various states of disrepair and require repair. A priority three action item was incurred due to this. (EFI 2.4.6.03) Another concern is the use of fire hoses to provide water for well work and maintenance. This practice often results in lost or missing fire hose nozzles. The fire suppression system needs to be reserved for fire fighting use and should not be used as a convenient source of water. That's why checking the hose stations is an important part of the MRMD monthly safety inspection.

After the previous safety audit found numerous problems with the fire suppression system that existed at the time, the previous operators of RILP contracted Collings & Associates Fire Protection Engineering of Ventura, California to perform an assessment of the system and make recommendations. By agreement the existing vertical shaft turbine pump with a 25 horsepower three phase electric motor was to remain in service as a backup fire pump after recommended upgrades to the discharge piping. It was further agreed that a new vertical turbine fire pump should be installed and maintained under NFPA 20 and must be of the required type and performance and meet the specifications identified by Collings & Associates and be suitable for marine applications. It was not required to be an NFPA certified pump however. Two electric submersible pumps were selected and accepted in lieu of a vertical turbine pump. They are installed in casings submerged into the ocean and tied into the 8-inch header. It was also agreed that two fire foam monitors would be added to provide adequate protection for the Island's oil storage tanks.

Although testing of the primary firewater pumps is performed weekly, the only documentation is the operator's initials. NFPA regulations require an electric pump to be run weekly for a minimum of ten minutes and the discharge pressure to be recorded. A priority three action item was incurred for the failure to properly document the weekly tests. (EFI 2.4.6.03) The well bay deluge system is tested monthly and witnessed by MRMD personnel as required. NFPA regulations state that an annual test shall be conducted under minimum, rated and peak flows of the fire pump. The lack of any recent test resulted in a priority three action item. (EFI 2.4.6.05) The testing of the firewater pumps will be further addressed by the TEC Team. The failure to post a diagram of the firefighting system showing the location of all equipment resulted in a priority three action item. Smoke detectors are located in the control room / office, change room and lab and are tested at the monthly inspection.

The fire suppression system for the onshore leases utilizes a 3-inch piping system running to the PRC 410 tank farm. This system ties into a private hydrant located at the front gate. The hydrant in turn ties into a dedicated 6-inch fire service line of the Casitas Municipal Water District located on the opposite side of Old Pacific Coast Highway from the front gate. This system is supplemented by five 2½-inch fire department connection stations, two 1½-inch fire hose stations and two foam monitor stations. Collings & Associates verified the adequacy of the system by flow test. Additionally a Ventura County Fire Department fire station borders the leases on the east.

2.4.7 Combustible Gas & H_2S Detection: Rincon Island installed an automatic combustible gas detection and alarm system consisting of sixteen monitors strategically located around the island as a result of the previous safety audit. These monitors are tested during the monthly safety inspections, which are witnessed by MRMD field personnel. MRMD regulations require that a diagram of the gas detection system showing the location of the monitors be posted. The lack of such a diagram resulted in a priority three action item.

There is no H_2S detection system since Rincon Island is a non H_2S facility. Additionally RILP advises that DCOR, the gas purchaser, continually monitors all gas for H_2S at its Rincon Onshore Facility (ROSF).

There is no combustible gas detection system and/or H_2S detection system required at the upland leases since the onshore lease gas is considered H_2S free.

2.4.8 Emergency Shutdown Device: The ESD System for Rincon Island is an integrated system that will cause the shut-in of all wells as well as the shut-down of the entire facility in the event of a fire, pipeline failure or other catastrophic event. The ESD System consists of nine manual shut-down stations. Opening the valve at any one of those stations allows the air pressure to bleed off triggering a shut-down of all systems except the phone system, air compressor and electrical service. Activation of the Fire Loop System which would occur by the melting of one of the fusible plugs also activates the ESD System as well as starting the fire pump. Certain high level and low level abnormalities trigger shut-downs of various systems. The ESD system will be addressed in greater detail by the Tech Team. Two priority one action items were incurred at the start of the safety audit due to junk/scrap equipment blocking access to manual Station #3 located at the air compressor and lack of accessibility to manual Station #6 located near the hydraulic skid. (EFI 2.4.8.01 &2.4.8.02)

The upland leases can be effectively shut in at the main power disconnect location. Certain safety devices also shut in equipment on the entire lease and are covered in the TEC Section.

2.4.9 Safety & Personal Protective Equipment: RILP has a well-defined Personal Protective Equipment (PPE) policy that was written and endorsed by the previous operator; however, it appears that Greka Energy, the current operator of RILP, was not aware this policy existed in the Operations Manual. The use of PPE observed in daily operations has been inconsistent and some safety practices are not consistent with the safety practices demonstrated by other operators of state leases. There were Cal OSHA regulations that had been violated or overlooked at times and significant items were addressed by action items as described below.

There was one unmarked emergency eye wash station that was found to be empty and no emergency shower located on the onshore leases resulting in two priority two action items and one priority three action item. (EFI 2.4.9.01, 2.4.9.02 & 2.4.9.04) One priority three action item was incurred on Rincon Island due to a rusted out belt guard on an injection pump. (EFI 2.4.9.03) A priority two action item was issued for failing to enforce the safety footwear standard after it was pointed out to Greka Energy management representatives. (EFI 2.4.9.05)

Personnel were observed working at elevations above 6-feet without using fall protection during monthly safety device testing on separators. In addition to pointing out this violation to RILP personnel, an action item was previously issued to construct a proper platform since this is a routine operation.

Standards for lockout / tagout were developed to help prevent injury to personnel when servicing and maintaining facility machines and equipment. Unexpected energizing, start-up or release of stored energy can cause injury or death. OSHA regulations require that employees be provided with individually keyed or group locks. Although group locks were observed on Rincon Island, no definitive indications of actual use were noted.

On a positive note RILP does have a multi-profile portable gas monitor manufactured by Bio Systems that the Production Foreman keeps in his office but is available for operator’s use. The monitor is calibrated monthly by the safety representative.

No personnel safety-training records were available to show that instruction related to OSHA, Cal OSHA and environmental regulations such as HAZWOPER, HAZCOM, lockout / tagout, emergency response and safe use of facility equipment is occurring on an annual basis. This will be addressed in more detail in the Administrative Audit under Training, Drills & Applications.

2.4.10 Lighting: The Rincon Island production facility and causeway lighting is provided by pole mounted fixtures with high-pressure sodium vapor or similar type lighting. By appearance the lighting appears adequate; however, staff was advised that operators did not routinely go to portions of the island during night time hours because it was too dark to see.

The ELC Team tested twenty locations on Rincon Island for lighting levels during the week of September 1, 2007 and found ten of the locations or 50% did not meet recommended lighting levels for safety found in API RP 14F. Additionally a lighting diagram included in the survey reflected that twelve out of twenty-one floodlights were not working. A priority one action item was issued to repair or replace the lighting. (EFI 2.4.10.02) Additionally a priority one action item was previously incurred due to inoperative lighting in the Variable Speed Drive Building and Electrical Building. (EFI 2.4.10.01) Information supplied indicates that the lights are tied into the backup generator and should operate even if the island loses its electrical supply.

Five locations on the onshore leases were also tested for lighting levels on the same night as Rincon Island. None of the locations met recommended lighting levels for safety. Lighting will be further addressed in the Electrical Audit.

2.4.11 Instrumentation, Alarm & Paging: Pressure gauges are common throughout all oil production facilities. Temperature Indicators (TI's) are used to a lesser degree. During normal operations these devices sometimes become obscured by paint or the face of the gauge is heavily weathered requiring repair or replacement. Although no action items were issued, the overall condition of gauges appeared to be marginal. Normally a high quality gauge referred to as a test gauge is used for testing. Test gauges are recalibrated at any time they appear to be incorrect or at least annually. The gauges used for monthly testing at Rincon Island were standard gauges that appeared to be correct.

The prior operator of Rincon Island purchased and installed a leak detection program for the oil pipeline termed Supervisory Control and Data Acquisition (SCADA). The company reportedly went out of business and repair / replacement parts for the system are not available. This equipment has been out of service since some time after the 2000 audit and remains out of service. The pressure safety low device is in service and serves as the minimum required leak detection device. RILP has instituted another safeguard by only shipping during daylight hours.

Venoco Pipeline purchases the oil from both Rincon Island and the onshore leases utilizing Lease Automatic Custody Transfer (LACT) units. Pipelines are routinely controlled and operated remotely from a central control center. Sensing devices to measure flow, pressure and temperature are installed in conjunction with the LACT unit. The information measured by these various sensing devices is gathered in a Remote Terminal Unit (RTU) that in turn transfers the data on-line to the control center. In addition to the Venoco control center operator monitoring oil shipments, the oil shipping pump on the Island is equipped with both high and low pressure shutdowns. As previously mentioned oil is only shipped during day light hours.

The alarm panel in the Rincon Island control room and certain alarms from the PRC 410 tank farm including several safety devices on the gas compressor are connected to the Dia-

Log paging system. The Dia-Log system allows operating personnel to be notified via pager of an Island alarm or shutdown condition when onshore or vice-versa. A cascading system next pages the Production Foreman and then others if operating personnel do not respond to a page. The Dia-Log system is tested monthly and witnessed by MRMD personnel.

The TEC Team and the ELC Team reviewed the safety systems including the Dia-Log system in detail to assess the sufficiency of the system in regard to the alarms and shutdowns.

2.4.12 ESP, Pump Units, Wellhead Equipment & Well Safety Systems: None of the wells on the Island or onshore have surface or subsurface safety valves. RILP indicates that no wells or casings are capable of flowing. Sixteen wells on the Island have electric submersible pumps (ESP); however, in the past several months only three or four have been on production due to various down hole problems. Four wells are tied into the hydraulic system which uses hydraulic fluid under high pressure to provide power to hydraulic rod pumps. Normally one or two of the rod pumps is producing with the remainder waiting on the well crew.

As a result of the previous safety audit, the ESP wells are equipped with a high pressure shutdown while the hydraulic rod wells are equipped with high and low pressure shutdowns. The ESP's and hydraulic rod wells are tied into the ESD system, and activation of the ESD shuts down all wells.

MRMD regulations require that the casing annulus pressures on each well shall be checked monthly and a record of the pressure readings shall be maintained at the facility. Lessee is required to give immediate written notification to staff of the occurrence of an anomalous pressure between casing strings in any well. The lack of a monthly log resulted in a priority three action item. (EFI 2.4.12.01)

2.4.13 Emergency Generator: Rincon Island has a 3-phase A/C auxiliary generator powered by a Caterpillar diesel engine. The auxiliary generator system is designed so that the generator automatically starts when normal power drops to below the drop-out set point regardless of whether the main breaker trips or the Edison power goes down. The generator has a 1000 gallon fuel tank which is also used by the well crew. The Production Foreman advised that the 400 gallon level is notched and fuel is never drawn below that level.

No Preventative Maintenance (PM) procedure was found to be in place for the emergency generator. Staff was advised that RILP employs contract labor to repair the generator when it malfunctions. MRMD recommends that maintenance procedures and documentation be improved. The generator driver (diesel engine) is tested each month as part of the MRMD inspection but the actual capability of the generator to provide electrical power is not determined. The emergency generator will be addressed in more detail in the Electrical Audit.

2.4.14 Compressed Air System: The Rincon Island facility utilizes a Quincy Model 512 air compressor powered by a 30 horsepower 3-phase electric motor. Staff was advised that the air compressor is approximately 1 ½ years old and there is a manual for the compressor in the control room / office. Preventative maintenance is to be performed by operating personnel.

A priority one action item was issued at the start of the safety audit because the lack of an operable air drying system on the compressed air system allowed water to accumulate in the instrument air system and compromised the integrity of the emergency shut-down system. (EFI 2.4.14.01) In an apparent cost cutting attempt, RILP installed what could basically be described as a water trap with an automatic dump valve. The effectiveness of this installation will be further assessed in the Technical Audit.

*2.4.15 Spill Containment***:** The working area of Rincon Island is paved and a secondary containment berm, which looks like a speed bump that bisects the Island, extends from the Shipping Pump Room west to the walkway area between the Gas Compressor Skid and the Variable Speed Drive Building. As a result of the 2000 safety audit, an additional secondary containment berm was added to include the Flare Scrubber and the Gas Compressor Skid in the containment area so that any fluids spilled during routine well work or rainfall in the containment area drain to the well bay. This secondary containment system appears adequate. The well bay has a pit on each end where the fluid migrates. Air pumps are used to transfer the fluid to the Wash Tank for processing. Vacuum trucks are used to skim off the accumulated oil layer from the pits as necessary. The Island tank farm is totally enclosed by block wall and has sump pumps to transfer any fluid that might flow into the sump. Additionally an 1800-foot containment boom is stored at the boat landing. Although the 500-foot sorbent boom stored on top of the Electrical Building is included in oil spill response equipment, the age and condition of this boom is questionable.

On the onshore leases the PRC 410 tank farm has an approximately two-foot high earthen berm surrounding the tank farm. Containment berms are required under EPA's Oil Pollution Prevention regulation for any facility where a spill could reach navigable waters. Typically these containment berms are designed to contain the volume of the largest vessel within the containment area plus an allowance for rainfall. The berm was worn down from apparent foot traffic resulting in a priority three action item to restore the berm. (EFI 2.4.15.01) An additional area of concern is Los Sauces Creek, which splits the property; however, RILP has utilized a 22-inch diameter casing to encase the five 3-inch oil and gas lines that cross Los Sauces Creek. The TEC Team will consider any additional measures for recommendation and the EPA required Spill Prevention, Control and Countermeasure (SPCC) Plan will be discussed in the Administrative Audit.

*2.4.16 Spill Response***:** In addition to the booms mentioned above, sorbent pads are kept in inventory while cellular phones and spill radios are maintained. Additional spill response resources include two deployment boats, a 17-foot Boston Whaler and a 22-foot Invader, stored on the boat landing. These boats are launched using a boat hoist with an electric winch. Normally Rincon Island only has one operator on duty, and the operator is also responsible for the onshore leases. To launch a response boat and deploy the containment boom in a timely manner would require at least two individuals; therefore, oil is only shipped through the pipeline during daylight hours. In the event of a spill, the operator on duty on the Island would contact the Production Foreman at the onshore production office to assist him in launching the boat and deploying the containment boom. The Operations Manual specifies a weekly checklist for each boat that is to be kept in the control room / office and made available for inspection. Clean Seas is under contract to provide resources to respond to an oil spill. Additionally Clean Seas has supplied an oil skimmer to Rincon Island and tests the skimmer monthly. A boom deployment drill for operating personnel is also held annually with Clean

Seas at Rincon Island. The Facility Response Plan will be discussed further in the Administrative Audit.

2.5 Mechanical Integrity / Preventive Maintenance Program

This section gives a general evaluation of the preventative maintenance conducted and addresses the integrity and condition of other machinery and equipment not previously covered by this report. This section also provides comments on specific areas of concern.

Typically a preventative maintenance plan for critical process equipment such as pumps and compressors is developed so that mechanical problems can be detected and remedied before failure occurs. Additionally these plans typically include an active ongoing inspection program for vessels, tanks and piping so that needed repairs can be made before any type of failure occurs. RILP has a well written Preventive Maintenance Plan developed by the previous operator that addresses tank and vessel maintenance as well as other items; however, RILP personnel were not aware of its existence prior to the audit. Previous action items addressing tank inspection deficiencies (EF&I 2.4.2.01 & 2.4.2.02) and pressure vessel inspection deficiencies (EF&I 2.4.3.01 & 2.4.3.02) resulted due to the lack of an ongoing preventive maintenance program. RILP also does not utilize any computer based maintenance program to schedule and track work orders that has become standard within the industry. As a result recent preventive maintenance records as well as corrective maintenance records for Rincon Island and the onshore leases are sketchy at best to totally nonexistent.

Electrical Audit

3.0 ELECTRICAL AUDIT

3.1 Goals and Methodology

The primary goal of the ELC Team was to evaluate the electrical systems and operations at Greka Rincon Island and Onshore Facility to determine conformance to the California Electric Code (CEC) and industry standards.

References used in review of facilities include documents published by the American Petroleum Institute (API), National Fire Prevention Association (NFPA), the State of California Electric Code (CEC) and State Lands Commission Regulations. The ELC Team review comments are primarily based on API RP 500, API RP 540, and the CEC. The drawings used in support of the audit were Electrical Single-lines and Area Classification Drawings for the Greka Rincon Island and Onshore Facility.

The ELC Matrix, Section 3.0, provides a detailed listing of the locations and items identified for correction. The matrix is organized in sections. Each section is discussed below along with examples of typical items encountered.

3.2 Electrical Area Classification

The API recommended practices 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 ELC Team review comments for all hazardous areas are based on API RP 500, API RP 540 and CEC documents.

The purpose of an Electrical Area Classification Drawing is to define the locations of boundaries and areas where specific electrical 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 insure compliance with the CEC. Electrical Area Classification Drawings are required to contain the information necessary for a qualified electrician to perform work in and around classified areas.

The addition, relocation or change in process equipment, lines and valves requires that classified areas be reassessed and that classified boundaries be redrawn. If the Area Classification drawings in some cases do not show the present conditions, all new electrical equipment purchased for installation should meet the most stringent requirements and be rated explosion-proof in accordance with the Code. After updating and revising the area classification boundaries as required by the matrix and as described below, additional equipment may be identified as unsuitable. Electrical equipment that is not suitable for installation in a classified area will need to be relocated, replaced with equipment that is suitable, purged, or non-permeable barriers will need to be installed. Enclosed and gasketed fittings are suitable for Division 2 but not Division 1. NEMA 3R enclosures are suitable for unclassified areas but not Division 1 or Division 2. Where non-explosion proof enclosures with arc producing devices are located in Class I areas, they are required to be purged and pressurized per NFPA 496.

Rincon Island:

Area Classification Drawings of Rincon Island were not available for the inspection at either the onshore office or the control room on the island. (ELC-3.2.01) Area Classification drawings from the previous Audit in 2000 were used. Changes were small and did not require drawing updating.

Onshore Facility:

Area Classification Drawings were received for the onshore facilities PRC 410 and 145. A recently installed compressor did not appear on the drawing; however, the compressor equipment conformed to the area classification requirements indicated on the drawings. The extent of the classified area was not affected by the new equipment and did not require revision.

3.3 Electrical Power Distribution System, Normal Power

3.3.1 System Configuration: Electric power for normal operations at Rincon Island is provided from the SCE substation and switchyard located on the island. One 480V service supplies the main switchboard (SCE meter #23028107) in the Electrical Building. A second 480 volt feed supplies the VSD power distribution panel in the Variable Speed Drive Building. Two 16.5kV feeds are also supplied from the Edison substation. One supplies the drilling rig while a second feeds a 1500kVA 16.5kV-480V delta-delta transformer supplying a main distribution panel in the Variable Speed Drive Building.

Electric power for normal operations at the onshore facilities is provided via SCE pole lines supplying 3-phase, 480V power to local outdoor switchracks.

Records of SCE meter service were requested for both the island and onshore facility to verify peak demand in kW for comparison with system capacity. As of this writing, the requested meter data has not been obtained and no analysis could be completed. (ELC-3.3.1.01 and ELC-3.3.1.02)

3.3.2 Electrical Single-Line: Electrical single-line drawings from the audit completed in 2000 were available for review of the Rincon Island facilities. Latest copies of single-line drawings were requested from the client. (ELC-3.3.2.01) during the audit, sizes and ratings of the switchrack equipment were recorded for later comparison to requested drawings.

One single line drawing 1918-S5G-12 was received for the onshore facilities; however, it lacked both the cable sizes and equipment descriptions necessary to evaluate the electrical system. (ELC-3.3.2.02) during the audit, sizes and ratings of the switchrack equipment was recorded for later comparison to requested drawings.

The audit focused on power distribution systems 480 V and above and excluded the lower voltage systems.

3.3.3 Equipment and Component Ratings: The normal power system capacity appears adequate for the present loads based on observation of equipment connected to the switchracks. However, actual system capacity could not be confirmed against actual power usage as meter readings were not received from the Operator. SCE records were requested in 3.3.1 above.

Much of the equipment on both the Island and onshore was reported by the operations and maintenance personnel as out of service (example the Siemens MCC-1 on the island and switchrack near the old boiler room at PRC 145). However, no signage was posted on the equipment indicating the operational status, and in one case power was still energized to an out-of-service starter. It is recommended that out-of-service equipment be either removed, or identified and tagged. All out-of-service equipment must be de-energized, including control voltages, etc. (ELC-3.3.3.01 and ELC-3.3.3.02) Additionally, out-of-service equipment must be maintained in good condition, as if in use, if it is not removed.

3.3.4 System Electrical Design Safety: Several items were noted during the inspection. The main switchgear in the Electrical Building has enclosure openings on the front that are covered in duct tape. This is not adequate protection. Openings should be covered by sheet metal plate equivalent to the enclosure or other adequate protection method. The covers shall be permanently fastened to the face of the equipment. (ELC-3.3.4.01)

The switchrack located on the exterior of the wall behind the injection pump area does not have an adequate access or egress path. In an emergency the operator would need to climb over a wall and negotiate from rock to rock along the break wall to reach the switchrack. A path (walkway or platform) is required to be provided for access to the switchrack. (ELC-3.3.4.02)

3.3.5 Grounding (System and Equipment): CEC Article 250 provides the requirements for power system grounding and bonding. The requirements for grounding are established to prevent or reduce the possibility of personnel injury due to shock hazards resulting from elevated touch potential as a result of improper grounding. The rules of grounding also contribute to reduction of equipment damage during a fault. Three specific types of grounding are required at the facilities: power system grounding, safety or equipment grounding, and static charge grounding. Transformers of separately derived ground systems are required to be solidly grounded systems 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. Bonding shall provide reliable grounding continuity from the load back to the power transformer grounding. The best way to achieve this is to include properly sized equipment grounding conductors with each set of power conductors from the source of power to each of the equipment grounding points and include bonding jumpers at points of discontinuity along the route. Equipment grounding conductors are not always installed on all circuits and bonding must then be achieved through continuity of raceways and fittings. Equipment bonding conductors to major equipment: transformers, switchgear and the like, were installed and appeared adequate.

CEC 501-16(b) requires that all liquid-tight conduit used in a hazardous area be supplemented with either an internal or external ground bonding jumper. Spot checks of the facility found these internal grounds have been included on many of the liquid-tight conduits.

3.4 Electrical Power Equipment Condition and Functionally

3.4.1 Wiring Methods and Enclosures: Given the harsh environmental conditions at and near the seashore, the overall condition of electrical equipment can be rated as fair. Metallic ferrous enclosures are corroded and require application of corrosion inhibiting paint.

Rincon Island: Several enclosures showed heavy corrosion and should be repaired or replaced. (ELC – 3.4.1.08)

In the Electrical Building, working space at the main switchgear and panels located behind the gear are blocked by oil containment equipment and other stored items that need to be relocated. (ELC- 3.4.1.01 & ELC – 3.4.1.06)

In the Variable Speed Drive Building access to several VSD controllers was blocked, and several conduit fittings were missing cover plates. (ELC – 3.4.1.02 & ELC – 3.4.1.07) Some well designation labels on VSD controllers and panel circuit breakers were loose or missing and need to be replaced and/or re-attached. (ELC-3.4.1.03 and ELC-3.4.1.04)

Some equipment identified by the operator as out-of-service was discovered to still be supplied from an undetermined source of power. Out-of-service equipment should be identified by label, isolated and/or locked out to prevent accidental activation. (ELC – 3.4.1.11 & ELC-3.4.1.12)

Onshore Facility: Most switch rack starters and equipment enclosures were in acceptable condition. Several of the switchrack mounted dry-type transformer enclosures showed excessive corrosion and should be checked by maintenance personnel for repair or replacement. Some abandoned electrical equipment was left in the working space in front of active electrical switchracks. Abandoned equipment needs to be properly disposed of or removed to a remote storage location. (ELC-3.4.1.15)

The working space in front the switchrack near the gas compressor skids is blocked by the pipe sleeper way. Since the piping cannot be moved, a style or platform will be needed over the piping to provide access to equipment on the switchrack. (ELC-3.4.1.13)

3.4.2 Safety Procedures: Safety Standards (procedures) in the operations manual found in the operator's office on Rincon Island were out of date and not complete. Maintenance work was recorded using an "annual inspection certification form". This form does not meet the requirements for lockout / tagout certification. Procedures and lockout / tagout forms need to be implemented for maintenance of the facilities. (ELC-3.4.2.01 & ELC-3.4.2.02)

No Arc-flash warning labels have been applied to equipment. No instructions or PPE requirements for Arc-flash were found during the inspection. An Arc-flash hazard assessment study and labels are required per CEC110.16. (ELC-3.4.2.03 & ELC-3.4.2.04) The safety procedures must be supplemented to include Arc-flash hazard training and work procedure requirements.

No planned maintenance schedule was found during inspection or received. Maintenance seems to be on an as-needed basis. When something breaks down it is repaired or abandoned. It is recommended that a scheduled and controlled maintenance program be implemented.

Personnel were unaware of the existence of any extension cord and portable equipment testing and labeling programs. CEC 305 identifies a maximum time constraint of 90 days for temporary cord installations. No methodology was found in the Greka literature to test, track or verify that temporary and portable extension cords meet CEC 305. It is recommended that Greka set up a testing schedule (quarterly, every 90 days) and marking system for temporary power extension cords and a method to identify when cords were last inspected for safety. (ELC-3.4.2.05)

3.5 Emergency and Standby Power

3.5.1. System configuration: Rincon Island standby power is provided by a 210-kW, 480-volt, and 3-phase diesel driven generator located in the Generator Building south of the Electrical Building and connected via 400-amp auto-transfer-switch to the "standby switchboard". The standby generator starts automatically during a total power failure or power dip to provide power to maintain the facility service including; emergency panels #1 through #5, injection pump racks, and both gas and air compressors. No operational descriptions were received as to the operation of the emergency system or to confirm events necessary to initiate a generator start. (ELC-3.5.1.02) There was no log to document regular monthly tests of the generator. A log is required.

A small UPS power supply located in the operator's office was reported to provide ride-through power for the computer and communications located within the office. No description of the UPS system or actual equipment supplied from the UPS was available. (ELC-3.5.1.03)

3.5.2 Equipment and Component Ratings: MRMD regulation 2132(g) (7) requires "an auxiliary electrical power supply shall be installed to provide sufficient emergency power for all the equipment required to maintain safety of operation in the event the primary electric power fails".

The 210kW standby generator and standby power system from observation appears adequate to the present load conditions. However, this unit or the UPS could not be confirmed to supply the alarm, control and communications systems. Documentation of the critical loads is required to confirm they are supplied from an emergency power supply.

3.5.3 Electrical System Design Safety: The electrical equipment enclosures on the backup generator show signs of heavy corrosion. Corroded equipment enclosures should be repaired or replaced. (ELC-3.5.1.01)

3.6 Electric Fire Pump System

The primary fire pump system consists of two electric submersible pumps installed side by side in casings and tied into the 8-inch fire water header running under the dock.

The backup electric fire pump is located at the south-west corner of the facility near the emergency generator building. Physical inspection found the pump to be recently upgraded and in good working order.

Control diagrams for fire pump control, operation and testing procedures were not available during the inspection.

3.7 Process Instrumentation Wiring Methods, Materials and Installation

There are no electrical schematics or diagrams available for the electrical process instrumentation systems, monitoring systems, and alarm and safety shutdown systems. The documentation was requested. (ELC-3.7.01 & ELC-3.7.02) The process monitoring has emergency generator backup.

3.8 Standby Lighting

Rincon Island: Area lighting is provided by pole mounted and building mounted floodlights. The lighting is fed from panels connected to the standby generator,

Fixtures are installed and provided in conformance with the CEC and appear to be located to provide adequate lighting levels for the tasks performed. Fixtures are appropriate types and designs for the environmental and hazardous area conditions. However, several of the fixtures are broken and many (12 of 21) have burned out lamps that require immediate replacement.

Onshore facilities: Area lighting is provided by pole mounted floodlights. Some switchracks were also equipped with a light over the rack. Many of the lights were not working and several were broken.

Lighting Survey: Outdoor lighting surveys were conducted at both Rincon Island and the onshore facility on September 1, 2007 in accordance with API RP 540 14F, table 15 of Section 9.2.3. Results of the survey were mixed. Ten of twenty areas on Rincon Island are provided with satisfactory illumination levels. None of the areas onshore met the recommended minimum illumination levels for safety. Specific recommendations are presented in the action item matrix. (ELC-3.8.01 through ELC-3.8.13)

3.9 Special Systems

The ELC Team review comments for special systems are based on API RP 500, API RP 540 and CEC documents.

*<u>3.9.1 Safety Control Systems, Electrical Shutdowns</u>***:** Safety control systems are required to be a combination of devices arranged to safely affect 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 or operation of equipment in a fail-safe condition.

<u>Rincon Island</u>: Control and Signals from field equipment are wired to two panels in the operator's office. No information was available on the operation or makeup of the safety system. Written descriptions and schematics of the process control, Haliburton control systems and ESD interface were requested. (ELC-3.9.1.01 & ELC-3.9.1.02) When this information is received, an evaluation of the safety control system may be made.

Emergency shutdown (ESD) pneumatic switches are located on the island and are tested regularly.

*<u>3.9.2 Gas Detection System</u>***:** Combustible gas detection systems, LEL and H2S, are usually employed to detect combustible gas leaks in equipment and piping, to warn personnel of explosive and toxic concentrations and to initiate remedial action.

Sixteen LEL detectors are located about the facility. These units are tested monthly and records retained. There is no H2S detection system installed at Rincon Island.

*<u>3.9.3 Fire Detection System</u>***:** Fire detection and smoke detection is usually employed to detect and warn personnel of fire and smoke conditions and to initiate remedial action.

The island fire detection system consists of twenty seven fusible plugs on a pneumatic system and three electronic self contained smoke detectors. However, no operational description as to how these tied into the safety system was received. There is insufficient information on which to make an assessment of the fire detection on Rincon Island at this time.

*<u>3.9.4 Aids to Navigation</u>***:** Pole mounted horn and rotating beacon on Rincon Island had some corrosion on the enclosures but appeared functional. It was not tested during the inspection. This section is not applicable to onshore installation.

*<u>3.9.5 Communication Equipment</u>***:** A communications interface is provided to alert personnel of a process shutdown via telephone modem. Operating personnel carry cell phones and pagers. Three numbers are auto dialed to obtain a response to a process alarm. The communications base unit is fed from normal and emergency power but not UPS power. PVC signal conduit routed along the causeway is broken at the junction of the causeway and the island and requires repair. (ELC-3.9.5.02)

*<u>3.9.6 General Alarm System</u>***:** A local beacon appears to be the only alarm or notification of an operation of a valve to shut in a well from the Haliburton Control Panel. The support for the beacon is corroded and needs repair. Operational description or system schematic is needed to evaluate this system. (ELC-3.9.5.01)

<u>3.9.7 Cathodic Protection</u>: Not addressed in this audit.

Technical Audit

4.0 TECHNICAL AUDIT:

4.1 Goals and Methodology

The goal of the Technical (TEC) Team was to evaluate the general design of the Rincon Island facility and its safety systems for compliance with current regulations, codes, and industry standards. The design review also focuses on other key equipment including the emergency shut down system, pressure relief and flare systems, combustible gas detection system, fire detection and suppression systems, spill prevention systems, and spill response equipment. Any specific design concerns that were previously identified by the EFI or Electrical Teams are also addressed on a system basis in this chapter.

The design review addresses Rincon Island separately from the onshore production areas. The design review for Rincon Island is based upon *API RP 14C* which is specified as the design requirement for Production Facility Safety Equipment and Procedures by MRMD 2132(g). A list of the other standards considered based on applicability is included in the Appendix. The codes, rules, regulations and recommended practices that are applicable establish the minimum guidelines for the safe and efficient design of these production facilites.

The review of the onshore lease facilities for PRC 410 & 145 was based upon the standards as applicable to an upland lease. The standards for upland leases are less stringent than those for Rincon Island.

Additional materials consulted in the design review included the previously verified P&ID's, the operations manual containing information on equipment controls and safety devices, unit safety information, a fire protection survey and analysis, human factors, risk management methods, process safety analyses (PHA) and existing SAFE charts for the Island facility. Action items were developed when evidence of noncompliance with significant applicable design requirements occurred. Some recommendations based on standards that are not considered a regulatory requirement, are presented only within the text of this chapter and do not show up as action items.

4.2 Offshore Production Safety Systems

The safety control system on Rincon Island is an evolution of safety control devices that have been installed on the island for decades. Some recent upgrades occurred as a result of the previous safety audit in 2000. These new safety devices and upgrades installed after the 2000 audit brought Rincon Island fully into compliance with *API RP 14C*. As the standard for the production safety systems on Rincon Island, *API RP 14C* typically provides for two levels of protection independent of and in addition to the normal process control devices. Rincon Island has this protection and these devices are tested monthly as part of the CSLC monthly testing requirements.

As an overview, operators on Rincon Island are made aware of potential emergency situations by alarms that are triggered by the production safety systems as well as combustible gas detectors and a fusible plug fire detection system. These systems warn personnel of possible fire, gas releases and other events. In addition, the detection, alarm and communications systems are continuously powered and allow personnel to communicate with others in emergency situations. Easily recognized alarm tones (fire and combustible gas) are installed to alert personnel to potential emergencies. The Electric Submersible Pump (ESP) wells on the Island are equipped with a high pressure shutdown and the hydraulic rod wells are equipped with high and low pressure shutdowns. The ESP's and hydraulic rod wells are both tied into the ESD system and activation of the ESD shuts down all wells. Tanks, pressure vessels, and pumps similarly are also equipped with safety devices

Rincon Island's Safety Analysis Function Evaluation (SAFE) chart was reviewed to determine if each tank, pressure vessel, pump or other piece of equipment was equipped with the appropriate required safety devices. The system was found to be compliant with *API RP 14C* with minor exceptions. These exceptions included some improper equipment designations, incorrect Safety Analysis Checklist (SAC) references, and incorrect alternate SAC references. (TEC – 4.2.01, 4.2.02 & 4.2.03) Other minor exceptions to compliance involved modification of required safety devices and problems related to equipment that has been taken out of service. (TEC - 4.2.04 & 4.2.05)

The general layout and design of the Island was also evaluated for the elimination of hazards and adherence to safe design concepts. A "What If" Process Hazard Analysis (PHA) PRC 1466 Rev. 7/26/01 that had been completed by the previous operator, was reviewed. It is recommended that RILP consider revalidating the PHA since it has been more than five years since it was conducted and changes have been made to the operation. Management of Change management practices have also not been followed, thus a revalidated PHA would be appropriate to provide engineering oversight and would be consistent with good oilfield practice.

4.3 Onshore Production Safety Systems

The MRMD regulation requirements for the onshore safety systems are less stringent than those for Rincon Island. These requirements predominantly consist of level alarm protection for stock tanks, as well as high and low pressure shutdowns for each well and for the gas compressor. Hazard analysis methods also identify the appropriate safeguards for other processing equipment that would be considered good industry practice. To follow the evaluation of the onshore processing equipment, a brief overview is in order.

The PRC 410 and PRC 145 offshore leases are produced from onshore locations just south of the old Pacific Coast Highway and north of U.S. Highway 101. These wells are produced by walking beam units with sucker rod pumps. All fluids are piped to the PRC 410 tank farm comprised of two wash tanks and six 500 barrel stock tanks. Production from PRC 145 wells and PRC 410 wells remain isolated from each other and produced into separate tanks. The PRC 145 tank farm is out of service. Wells on the PRC 410 lease are first routed through either a test separator or a group separator and then on to a designated wash tank before saleable oil flows to one of three dedicated stock tanks for PRC 410. When a stock tank reaches near capacity, oil flow is then switched to one of the remaining two tanks. On the PRC 145 lease one well is routed through a test separator before commingling with production from other wells. This occurs at a point just upstream of the designated wash tank. Saleable oil from the wash tank then flows to one of three dedicated stock tanks for PRC 145. Gas is shipped through a compressor to the ROSF gas plant. Oil from the stock tanks for both leases is shipped through a recently installed LACT unit to the Venoco Pipeline. The alarm system from the PRC 410 tank farm utilizes the Dia-Log Automated Alarm System to notify the operator who is normally on Rincon Island.

The safety devices required by the MRMD regulations for tanks, wells, and other equipment was found to be properly designed and installed with few exceptions. During the safety audit, a LACT unit was added along with an associated charge pump, and a downsized gas compressor used for shipping and vapor recovery. At the time, MRMD had received information relating to the LACT Unit and charge pump, but no information or documentation for downsizing the Gas Compressor had been provided. An action item was issued to provide engineering information for the downsizing of the gas compressor, its related equipment and required safety devices. (TEC - 4.3.01). The following sections address more detailed review of the safety systems.

4.3.1 Process Hazards Analysis

The previous operator conducted a "What If" Process Hazard Analysis (PHA) for PRC 410 & 145 (Rev. 7/26/01) to determine if appropriate safety devices were in place following good industry practice. The PHA was reviewed as part of this audit and there were no issues identified except that the PHA does not address changes or modifications made to the facility since 2001. It is recommended that Greka revalidate the PHA every five years and whenever significant changes are made to equipment and operations. Changes made since 2001 include the recently installed LACT Unit and the downsized gas compressor. The use of Management Of Change (MOC) methods would have triggered engineering evaluation and or hazards analysis of these changes but Greka has not actively employed MOC at this facility. The use of Management of Change and other Safety Management methods are recommended at all state offshore oil and gas lease facilities.

4.4 Wellheads, Surface & Subsurface Safety Valves

None of the wells on Rincon Island or the onshore leases are equipped with either surface or subsurface safety valves. Surface and subsurface safety valves were not required when the wells were drilled and are not currently required because the wells are not capable of free flow once artificial lift is stopped. Carbon steel with standard trim has been utilized for wellhead valves and piping since H_2S is not present.

4.5 Safety Devices on Vessels & Tanks

Both pressure vessels and tanks at the Rincon Island and onshore locations have a history of safe operation. Pressure vessels within RILP facilities have the ASME required pressure relief devices and are equipped with vapor recovery, as well as the other level and pressure safety devices called for by the SAFE chart for the island or the onshore facility PHA. The condition and maintenance of these pressure relief devices are further addressed in section 4.6.

All atmospheric tanks including the stock tanks are equipped with the appropriate safety devices and required systems including pressure-vacuum relief valves, vapor recovery system, and LSH devices. Stock tank LSL's are used as a safety device to shut-off the LACT charge pumps and to prevent gas blow-by. The high and low-level alarms installed on the stock tanks are properly installed and tested as required. The secondary containment is addressed in Sections 2.4.15 and 4.14. One action item was issued onshore. It asked to clarify the purpose and operation of an open valve located in the piping for the PRC 145 stock tank bottoms and is used to draw off accumulated water. The valve in question was labeled NC on the P&ID's. Prevention of accidental oil overflow also needs to be clarified regarding this valve. (TEC – 4.5.01)

4.6 Pressure Relief Valves

Pressure relieving devices are installed to ensure that a process system or any of its components are not subjected to pressures that exceed the maximum allowable working pressure of the vessel. These devices are designed to open and relieve excess pressure during operational upsets, external fires and other hazards, and to reclose, preventing further flow of fluid after normal conditions have been restored. The size and design of a pressure relief device is determined by the overpressure protection that may be required by the process equipment. A properly designed, installed and maintained pressure-relieving device is essential to the safety of personnel and the protection of equipment. Inspections were evaluated and addressed in Section 2.4.4. As with other older installations, the relief valves and associated piping were sized for a much higher production rate than presently exists. All tanks and pressure vessels were properly equipped with these devices as previously noted.

The set points of both the onshore shipping pump and the Rincon Island shipping pumps were determined to be higher than the MAWP of the pipelines resulting in two priority one action items. (TEC – 4.6.01 & 4.6.02) Another instance was discovered during the safety inspection where the set pressure for the relief valve on the Rincon Island Gaso Injection Pump was higher than that shown on the P&ID's. Because no documentation could be found regarding the increased pressure setting, an action item was issued to provide engineering justification that all safety and reservoir protection requirements had been met with the increased pressure setting. (TEC – 4.6.03)

4.7 Relief and Flare System

In the event of over pressure on any of the vessels on Rincon Island, gas will relieve into the relief system via pressure safety valves and be carried to the Vent Scrubber before flowing to the Flare Scrubber. Any liquids will be returned to the Wash Tank by level control, and gas will be released by pressure control to the main 4-inch flare for combustion. The flare system also has a 3-inch flare line that was designed for use if the 4-inch flare line required maintenance or became blocked. Should the pressure in the relief system continue to raise, pressure safety valves on both the Vent Scrubber and Flare Scrubber relieve into the 3-inch flare line.

The analysis of the system included the sizing of PSV's and the safe disposal of relieved gas and liquid hydrocarbons through the vent and flare scrubbers to the flare stack. The location of the flare stacks pose minimal or no risk to personnel. Analysis of the relief system concluded that there is more than sufficient capacity so that the backpressure imposed by multiple pressure relieving devices, at full header load, will not exceed acceptable levels.

4.8 Fire Detection System

Primary fire detection for the Rincon Island facility relies on a fire detection system consisting of twenty-seven fusible plugs installed at every electric motor, pump and vessel on the Island, as well as by visual fire detection and observation by operating personnel. The fusible plug detectors melt in the event of a fire causing depressurization of the pneumatic control loop that both activates the fire pump and triggers the ESD system, which in turn, shuts down or de-energizes all equipment. In addition, sixteen combustible gas detectors have the ability to shutdown the facility at predetermined flammable vapor levels. Smoke detectors are also located in the control room / office, change room and lab. All of these systems are tested monthly and witnessed by MRMD personnel.

There is no fixed fire protection installed or required on the onshore leases.

4.9 Fire Suppression System

The function of the fire suppression system is to reduce the effects of a fire on a production facility by limiting the fire within fire barriers, cool the equipment and structures, reduce the oxygen supply and stop the fire by shutting off the fuel supply. The fire fighting and protection systems used within the Rincon Island facilities consist of fire water, a foam monitor system and dry chemical fire extinguishers.

Fire Water System:

The Rincon Island fire water fighting system consists of a loop system supplying water to hose reels, a deluge system with sprinklers running the entire length of the well-bay and two fixed monitor foam stations. The primary firewater system consists of two side by side electric submersible pumps installed in casings extending from the boat landing into the ocean water below. These casings tie into the 8-inch firewater header, and both pumps are operated simultaneously. The secondary fire pump is a vertical turbine electric pump also located on the boat landing and can be run off either the main power supply or the standby diesel generator. Depending upon the switch position settings either the primary system, secondary pump or both systems will automatically start when activated manually or by the pneumatic fire loop system. Initial flow tests of the system hydraulics, by a private fire protection engineer (Collings & Associates), showed that the fire pumps had the capacity to supply the monitor stations with adequate flow and pressure. As previously noted in the EF&I section weekly fire pump test results were not meaningful without recorded pump pressures for comparison purposes, and the lack of annual flow tests further compounded the problem. In addition to instituting a meaningful weekly testing program, staff recommends that monthly testing of the well-bay deluge system consist of running the primary system and the secondary pump independently of each other to visually verify that both are capable of supplying adequate fire water to the deluge. Since only the secondary fire pump can be run utilizing the standby electric generator, staff recommends that the secondary fire pump be tested independently every six months using only the power supplied by the standby generator.

The fire suppression system for the onshore leases utilizes fire hydrants tied in to the municipal system, hose stations, and two stationary foam monitors. There appears to be adequate water supply and pressure. The system appears to meet all of the requirements for an upland lease and has been examined periodically by the local fire authority.

Foam System:

The Rincon Island foam monitor system has two foam nozzle monitor stations and appears to provide adequate coverage for the Island. Foam stored in trailer mounted bulk tanks also appears adequate. These bulk tanks could also be moved to the onshore leases for use in an emergency. The two stationary foam monitors onshore also appear satisfactory.

Portable Extinguishers:

Fire extinguishers are strategically placed throughout Rincon Island as well as the onshore leases. Inspection labels on the extinguishers are up-to-date and inspections records are available. Operating personnel have the option of extinguishing a small fire, but they also rely on the Ventura County Fire Department with a fire station located adjacent to the onshore leases and approximately 2 miles from the Rincon Island facility with a response time of approximately 15 minutes or less.

4.10 Combustible Gas Detection and Alarm System

Gas detector systems are typically required in areas where adequate ventilation cannot be achieved or in areas where operating personnel are frequently in attendance, such as living quarters, offices and switchgear rooms. Such a system should alert personnel by audible and/or visual alarms at low gas concentrations and initiate action to shut off the gas source before the concentration reaches the lower explosive limit. Rincon Island's combustible gas detection system appears to meet all of the requirements specified in the latest edition of *API RP 500* and complies with MRMD regulations for offshore installations.

Rincon Island is equipped with sixteen (16) fixed gas Lower Explosive Limit (LEL) detectors to meet requirements. The design and installation of Rincon Island's gas detection (ASH) system meets MRMD regulations and alerts personnel to the presence of low-level concentrations (25% lower explosive limit, LEL) of flammable gas / vapor by both an audible and visual alarm. As the concentration of the gas approaches 50% of the LEL, shut down of all sources of ignition occurs and the firewater pump is started. All gas detection instruments are tested monthly or in accordance with *MRMD regulation 2132(g) (1) (F)* and witnessed by MRMD personnel. Maintenance histories and test results were available

4.11 H_2S Detection & Alarm System

MRMD regulations require automatic hydrogen sulfide gas detection and alarm systems on offshore installations when production is know to contain H_2S. RILP personnel have advised that previous oil and gas samples from both Rincon Island and the onshore leases have been H_2S free, and therefore no H_2S detection system is required.

4.12 Auxiliary Electrical Power Supply

Auxiliary electrical power supplies are normally installed for all electrical equipment required to maintain safety of the operation in the event the primary electrical power supply fails. Covered safety equipment includes any detection, alarm, safety shutdown, emergency lighting, safety system equipment such as fire pumps, and the emergency shut down (ESD) system.

MRMD Regulation 2132(g)(7)(A) requires that an auxiliary electrical power supply be installed for all electrical equipment required to maintain safety of the operation in the event the primary electrical power supply fails. This requirement applies to offshore platforms and upland facilities serving these leases. The covered safety equipment includes the previously referenced equipment.

Emergency power for Rincon Island includes both an auxiliary generator and a small UPS system located in the control room / office for computer and electronic controls. The safe shutdown of the facilities is accomplished primarily through the use of a pneumatic ESD system and not the computer controls. The auxiliary generator at Rincon Island is diesel driven and starts automatically in the event of a power outage. Staff was advised that the generator supplies power to essential safety systems including the air compressor, area lighting, the Dia-Log Automated Alarm System and the secondary fire pump. Written documentation pertaining to the auxiliary generator is limited at best. The electrical audit will address any issues with the auxiliary generator.

4.13 Compressors, Shipping Pumps & Pipelines

Offshore pipelines transport liquids and gases between the offshore platform or islands and an onshore facility. Overpressure and leak detection is accomplished through the use of PSH and PSL sensors as a minimum requirement. These PSH and PSL sensors are required on all departing pipelines to shut off all input sources from the offshore installation by *API RP 14C* and MRMD regulations.

The oil and gas pipelines from Rincon Island run over the causeway to shore and are equipped with PSH and PSL safety devices to detect leaks and prevent over pressuring of these departing pipelines. Both of these pipelines are also equipped with appropriate shutdown valves. The PSH and PSL devices are tested monthly at MRMD witnessed inspections in accordance with *MRMD 2132 (g) (1) (B)*. One priority two action item was issued because the PSH set point on the Rincon Island oil shipping line exceeded the recommended maximum set point. (TEC – 4.13.01) Other proactive measures to reduce the risk of oil and gas leaks from these pipelines include the required cathodic protection system for the buried portions, hydrostatic testing, weekly pipeline inspections, a recently added block valve installed at the head of the causeway for pipeline isolation, and oil shipments only during daylight hours.

Onshore pipelines are to be designed, constructed, tested, operated and maintained in accordance with “good oil field practice” (CCR 1774). Accepted industry practices point to constant re-evaluation of safety systems to minimize spill volume in the event of a leak. One proactive approach utilized onshore is the 22-inch section of casing extending across Los

Sauces Creek that encases five 3-inch gathering and test lines to minimize the chance of any hydrocarbons leaking into the creek. The Venoco Pipeline Remote Terminal Unit (RTU) on the LACT unit also offers additional protection against oil spills.

4.14 Spill Containment

The Tech Team evaluated the secondary containment volumes available at Rincon Island and the PRC 410 tank farm at the onshore leases and found them to be adequate for meeting the spill control and containment (SPCC) regulations. The containment area for the Island stock tanks will contain more than the volume of the largest tank plus the recommended allowance for precipitation. History has shown that the containment volume provided by the Island well bay has been sufficient for containing spills and rainwater runoff from the other production areas of the Island. Onshore, the containment volume of the PRC 410 tank farm requires a minimum two foot high containment berm. This volume was reviewed and determined to be adequately sized. There were no other spill containment design issues.

Administrative Audit

5.0 ADMINISTRATIVE AUDIT

5.1 Goals and Methodology

The goal of the administrative audit (ADM) team was to verify the availability of and review the manuals, programs, procedures, and records required by Federal, State and local authorities as well as adherence to applicable industry standards. The Operations Manual and the Facility Oil Spill Response Plan for Rincon Island and the onshore facilities were carefully reviewed for adherence to these requirements and standards as detailed below. The latest hardcopy versions of both the Rincon Offshore Oil Field Manual dated November 2003 as well as the Facility Response Plan Volume 1: Response Manual and Volume 2: Contingency Planning Information were reviewed in the MRMD offices in Long Beach. Other required or associated plans, manuals, policies, and documents that are needed for proper and safe facility operations were also reviewed at RILP's onshore production office as well as observing the application of policies and procedures at the facility.

5.2 Operations Manual

The Rincon Offshore Oil Field Manual was revised by the previous operator of RILP as part of the previous safety audit in 2000. Although updates for various sections are required due to the change in ownership, the manual is very complete, well prepared and meets the requirements for an operations manual outlined in MRMD Regulation 2175. Unfortunately it appears that the RILP management and operating personnel are unfamiliar with this manual and tend to not use or follow the procedures within.

Copies of the Rincon Offshore Oil Field Manual were located in the Rincon Island control room / office and in the onshore production office and were easily accessible to personnel. A detailed review of this manual was conducted against the standards contained in MRMD Regulation 2175 pertaining to manual content. The Rincon Offshore Oil Field Manual followed the MRMD regulation format in that it was arranged in a logical manner including a table of contents, numbered pages and tabs for quick and easy access. MRMD requirements also include specific information as to the equipment located within each facility, safe operating practices for the equipment, facility startup and shutdown procedures, and emergency procedures. The manual provides sufficient information regarding the Systems Safety and Automatic Control Systems as well as information pertaining to training, equipment and procedures. The Operations Manual includes information for each production flow stream, including operating pressures, quantities, temperatures, properties, capacities and physical size, pressure and temperature ratings for all equipment in written form.

Some contact information had not been updated or was incorrect. The Qualified Individual and Alternate in Section 2 of the operations manual were incorrect and resulted in a priority three action item. (ADM 5.2.01) Failure to update staff, chain of command and employee qualifications in Section 4 of the manual also incurred a priority three action item. (ADM 5.2.01) Other items resulted from failure to update specific operating procedures both onshore and on Rincon Island resulted in two additional action items. (ADM 5.2.03 & 5.2.04)

The Personnel Safety Section of the operations manual regarding protective equipment clearly states that steel toed boots are required for operating personnel at these facilities. This policy is in accord with Cal OSHA standards and is comparable to the safety policies of other state lease operators. Currently, Greka is not following their manual nor advocating the proper use of safety footwear at this facility. A priority two action item was previously issued by the EF&I team regarding this Safety & Personal Protective Equipment issue that is addressed in the operations manual.

It was also noted that there is a Management of Change (MOC) Section included in the operations manual. There have been no MOC reviews conducted for any of the equipment changes that have been made to the facility since 2001 and it appears that MOC methods are not currently implemented or employed by Greka.

5.3 Spill Response Plan

The Rincon Island and Associated Leases Facility Response Plan Volume 1: Response Manual and Volume 2: Contingency Planning is an extensive plan that, as the name implies, includes both Rincon Island and the onshore leases and was designed to fulfill the requirements for an Oil Spill Contingency Plan required by California state regulations and for a Facility Response Plan required by federal regulations

An Oil Spill Contingency Plan is a written document that includes a copy of the California Certificate of Financial Responsibility (COFR) and provides for an incident command system, provides procedures for reporting oil spills, describes communication plans, describes protection strategies, identifies an oil spill responder (OSRO), identifies a qualified individual (QI), identifies an agent for service of process, and is certified by the plan holder's management for authority to implement the plan as well as to the plan's accuracy, feasibility, and executability as required by California Department of Fish and Game, Office of Spill Prevention and Response (OSPR) regulations, CCR Title 14, Regulation 817.02.

A Facility Response Plan is required of any non-transportation related facility that, because of its location, could reasonably be expected to cause substantial harm to the environment by discharging oil into or on the navigable waters or adjoining shorelines per Title 40 CFR Section 112. The Facility Response Plan is coordinated with the Federal Spill Prevention, Control, and Countermeasure (SPCC) Plan. The SPCC Plan will be addressed in Section 5.4.

RILP's Facility Response Plan was found to be comprehensive and in a clear format. The plan contained the following required content:

- Facility description
- Hazards Evaluation Study and potential worst case spill scenario evaluation
- On-water containment and recovery procedures
- Shoreline protection and clean-up
- Response procedures

The Facility Response Plan was thoroughly reviewed using MRMD checklists developed from the regulations to verify detailed content requirements. The Facility Response

Plan was found to adequately address the policies and procedures to prevent, evaluate, contain, mitigate, and review the effects of unauthorized discharges. The procedures outlined within the manual included:

- On-water Containment and Recovery of Oil Spills
- Notification, Spill Response and Cleanup
- Shoreline Protection and Cleanup
- Waste Management Procedures
- Wildlife Care and Rehabilitation Procedures
- Hazardous Materials Communications and Training Program

The ADM Team reviewed and determined that the Facility Response Plan contained the required information and was presented in a clear format.

There were eight priority three action items identified due to the failure to properly update the plan. Copies of the certificates of financial responsibility (COFR) in the plan were ones that had expired 9/30/03. (ADM – 5.3.01) The Qualified Individual and Alternate were not up to date with a current employee. (ADM – 5.3.02) The Agent for Service of Process was out of date. (ADM – 5.3.03) The plan was not certified by an executive with the plan holder's management, to provide authority to implement the plan. (ADM – 5.3.04) The plan also needed to be certified by the plan holder's management for accuracy, feasibility, and executability. (ADM – 5.3.05) The Certificate of Contractual Services from Clean Seas needed to be updated with a current contract certificate. (ADM – 5.3.06) The Emergency Response Team needed to be updated with currently available employees. (ADM – 5.3.07) The Safety Training Logs & Schedules also needed to be updated. (ADM – 5.3.08)

5.4 Required Documents & Records

Regulatory agency required documents are available at the onshore production office. These documents include the aforementioned Rincon Offshore Oil Field Operations Manual as well as the Rincon Island and Associated Leases Facility Response Plan Volume 1: Response Manual and Volume 2: Contingency Planning. Also in place are the Preventive Maintenance Program and an Illness & Injury Prevention Plan.

The required Spill Prevention, Control and Countermeasure (SPCC) Plan is a cornerstone of the Environmental Protection Agency's strategy to prevent oil spills from reaching the nation's waters. An SPCC Plan could not be located, yet is required to be prepared in accordance with good engineering practices and clearly address operating procedures that prevent spills, control measures installed to prevent a spill from reaching navigable waters, and countermeasures to contain, clean up, and mitigate the effects of an oil spill that reaches navigable waters. The SPCC Plan must also include a demonstration of management's approval and must be certified by a licensed professional engineer. Because there was no Spill Prevention, Control and Countermeasure (SPCC) Plan available for Rincon Island or the onshore leases, two priority three action items were issued. (ADM - 5.4.01 & 5.4.02)

5.5 Training, Drills & Applications

RILP safety representatives indicated that Greka Energy has an ongoing training program for Greka personnel in the Santa Maria area. There is however, no program available for RILP operating personnel to receive initial or annual refresher training as required by Cal OSHA regulations. This training includes: confined space entry, oil spill drills, hazardous communications, HAZWOPER, hot/safe work permitting, H_2S, lockout / tagout, and personal protective equipment. A priority three action item was incurred as a result. (ADM - 5.5.01)

Although some RILP operating personnel have received T-2 training in Production Facility Safety Equipment and Procedures based on API RP 14C, the more recent employees have not received this training. RILP is the only operator of state leases that does not have a comprehensive ongoing T-2 training program in place for offshore facility operating personnel.

The Audit staff was advised that some employees have received DOT training in pipeline operations. A majority of these training courses are computer based and are required for pipelines under DOT jurisdiction although most operating companies have now incorporated them into their standard training matrix.

Staff was further advised by RILP management that monthly safety meetings were being conducted although no written documentation regarding topics or participation was furnished. Operating personnel subsequently advised Staff that overtime pay to attend safety meetings had been eliminated, thus company safety meetings were normally limited in attendance to the sole operator on duty.

Safety orientations for first time visitors to Rincon Island do not appear to be occurring. Again, It is standard practice with other operators of state leases, to have an orientation and safety training program in place for first time visitors, and in particular for contract employees. Several other operating companies now utilize videos and testing before any work commences. Similarly there was no evidence that any tailgate safety meetings were occurring for contractors It is recommended that Greka implement these standard industry practices to help reduce the likelihood of an accident or incident.

Human Factors

6.0 HUMAN FACTORS AUDIT:

6.1 Goals of the Human Factors Audit:

The primary goal of the Human Factors Team 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 be conducted following audits of the three state lease facilities. Results of this team's work will be considered confidential between CSLC, and Rincon Island Limited Partnership 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), and
- Investigation and Audit (9).

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

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

6.2 Human Factors Audit Methodology:

The CSLC Mineral Resources Management Division will schedule the SAMS interviews with the operator's staff and sub-contractors in coming months. The assessors will evaluate the responses based on SAMS guidelines and develop a separate confidential report for the operating company. The MRMD staff will provide the confidential report accompanied by a formal presentation that summarizes the report.

Appendices

TEAM MEMBERS

EQUIPMENT FUNCTIONALITY AND INTEGRITY TEAM

CSLC – MRMD	Mark Steinhilber P.W. Lowry Daryl Hutchins
RILP	Richard Zavala Al Wedderburn Rick Ward

TECHNICAL TEAM

CSLC – MRMD	Mark Steinhilber P.W. Lowry Daryl Hutchins
RILP	Richard Zavala Al Wedderburn Rick Ward

ADMINISTRATIVE TEAM

CSLC – MRMD	Mark Steinhilber P.W. Lowry Daryl Hutchins
RILP	Richard Zavala Al Wedderburn Rick Ward

ELECTRICAL TEAM

Power Engineering Services (PES)	Doug Effenberger Larry Collins
RILP	Richard Zavala

ACRONYMS

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

REFERENCES

GOVERNMENT CODES, RULES, AND REGULATIONS

Cal OSHA — California Occupational Health and Safety

3215	*Means of Egress*
3222	*Arrangement and Distance to Exits*
3225	*Maintenance and Access to Exits*
3308	*Hot Pipes and Hot Surfaces*
3340	*Accident Prevention Signs*
5189	*Process Safety Management of Acutely Hazardous Materials*
6533	*Pipe Lines, Fittings, and Valves*
6551	*Vessels, Boilers and Pressure Relief Devices*
6556	*Identification of Wells and Equipment*

CCR — California Code of Regulations

1722.1.1	*Well and Operator Identification*
1774	*Oil Field Facilities and Equipment Maintenance*
1900-2954	*California State Lands Commission, Mineral Resources Management Division Regulations*

CFR — Code of Federal Regulations

29 CFR	*Part 1910.119 Process Safety management of Highly Hazardous Chemicals*
30 CFR	*Part 250 Oil and Gas Sulphur Regulations in the Outer Continental Shelf*
33 CFR	*Chapter I, Subchapter N Artificial Islands and Fixed Structures on the Outer Continental Shelf*
40 CFR	*Part 112, Chapter I, Subchapter D Oil Pollution Prevention*
49 CFR	*Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standard*
49 CFR	*Part 195, Transportation of Liquids by Pipeline*

INDUSTRY CODES, STANDARDS, AND RECOMMENDED PRACTICES

ANSI American National Standards Institute

B31.3	*Petroleum Refinery Piping*
B31.4	*Liquid petroleum Transportation Piping Systems*
B31.8	*Gas Transmission and Distribution Piping Systems*
Y32.11	*Graphical Symbols for Process Flow Diagrams*

API American Petroleum Institute

RP 14B	*Design, Installation and Operation of Sub-Surface Safety Valve Systems*

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

ASME — American Society of Mechanical Engineers

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

ISA — Instrument Society of America

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

	S12.13	*Part II, Installation, Operation, and Maintenance of Combustible Gas Detection Instruments*
NACE		National Association of Corrosion Engineers
	RPO169	*Control of External Corrosion on Underground or Submerged Metallic Piping Systems*
NFPA		National Fire Protection Agency
	20	*Stationary Pumps for Fire Detection*
	25	*Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*
	70	*National Electric Code*
	704	*Identification of the Hazards of Materials for Emergency Response*
CEC		California Electric Code