HSS-302 Radiation Protection

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1.0 INTRODUCTION

1.1 Purpose

HSS-302 provides procedures that Marathon and contract employees must utilize when engaged in activities working with or around any radiation sources to keep exposure to radiation As Low as Reasonably Achievable (ALARA).

HSS-302 outlines the regulatory obligations that must be addressed in order to possess and use both radioactive materials and radiation (X-ray) machines.

1.2 Scope

The procedures and information apply to all Marathon employees and contractors.

2.0 REFERENCES

Applicable requirements in the latest edition (or the edition indicated) of the Confined Space Procedure / Standing Instruction and the Isolation , shall be considered an integral part of this Practice. Additional references are listed below. Short titles will be used herein when appropriate.

2.1 Marathon Procedures and Standards

- LAR Carson F/S 305, Confined Space
- LAR HSS-008, Control of Hazardous Energy

MPC HES&S HLT-2016, Radiation Safety Program Management

2.2 Government Regulations

- Title 17 California Code of Regulations, Chapter 5, Subchapter 4. Radiation
- Title 8 California Code of Regulations, Group 14, Radiation and Radioactivity
- 10 Code of Federal Regulations, Part 20, Standards for Protection against Radiation
- Radioactive Material License, number 1364-19, California Department of Public Health
- Radiaoctive Material License, number 0078-19, California Department of Public Health
- United States Nuclear Regulatory Commission, NRC Directive "Increased Controls"

3.0 DEFINITIONS

The following additional definitions and terms associated with safe utilization of sources of radiation are applicable to this Standard.

Table 1 Definitions and Terms

Term	Description
Owner	Marathon
Parent Document	The Specification, Practice, or Industry Standard used as the basis for the process being defined.
As low as reasonably achievable (ALARA)	An approach to radiological control or process to manage and control exposures (individual and collective) to the work force and to the general public at levels as low as is reasonable, taking into account social, technical, economic, practical and public policy considerations.
Background radiation	Radiation from cosmic sources; naturally occurring radioactive materials which have not been technologically enhanced, including radon (except as a decay product of source or special nuclear material; consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation; and global fallout as it exists in the environment from the testing of nuclear explosive devices. "Background radiation" does not include radiation from materials regulated by the NRC.
General License	A document issued by the Radiologic Health Branch (RHB) to allow a person or organization to acquire, use, or possess a device that utilizes a radioactive material (e.g., a level gauge, an alloy analyzer) through an authorized transfer by the device manufacturer/distributor.
Increased Controls Directive	The Nuclear Regulatory Commission has established a quantity limit for selected radioactive materials which a license holder can possess without additional controls in place to secure them. The RSO uses this information at the time of purchase to make known whether additional controls must be a part of a project associated with obtaining new radioactive material sources.
Member of the Public	An individual who is not occupationally exposed to radiation or radioactive material. Refinery employees (with the exception of the Radiation Safety Officer and Altenates) are considered "members of the public" for the purpose of Radiation regulations.
mR (millirem)	A measure of radiation dose to the body. This term is more commonly cited than "rem" (see below). One thousand millirem (1000mR) is equal to one rem (1 rem).
NORM	"Naturally Occurring Radioactive Material", which may be found in petroleum as it is extracted from the ground. NORM may be present in some scale build-up in pipes or vessels.
Nuclear Regulatory Commission (NRC)	The NRC is the regulatory agency charged with the establishment of rules to regulate the use of radioactive materials which ensure the protection of public health and safety.
Occupationally Exposed Individual	The Radiation Safety Officer (RSO) and Alternate Radiation Safety Officer (ARSO) are considered occupationally exposed individuals. Licensed contractors who handle radioactive material while performing their essential job duties, e.g., radiography, relocating and adjusting gauges that contain a radioactive material, are considered occupationally exposed individuals.

Table 1 Definitions and Terms

Term	Description
Radiation	Ionizing radiation includes alpha and beta particles, gamma and X-rays and fast neutrons
Radiation Machine	A device capable of producing radiation when in operation, (e.g., contains an X-ray tube). A radiation machine is NOT a device that produces radiation by use of radioactive material.
Radioactive Material	Includes activated material, sealed and unsealed sources, and material that emits radiation spontaneously. For compliance with Department of Transportation regulations, material with a specific activity greater than 0.002 microcuries per gram. Includes any material, equipment or system component determined to be contaminated or suspected of being contaminated with nuclides undergoing radioactive decay.
Radioactive Material Licenses (number)	LAR maintains licenses to operate equipment that contains a radioactive material; a specific license and a general license. LAR-C (FAC1364-19) and LAR-W (FAC0078-19) each have a specific license. Appendices A and B list the locations of the equipment that are specifically licensed. Compliance with the provisions stipulated in the license are of paramount importance in LAR's ability to possess radioactive materials. The general license (GLD 27) incorporates equipment at LAR as a whole. See Appendix D. A copy of each license is posted on the LAR SharePoint site under EHS > Health > Radiation
Radiologic Health Branch	A division of the California Department of Public Health (CDPH) which regulates the possession and use of radioactive materials (under both specific and general licenses) and radiation (X-ray) machines.
Radiation Protection Program (RPP)	A documented methodology for compliance with regulatory requirements for radiation protection.
Radiation Machine (X-ray) Registration	LAR must register with the RHB any purchased equipment that contains an X-ray tube. Registration must occur within 30 days of purchase. LAR's current inventory is listed in Appendix C. A process to ensure X-ray equipment is registered in a timely manner is shown in Appendix F chase.
Radiation Safety Officer (RSO) and Alternates (ARSO)	Persons, who by a combination of training and experience, have particular knowledge in radiation safety issues, and are therefore designated by Marathon as a resource for concerns and advice on nuclear materials and radiation safety. The RSO is John Sullivan. The ARSO is Sharon Callahan.
Rem	A measure of radiation dose to the body. Per the NRC, the maximum permissible dose of radiation to the whole body that a person may receive in a year is 5000 millirem for occupationally exposed

Table 1 Definitions and Terms

Term	Description
	individuals, and 100 millirem for a member of the public (considered non-occupationally exposed).
Reportable sources of radiation	Include: (1) Machines capable of producing radiation when installed and in operation (2) Amounts of radioactive material present in devices designed and manufactured for the purpose of detecting, measuring, gauging, controlling thickness density, level, leakage or qualitative or quantitative chemical composition as specified in the licensing regulations.
Restricted Area	An area is designated as restricted when access to said area is controlled as a means to protect persons from exposure to radiation in excess of the allowable level. An area barricaded by a radiography crew would be considered a "restricted area". The barricade tape ensures no person outside the barricade tape receives an exposure in excess of two (2) millirem in an hour
Sealed source	Radioactive material that is contained in a sealed capsule that is further sealed between layers of nonradioactive material (i.e., a source housing). The confining barriers prevents dispersion of the radioactive material under normal and most accidental conditions related to use of the source.
Specific License	A document issued by the Radiologic Health Branch (RHB) to allow a person or organization to acquire, use or possess a device that utilizes a radioactive material (e.g., a level gauge) through an authorized transfer by the device manufacturer/distributor. A specific license imposes stricter requirements than a general license. See "Radioactive Material License" above.
Unrestricted Area	An area is designated "unrestricted "when access to said area is not controlled as a means to protect persons from exposure to radiation from radioactive materials. Please note: No person in an unrestricted area shall receive a dose of radiation that exceeds 2 millirem in any one hour OR 100 millirem in seven (7) days. No fetus of a declared pregnant woman shall be exposed to a dose of radiation in excess of 500 millirem during its term as a result of exposure to the mother.
Wipe Test	An analytical testing method performed to determine whether radioactive material is present on the source housing, which would indicate a leak from the sealed radioactive material source. Wipe tests are performed twice per year.

4.0 RESPONSIBILITIES

4.1 Radiation Safety Officer and Alternates

a. Ensure that all applicable LAR licenses are maintained current and accurate.

b. Ensure that all radiation sources are inspected at a minimum of every six (6) months by either the RSO or the radiation contractor. Inspection to include a shutter check. Ensure source holders are labeled appropriately.

c. Source surveys to assure adequate shielding (by contractor)

d. Wipe tests to detect possible leakage of the source (by contractor)

e. Addition of new sources to the inventory. Ensure addition of new sources is compliant with NRC "Increased Controls" directive.

f. Appropriate notification to applicable agencies

g. Ensure proper storage and installation of sources (by the RSO)

h. Isolate radiation as a source of hazardous energy prior to entry into a vessel to which a radiation source is attached (e.g, close and lock shutter)

i. Re-energize a radiation source (i.e., remove lock and open shutter)

j. Maintain records and documents related to radiation management program. Provide Operations with the postings required in 4.3 (g).

k. Review the Radiation Management Program on an annual basis and maintain the annual review summary.

l. The RSO is John Sullivan. The ARSO is Sharon Callahan.

4.2 All Personnel

Complete their required radiation safety training, and maintain a general awareness of the location of radioactive materials and radiation (X-ray) machines, and the potential hazards that these materials and equipment can cause if not handled properly.

4.3 Owners and Potenial Owners of Radiation Equipment

a. Notify the Radiation Safety Officer of the intent to purchase or remove from use a device (e.g., level gauge, density meter, alloy analyzer) that contains a radioactive material. The radioactive materials license and general license must be kept up-to-date to reflect current inventory.

b. Notify the RSO when a radiation (X-ray) machine (e.g., X-ray spectrometer, alloy analyzer). will be purchased, relocated or replaced. The Radiation (X-ray) Machine registration must be kept current. A new radiation (X-ray) machine must be registered within 30 days of purchase.

c. Contact the RSO when a radiation (X-ray) machine is no longer needed. The X-ray tube MUST be disposed of properly, not as industrial waste.

Note: See **Appendix F** when planning to obtain equipment that produce radiation.

4.4 Operations

(Operators/ Supervisors) are responsible for:

a. Ensuring a gauge that contains a radioactive material source is included in the equipment isolation plan, as appropriate, per HSS-008 "Control of Hazardous Energy" for general maintenance and turnaround situations. Providing the RSO (or ARSO) with an isolation tag for each source, when isolation of the radioactive material source is required.

b. Contacting the RSO / ARSO when a radioactive material source in a fixed gauge needs to be isolated and de-energized.

c. Conducting a job walk with a radiographer to ensure that all points of access (e.g., stairways, ladder cages) into the restricted area have also been barricaded to prevent entry, prior to the initiation of radiographic work (i.e., exposing a radioactive material source).

d. Ensuring work occurring simultaneously with radiography (SIMOPS) does not occur within the area barricaded for radiography.

e. Communicating with Operator(s) in an adjacent unit(s) should a barricade established for radiography extend into their operating area(s).

f. Identifying for radiographers any measurement indicating devices that are known or suspected to be impacted by radiation released during radiography.

g. Maintaining the posting of signage required under Radiation Safety Regulations, which include:

- Warning signs that read CAUTION: RADIOACTIVE MATERIALS are posted at locations within operating areas on equipment and pipelines, by the probes and gauges where radioactive materials are used.
- Warning signs that read CAUTION: X-RAYS are posted in areas where radiation (X-ray) machines are operated.
- Department of Public Health (CDPH) Form RH-2364, "Notice to Employees" regarding their rights under the California Radiation Control Regulations are posted in locations where reportable sources of radiation are used.

4.5 Quality Assurance Laboratory Personnel

Technicians and chemists working at the Quality Assurance Laboratory are responsible for:

a. Ensuring that a radiation machine (i.e., instrument that contains an X-ray tube) is used only by persons specifically trained in its safe handling.

b. Notifying the Radiation Safety Officer of any changes in the status (e.g., purchase, sale, re-location, removal from service, etc.) of their inventory of radiation machines on a monthly basis.

c. Following the protocol outlined in Appendix D when purchasing, repairing or removing a radiation (X-ray) machine.

4.6 Users of Alloy Analyzers

Alloy analyzers used for the purpose of positive material identification (PMI) can contain either a radioactive material or a radiation (X-ray) tube. Persons who operate these analyzers are responsible for:

a. Ensuring that they have been trained in its safe handling. A list of approved users should be forwarded to the RSO for filing. Training records should be forwarded to the Learning and Development Department.

b. Ensuring that a "Use Log" is maintained for the alloy analyzer.

c. Ensuring that the alloy analyzers are kept in a secure location when not in use.

d. Ensuring that, when an alloy analyzer is being transported, the instrument is shut off and are securely packed inside the carrying case and documented to meet DOT regulations when traveling on the public roadway.

e. Notifying the Radiation Safety Officer of any change in the inventory of their alloy analyzers (e.g., purchase, sale, removal from service, etc.) on a monthly basis.

f. Following the protocol outlined in Appendix D when purchasing, repairing or removing from service an alloy analyzer.

4.7 Procurement Department Personnel

The Procurement Department is responsible for:

a. Instituting and maintaining an internal protocol that helps to ensure the RSO is notified prior to intended purchase of both devices that contain or use radioactive materials and radiation (X-ray) machines. See Appendix D.

b. Ensuring that the RSO receives a copy of the sales agreement when Marathon owned equipment that contains a radioactive material or radiation (X-ray) machine is bought or sold.

4.8 Radiation Contractors

Radiation contractors at LAR are contractors who maintain radioactive material licenses to handle radioactive materials that are utilized to provide service to LAR. These contractor provided services include:

- Radiography
- Technology consulting services for diagnosing, detecting and measuring process operational concerns, e.g., using a tracer gas
- Subject matter expertise for ensuring the optimization of measurement equipment such as level gauges and density meters that utilize radioactive materials

Radiation contractors may bring and use radioactive material sources and/or radiation-producing machines at LAR. The employees of radiation contractors are classified as Radiation Workers.

Upon request, a radiation contractor is responsible for:

a. Supplying pertinent information (e.g., number, type, strength, and location(s)) regarding where a radiation source(s) will be used and/or stored at LAR.

b. Submitting or making available a copy of their radiation safety program, Radioactive Materials License, and Emergency Response Plan for review by the RSO.

c. Supplying proof of training or certification for each employee who handles equipment that contains a radioactive material source while working at LAR.

5.0 PROCEDURE FOR RADIATION SAFETY

5.1 Sources of Radiation

a. All sources of radiation (i.e., radioactive materials or radiation (X-ray) machines) brought into or removed from LAR must be reported to and be accounted for by the Radiation Safety Officer.

b. Gauges that contain radioactive materials owned by LAR and their location of use are listed in the following Appendices:

- Appendix A lists the gauges in use at Carson
- Appendix B lists the gauges in use at Wilmington
- Appendix C lists the radiation (X-ray) machines in use at both sites
- Appendix D lists the alloy analyzers in use at both sites

c. Gauges owned by Marathon Logistics which are in use at Carson are listed in Appendix E.

d. Radiography cameras used by Inspection contractors are stored in "double lock" cabinets located along the east wall of the Traffic Office building at Carson and south of the TEAM trailer by Gate 1H at Wilmington.

e. Gauges that contain radioactive materials are in use at the Ineos Polypropylene site, which is located within the boundaries of the Carson site.

f. Certain types of "EXIT" signs contain tritium, a radioactive form of hydrogen. The signs have a radiation label attached on one edge.

5.2 Licensing and Registration

a. The refinery maintains agreements with the State of California that allows for the possession of radiation sources:

- A radioactive materials license that specifies the type and amount of radioactive material LAR can possess (i.e., "specific license"). Carson and Wilmington each have a specific license.

- A "general license" that allows the possession of devices that are exempt from a "specific license" (i.e., contain a lesser quantity of a radioactive material).
- A radiation (X-ray) machine registration inventory that specifies the radiation (X-ray) machines LAR possesses.

b. The licenses and registration are available for review in the Health Department .

c. Radioactive materials are used under the general supervision of the Radiation Safety Officer (RSO) or designated alternate (ARSO). The RSO and alternates are listed on the radioactive materials license. No other individual may act in the capacity of RSO.

5.3 Employee Health and Exposure Limits

a. The maximum permissible exposure for a LAR employee (i.e., individual members of the public, see "Definition") shall be 100 millirem (mR) per year. Calculated exposure assessments for Operators, Maintenace crafts persons and other individuals who work in units where radiation sources are present are below the 100 millirem (0.1 rem) per year allowable level. The exposure calculation information is kept on file in the Health Department.

b. LAR employees , with the exception of the RSO and ARSO, are considered Members of the Public as no employees are considered occupationally exposed. A Declaration of Pregnancy is not necessary for employees who are or plan to become pregnant.

c. The exposure dose rate to a non occupationally exposed individual (LAR employee or contractor) shall not exceed 2 millirem per hour (assuming that an individual may be in the vicinity of radiation sources or radiation-producing devices)

d. An employee who has a concern about radiation exposure may request a radiation survey at any time by contacting the RSO. The primary goal of LAR radiation safety is to control exposure to a level "as low as reasonably achievable" (ALARA).

e. A physical inspection of all sources of radiation sources shall be performed at least every 6 months.

The inspection and survey shall be conducted by the RSO, Alternate RSO or licensed Radiation Contractor responsible for ensuring the integrity of the radioactive material instrumentation.

The inspection shall consist of:

- Visual inspection of the source container/cabinet
- Survey using a calibrated radiation detection device
- The survey shall be documented.
- For radioactive material sources, a wipe test (which determines if radiation is leaking from a gauge that holds a radioactive material) the shall be conducted by the Radiation Contractor. Wipe test records are kept on file by the Health Group.

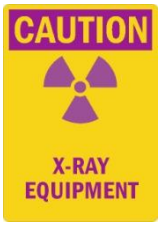
- If a leak test results in measurements of 0.005 microcuries or more of removable radioactive material, the Department of Health Services, Radiologic Health Branch will be notified within five (5) days of laboratory report receipt.
- A "shutter check" to ensure that the shutter will properly close when required will be performed by the Radiation Contractor.

f. In the case of x-ray analytical equipment, dose measurements shall be measured from any accessible region 5-cm from the outside surface of the generator cabinet.

5.4 Required Posting and Notifications

a. The following sign (or something similar) shall be posted near or next to a gauge that contains a radioactive material:

b. In the QA Lab, the following sign (or something similar) shall be located outside of a room that contains x-ray analytical equipment:



c. The following label shall be located on the x-ray analytical equipment:

d. A copy of CDPH Form RH-2364, which alerts employees to their rights under the state "Standards for Protection against Radiation", is posted in units where a source of radiation is located. A copy of this form is also posted on the LAR SharePoint site under EHS > Health > Radiation > Notice to Employees.

If a new radiation source is purchased for use in a unit, operating area or location not currently listed, the RSO will provide appropriate signage, labels and a RH-2364 form for posting.

5.5 Isolation of Radiation Sources

In order to protect employees from possible exposure to radiation during times when there is a need for entry into a process vessel (e.g, inspection, testing,turnaround maintenance), the following measures will be followed:

- Prior to a person's entering a vessel (e.g., coke drum, coker heater surge drum, fractionator tower, vacuum tower or precipitator hopper), the RSO, ARSO, or designated licensed radiation contractor will secure the radiation devices by locking the shutter in the closed position. A tag will be applied at or near the shutter to indicate it is in the "CLOSED" position.
- The device will remain in the out-of-service mode until the unit is ready for start-up. At this time, with Operations' approval, the RSO will return the sources to their operating modes.

- Only the RSO, Alternate RSO or a qualified representative designated by the RSO is authorized to open the shutters on radiation sources.
- The RSO/Alternate RSO shall utilize the radiation lockbox when isolating the equipment. Refer to HSS 008 "Blinding and Isolation" for requirements and guidelines for isolation of hazardous energy.

The Laboratory has analytical devices (see Appendix C) that produce X-rays. These devices are either "ON" or "OFF". When "OFF", the device is not producing X-rays. The x-ray machine shall be visually inspected and the surrounding area surveyed every six months by the RSO/ARSO

The PEI Department utilizes portable analytical equipment that are sources of radiation (see Apendices). At each site, this equipment is stored in a locked cabinet accessible only to radiation trained persons. This equipment is surveyed and wipe tested, as applicable, every 6 months.

5.6 Purchase, Installation and Removal of Sources of Radiation

All purchases of equipment that contain sources of radiation must be reviewed with and co-ordinated through the RSO.

- the Radioactive Material License must be amended to reflect the new radioactive material source(s) PRIOR to purchase and subsequent delivery onsite. The RSO, as part of the Management of Change (MOC) process, will determine whether the quantity of radioactive material to be purchased will create comply with the "Increased Controls" directive from the Nuclear Regulatory Commission. If the possession limit of a radioactive material is exceeded, additional measures must be taken to secure the material.
- the radiation tube registration must be amended within 30 days of receipt, removal or re-location of any radiation (X-ray) machine
- the General License must be amended within 30 days of receipt, removal or re-location of sources of radiation covered under the license.

The Procurement protocol for ensuring compliance with licensing and registration requirements is contained in Appendix F.

Removal (either temporary or permanent) of a source of radiation from its designated location must be coordinated through the RSO.

- a licensed radioactive material source can be permanently removed from LAR only through licensee-to-licensee transfer of ownership, i.e., from LAR to an authorized recipient.
- the RSO must obtain a copy of the recipient's radioactive materials license allowing receipt of the transferred radioactive material prior to shipment.
- Packing, storage and shipment of radioactive material sources must be performed by person(s) licensed to handle radioactive materials. Storage of materials prior to shipment must be in a secure location.

- Documentation will be kept on file by the RSO. (Note: The information on the licensee's radioactive materials license number is necessary in the required license amendment notification to RHB.)

Disposal of an "EXIT" sign that is labeled as containing a radioactive material must be handled through the RSO.

Only licensed individuals shall perform the installation, relocation, maintenance, repair, replacement, disposal, and initial radiation survey, of sealed sources containing radioactive materials.

Only those persons trained and certified to work on radiation devices and/or radiation-producing machines shall perform maintenance.

Radiation surveys shall be performed after any repair or maintenance of radiation sources or radiation-producing devices.

The sources of radiation must be accounted for during any decommissioning of a process unit or facility. The RSO will have primary responsibility should such an event occur.

5.7 Survey (Monitoring) Instruments

Survey instruments and personal dosimeters to assess exposure to radiation are located within the Industrial Hygiene laboratory at each site. The Ludlum 2241-2 survey meter is also located on the Support Rig that is staged during an emergency response.

Survey meters include:

- Ludlum 3 Beta/Gamma Survey Instrument with a 44-9 Pancake Probe Detector – used for Beta/Gamma contamination
- Ludlum 14C Beta/Gamma Survey Instrument with a 44-6 Survey Probe Detector – used for Beta/Gamma survey
- Ludlum 15 Neutron Counter Survey Instrument with 42-14 and 44-7 Survey Probe detectors– used for Neutron survey
- Fluke Biomedical Pressurized Ion Chamber Survey Meter used for Beta above 1 MeV, Gamma and X-ray above 25 keV
- Victoreen 190 Radiation Meter with GM Probe 489-35 – used for Alpha, Beta, Gamma, and X-ray
- Victoreen 450P Radiation Meter – used for Beta above 1 MeV and Gamma above 25 KeV
- Technical Associates Surface Contamination Meter TBM-3S – used for alpha, beta, and gamma contamination
- Ludlum 2241-2 Radiation Survey Instrument with a 44-2 and 44-9 Probe– used for Alpha, Beta, and Gamma and Gamma-specific contamination

Personal exposure monitoring devices include:

- Arrow-Tech AT-138 Dosimeter with Arrow-Tech DCA Model 909 Charger
- RaeSystems Neutron Rae II PRM-3020

Radiation survey instruments shall be calibrated:

- by an individual licensed or registered to perform such service
- at energies appropriate for the intended use
- at intervals not to exceed manufacturer's recommendations
- after each instrument servicing (other than battery replacement)

Calibration records are kept on file by the Occupational Health Group.

6.0 EMERGENCY RESPONSE

6.1 General Information

a. In the event of an emergency involving a source of radiation, notify the Operations Shift Supervisor (OSS) / Unit foreman who will, in turn, notify the RSS / 501. The RSS /501 will notify the RSO / ARSO.

b. An emergency involving sources of radiation may include, but is not limited to:

- damage to equipment to which radiation equipment is attached (e.g., fire within or near a coke drum, a vacuum tower)
- damage to the device which houses the source of radiation (e.g., fire impinges on the device, an earthquake or explosion may cause the device to come loose from the brackets that attach it on a vessel)
- damage to or loss of a portable source of radiation (e.g., alloy analyzer) as it is being transported (e.g., a vehicle accident)

c. If a fixed gauge that contains a radioactive material source is damaged or potentially damaged, an appropriate (minimum 50 feet) area around the damaged gauge (and source) will be evacuated and barricaded to restrict entry. The RSO will assess the area for radiation levels prior to allowing re-entry. If warranted, the RSO will arrange to have the damaged gauge (and source) removed and replaced.

d. If an incident involving a radiographer's equipment that contains a radioactive material source should occur (e.g., malfunction, physical damage) that results in a potential exposure to an individual, a facility representative will inform the RSO immediately. Any CAUTION: RADIATION barricade tape in use at the time of the incident will remain in place or be modified to ensure no person(s) working nearby is potentially exposed to radiation. The facility representative will inform the RSO of actions taken to cover /shield and remove the exposed radioactive material.

e. If a fixed gauge that contains a radioactive material source owned by Marathon Logistics is damaged or potentially damaged, the procedures outlined above will be followed. In addition, the local Logistics' RSO will be informed.

f. If at any time it becomes necessary to enter into an area where radiation work is being performed, the Unit Operator will:

- have the radiographer (1) cease work and (2) secure the radiation source device.
- pull the permit after the radiographer has confirmed that the source is secure and the area clear.
- re-issue the permit and notify the radiographer that work may be resumed once the situation /area is clear and acceptable to resume work

g. If a person walks into a barricaded area while radiography is being conducted, he/she should contact their foreman, who will contact the RSO and the Medical Department. An incident investigation will be conducted. The RSO and radiography contractor's RSO will determine the level of exposure. At minimum, such an occurrence will be classified as an "At-Risk" Health Related Incident (HRI)

h. If an "EXIT" sign that has a radiation label attached (i.e., contains tritium) is damaged, clean-up should not be attempted. The broken sign should not be touched. The area around the damaged sign should be secured, and the RSO contacted. The RSO will arrange to have the sign properly disposed of by a licensed contractor.

i. If a fixed gauge source at Ineos is damaged or potentially damaged, the LAR Carson RSO will assist the Ineos RSO, as requested.

j. See Appendix H for contact telephone numbers.

6.2 Radiation Emergency Response

The facility Emergency Response Plan will incorporate scenarios where damage to sources of radiation are plausible.

Security will alert the RSO if response to an event that requires radiation monitoring becomes necessary.

The RSO or ARSO will provide notify the RHB in the event of an emergency that results in the release of radiation.

The RSO or ARSO will serve as primary escorts for RHB inspectors or their designates in the event of an inspection or emergency response.

7.0 RADIOGRAPHY

Radiography is conducted under the supervision of the Inspection Department. Radiographers will follow all applicable rules and regulations, including, but not limited to:

- Staffing a minimum of two persons at each field radiography location.
- Ensuring the proper permitting paperwork as been obtained.
- Conducting a job walk with Operations to Prior to exposing a radioactive material source (1) advise the scope of the regulated area and (2) ensure that all points

of access (e.g., stairways, ladder cages) into a regulated area have also been barricaded to prevent entry.

- Establishing a regulated area marked with "Caution: Radiation Area" barricade tape, within which the radiography will occur.
- Using two layers of barricade tape to restrict access to the area of work and to all means of access to that area while performing radiography within the boundaries of a process unit.
- Ensuring no work is being conducted overhead or below a radiation regulated area, and that all points of access into the regulated area are barricaded.
- Evacuating persons not cleared to be in the barricaded area
- Establishing radio communications with area Operations.
- Using a flashing red light to warn persons working in the vicinity of the radiography that the radioactive material source is exposed.
- Displaying Radiation warning signs. Signage may include how to contact the radiographer in the event of an emergency.
- Maintaining direct surveillance of the radiographic operation to protect against unauthorized entry into the controlled area. Only the lead radiographer may allow entry to the regulated area.
- Using a survey meter to ensure that the level of radiation exposure at the perimeter of the regulated area does not exceed 2 millirem/hour.
- Conducting radiation exposure monitoring for their employees. Radiographers and radiographers' assistants shall wear a direct reading pocket dosimeter, an alarm ratemeter, and either a film badge or thermoluminescent dosimeter at all times during radiographic operations. Additionally, radiographers will take adequate measures to limit ionizing radiation exposure to themselves and shall maintain exposures to other personnel "As Low As Reasonably Achievable" (ALARA).
- Utilizing collimation and supplemental shielding whenever practical.
- Locking out radiographic equipment when not in use and surveying it for possible leakage. Radiographic exposure devices shall be kept locked at all times except during authorized use or when under the direct surveillance of a radiographer or radiographer trainer.
- Physically securing radiographic exposure devices while being transported.
- Carrying a copy of their Radioactive Material License in their vehicle.
- Notifying their LAR representative, LAR RSO or ARSO of any of the following:

- Overexposure or potential overexposure of any person in excess of that allowed by regulations
- Malfunctioning, potentially damaged, stolen or missing exposure device
- Unauthorized personnel within posted radiation boundaries

If radiographers are working in an area where their radioagraphic equipment may impact LAR equipment level detectors (e.g., level gauges at the Coker or Vacuum units), they must inform the control board Operator to allow the Operator to place the detector in manual for the duration of the radiography.

Note: When radiography is being performed in the North Area of LAR Carson close to Wilmington Avenue and 223rd Street, the radiography contractor will send an email to the Customs and Border Patrol office of the Department of Homeland Secrurity as a courtesy notification. Appendix G contains the distribution list for this email notification. The health group will be copied in that email.

8.0 TRAINING

The RSO/ARSO shall receive 40 hour initial training and refresher training whenever significant changes occur in duties, and annually via web-based training (WBT).

All other LAR MPC employees shall receive initial training through the Occupational Health Group, or via web-based training (WBT).

9.0 RECORDKEEPING , REPORTING, AUDITING

The following documents are kept on file by the Health Group:

- Results of wipe tests, source surveys and inventories
- Copies of the Radioactive Material License and correspondence for license amendments and renewals
- Copies of contractor licenses,
- Copies of general license information
- Copies of radiation (X-ray) machine registration
- Records of training
- Records of calibrations for survey equipment
- Records of receipt, transfer and removal of radiation sources
- Records of Dose Assessment calculations, including calculations of dose to "Members of the Public" referenced in Section 5.3(b)
- Exposure Record
- Records of inspections by the RHB or its designated agencies

The Occupational Health Group will review/audit this program annually to update changes in regulations or work practices. As best practices for keeping exposures to radiation ALARA become known, they will be incorporated into this program.

10.0 APPENDICES

APPENDIX A

The table below lists: (1) the unit or location where the device containing a licensed radioactive material source is used, (2) the particular radioactive material "radioisotope" used in the device, (3) the strength of the radioisotope; and (4) the manufacturer of the device, and (5) the date the device was installed at LAR.

Radioactive Material Sources at LAR-Carson

Marathon owned gauges

Location	Radioisotope	Activity (mCi)	Serial Number	Manufacturer	Date of Installation
#1 Coke Drum Upper	Americium-241 / Beryllium	500	B578	Kay Ray / ThermoFisher	1990 / 2017
#1 Coke Drum Lower	Americium-241 / Beryllium	500	26875	Kay Ray	1990
#2 Coke Drum Upper	Americium-241 / Beryllium	500	B579	Kay Ray / ThermoFisher	1990 / 2017
#2 Coke Drum Lower	Americium-241 / Beryllium	500	26680	Kay Ray	1990
#3 Coke Drum Upper	Americium-241 / Beryllium	500	B580	Kay Ray / ThermoFisher	1990 / 2017
#3 Coke Drum Lower	Americium-241 / Beryllium	500	26874	Kay Ray	1990
#4 Coke Drum Upper	Americium-241 / Beryllium	500	B581	ThermoFisher	1990 / 2017
#4 Coke Drum Lower	Americium-241 / Beryllium	500	26882	Kay Ray	1990
#5 Coke Drum Upper	Americium-241 / Beryllium	500	B582	Kay Ray / ThermoFisher	1990 / 2017
#5 Coke Drum Lower	Americium-241 / Beryllium	500	29041	Kay Ray	1990
#6 Coke Drum Upper	Americium-241 / Beryllium	500	B583	Kay Ray / ThermoFisher	1990 / 2017

#6 Coke Drum Lower	Americium-241 / Beryllium	500	29043	Kay Ray	1990
#1 Coke Drum High	Cesium-137	300	3596CP	Vega	2017
#1 Coke Drum Middle	Cesium-137	300	3591CP	Vega	2017
#1 Coke Drum Low	Cesium-137	300	3590CP	Vega	2017
#2 Coke Drum High	Cesium-137	300	3610CP	Vega	2017
#2 Coke Drum Middle	Cesium-137	300	3608CP	Vega	2017
#2 Coke Drum Low	Cesium-137	300	3604CP	Vega	2017
#3 Coke Drum High	Cesium-137	300	5350CP	Vega	2017
#3 Coke Drum Middle	Cesium-137	300	3655CP	Vega	2017
#3 Coke Drum Low	Cesium-137	300	3652CP	Vega	2017
#4 Coke Drum High	Cesium-137	300	5360CP	Vega	2017
#4 Coke Drum Middle	Cesium-137	300	5354CP	Vega	2017
#4 Coke Drum Low	Cesium-137	300	5352CP	Vega	2017
#5 Coke Drum High	Cesium-137	300	95080B	Vega	2017
#5 Coke Drum Middle	Cesium-137	300	8223CP	Vega	2017
#5 Coke Drum Low	Cesium-137	300	8214CP	Vega	2017
#6 Coke Drum High	Cesium-137	300	95097B	Vega	2017
#6 Coke Drum Middle	Cesium-137	300	95089B	Vega	2017
#6 Coke Drum Low	Cesium-137	300	95082B	Vega	2017
FCC Fract Tower (RPV 2322)	Cesium-137	5000	S98E0901	Kay Ray	1998

FCC 4th Stage Hopper (RPV 5520) Top	Cesium-137	500	S92H2002	Kay Ray	1998
FCC 4th Stage Hopper (RPV 5520) Bottom	Cesium-137	500	S92H2001	Kay Ray	1998
51 Vacuum Unit Tower (RW 5967)	Cesium-137	1600	2390CG	Vega	2008
ESP Hopper #1	Cesium-137	50	001/070V	Vega	2008
ESP Hopper #2	Cesium-137	50	005/070V	Vega	2008
ESP Hopper #3	Cesium-137	50	009/070V	Vega	2008
ESP Hopper #4	Cesium-137	50	013/070V	Vega	2008
ESP Hopper #5	Cesium-137	50	017/070V	Vega	2008
ESP Hopper #6	Cesium-137	50	002/070V	Vega	2008
ESP Hopper #7	Cesium-137	50	006/070V	Vega	2008
ESP Hopper #8	Cesium-137	50	010/070V	Vega	2008
ESP Hopper #9	Cesium-137	50	014/070V	Vega	2008
ESP Hopper #10	Cesium-137	50	018/070V	Vega	2008
ESP Hopper #11	Cesium-137	50	003/070V	Vega	2008
ESP Hopper #12	Cesium-137	50	007/070V	Vega	2008
ESP Hopper #13	Cesium-137	50	011/070V	Vega	2008
ESP Hopper #14	Cesium-137	50	015/070V	Vega	2008

ESP Hopper #15	Cesium-137	50	019/070V	Vega	2008
ESP Hopper #16	Cesium-137	50	004/070V	Vega	2008
ESP Hopper #17	Cesium-137	50	008/070V	Vega	2008
ESP Hopper #18	Cesium-137	50	012/070V	Vega	2008
ESP Hopper #19	Cesium-137	50	016/070V	Vega	2008
ESP Hopper #20	Cesium-137	50	020/070V	Vega	2008

APPENDIX B

The table below lists: (1) the unit or location where the device containing a radioactive material source is used, (2) the particular radioisotope used in the device, (3) the strength of the radioisotope; (4) the manufacturer of the device, and (5) the date the device was installed at LAR.

Radioactive Material Sources at LAR-Wilmington

Marathon owned gauges

Location	Radioisotope	Activity (mCi)	Serial Number	Manufacturer	Date of Installation
V 895 Top	Cesium-137	1000	2312CO	Vega	2012
V 895 Bottom	Cesium-137	2000	4016CM	Vega	2011
V 896 Top	Cesium-137	1000	2324CO	Vega	2012
V 896 Bottom	Cesium-137	2000	4425CM	Vega	2011

V 897 Top	Cesium-137	1000	3724CO	Vega	2012
V 897 Bottom	Cesium-137	2000	4426CM	Vega	2011
V 898 Top	Cesium-137	1000	3279CO	Vega	2012
V 898 Bottom	Cesium-137	2000	4428CM	Vega	2011
V 900 Frac	Cesium-137	500	B-340	Texas Nuclear	2005
V 901 Surge	Cesium-137	1000	B-56	Texas Nuclear	2005
V 899 Vac	Cesium-137	100	B-667	Texas Nuclear	2005
V 3593 Vac	Cesium-137	70	6277CO	Vega	2012
V 2183 Desalter (8)	Cesium-137	80	7234CP 8310CP 96037B 96038B 96039B 96040B 8311CP 7241CP	Vega	2015
V 2184 Desalter (8)	Cesium-137	80	7303CP 6971CP 8312CP 7272CP 7277CP 8125CP 8313CP 7307CP	Vega	2015

APPENDIX C

The table below lists the radiation (X-ray) machines registered to be used at the Los Angeles Refinery. A radiation machine contains an X-ray tube. The table identifies each machine by the location where the machine is set up and used, and the type of machine or its intended use.

The manufacturer's name and model number are provided for identification purposes.

Inventory of Radiation (X-ray) Machines at LAR				
Unit/Shop /Area	**Location**	**Equipment Type**	**Manufacturer**	**Model**
QA Laboratory	Carson Room 123	X-ray spectrometer	Horiba	SLFA-1800
QA Laboratory	Carson Room 123	X-ray spectrometer	Horiba	SLFA-2800
QA Laboratory	Carson Room 124	X-ray spectrometer	X-ray Optical Systems	Clora Bench Top Analyzer
QA Laboratory	Carson Room 233	Electron Microscope	Hitachi	S-3000N
QA Laboratory	Carson Room 224	X-ray diffraction	Philips (PanAnalytical)	DY-1094

QA Laboratory	Carson Room 201	X-ray spectrometer	X-ray Optical Systems	Clora Bench Top Analyzer
Carson Storehouse	PMI cage	Alloy analyzer	Niton	XL2-800
Watson Cogen Maintenance Shops	Inspection Office	Alloy Analyzer	Niton	XL3T-800
PEI /Inspection	FIT Offices Campus One	Alloy Analyzer	Innov-X	XT-245
QA Laboratory	Wilmington	X-ray Spectrometer	XOS	Sindie+Cl

APPENDIX D

The table below is a list of equipment that contains a radioactive material source, and is owned by the Los Angeles Refinery under the terms of a General License.

The table identifies each piece of equipment by the location / owner, where the machine is stored or used, and the type of equipment by its intended use.

The manufacturer's name and model number are provided for identification purposes.

Inventory of Generally Licensed Devices at LAR				
Unit/Shop /Site	**Location**	**Equipment Type**	**Manufacturer**	**Model**
PEI Carson	FIT Offices Campus One	Alloy Analyzer	Niton	XLp-818W
PEI Carson	FIT Offices Campus One	Alloy Analyzer	Niton	XL3p+
PEI Carson	FIT Offices Campus One	Alloy Analyzer	Niton	XL3p+
DCU	8 in Line	Cesium-137 5 mCi	Kay Ray	S99A2801

APPENDIX E

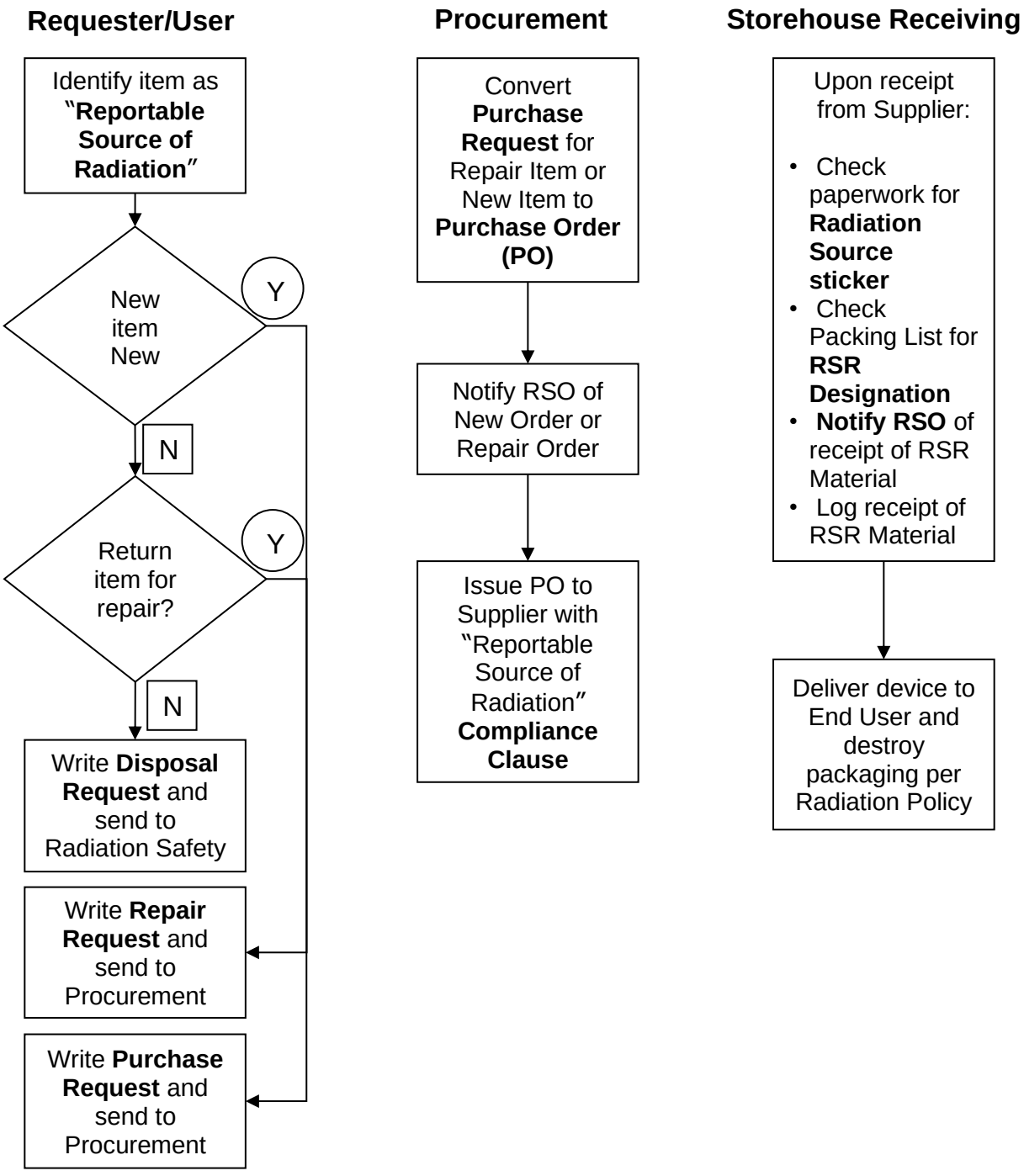
These devices listed below are licensed to Marathon Logistics and are located on pipelines running through the Carson site.

The table lists: (1) the location where the device containing a radioactive source is used, (2) the particular radioactive material used in the device, (3) the strength of the radioactive material; and (4) for what purpose the device is used.

Marathon Logistics owned fixed gauge Sources at LAR Carson				
Unit / Location	**Number of sources**	**Usage of source**	**Radioactive material source**	**Source strength (milliCuries)**
Line 69 south of #8 Cooling Tower	1	Density gauge	Cesium-137	200
Line 104 south of #8 Cooling Tower	1	Density gauge	Cesium-137	500
Line 64 south of #8 Cooling Tower	1	Density gauge	Cesium-137	500
Line 103 south of #8 Cooling Tower	1	Density gauge	Cesium-137	500
Line 80 northeast of #15 Cooling Tower	1	Density gauge	Cesium-137	500

APPENDIX F

Acquisition of Reportable Sources of Radiation: Roles and Responsibilities



APPENDIX G

The following people will be notified whenever radiography is performed in the North Area of the LAR Carson near Wilmington Avenue and 223rd Street.

1. Jo.r.comey@cpb.dhs.gov
2. Louis.salem@cpb.dhs.gov
3. Hung.t.ta@cpb.dhs.gov
4. Melanie.j.pickel@cpb.dhs.gov

APPENDIX H

Emergency Notiifcation Process

In the event of an emergency involving possible exposure to radiation, such as damage to aradioactive material source holder, loss of containment of a radioactive material, damage to a X-ray cabinet, the following steps should be taken:

- Evacuate personnel from the area immediately adjacent to the incident site (a minimum of 50 feet)
- Secure the area against entry/ re-entry
- Notify the RSO / ARSO immediately
- Notify RSS
- Ensure the ERT notification sytem has been activated

Emergency Contact Information

Name	Title	Office Phone #	Cell Phone#
John Sullivan	RSO	310-522-6233	562-480-7778
Sharon Callahan	ARSO	310-847-5716	310-940-7347
Luis Martinez	ESS Manager	310-847-5200	832-577-3437
Randy Hudgens	ERT	310-816-8750	714-345-4921
	RSS Carson	310-847-3646	310-918-5585
	RSS Wilmington	310-522-6404	

If warranted by the nature of the emergency, the RSO / ARSO or designated alternate will notify the following agencies and consultant support:

Name	Organization	Business Phone #	Cell /After Hours Phone #
Mike Sanford	DLP Services, Inc.	951-678-8726	951-235-9194
	LA County Health Department	213-351-7897	213-974-1234
Radiologic Health Branch	CA Department of Public Health	916-327-5106	800-852-7550 (OES)

If the manufacturer of a device that contains a radioactive material source needs to be contacted for technical information, they can be reached as follows:

Contact Company	Equipment Name(s)	Business Phone #
Thermo Fisher	Kay-Ray Sensall Texas Nuclear Technolgies	512-388-9320
Thermo Fisher	Niton, LLC	401-294-1234
Vega Americas	Ohmart Vega Americas	513-272-0524

11.0 CHANGE LOG

Summary of Changes	Changes Completed by:	Approved by:	Date
FS 935 and SAP 045 have been integrated to create HSS 302. The change to the format is the most noticeable change. A "Contents" table has been added to help direct procedural inquiries more directly to the appropriate section and page. The "Definitions" section has been expanded to include terminology from both SAP-045 and FS 935. Amended Section 5.3 "Employee Health and Exposure Limits" to incorporate references to the Reproductive Health Programs (FS 960 and HSP 698615) while eliminating female specific gender requirements In Section 5.4, included pictorial examples of signage required under Radiation regulations. In section 7.0 "Radiography", specified that double "Caution: Radiation" barricade tape is mandatory only when radiography is performed within process units. Appendix A lists only the radioactive material sources licensed for use at Carson. Appendix B is now an inventory of radioactive material sources licensed for use at Wilmington. Appendix C now lists the Radiation Machines registered to LAR., and includes an X-ray spectrometer at the QA Laboratory at Wilmington. Appendix D lists the "generally licensed" devices in use at both sites. Appendix E lists the radioactive materials licensed to Marathon Logistics which are physically located within the refinery property (at Carson). Appendix F lists the process for procuring radioactive material sources and radiation machines.	John Sullivan	Sharon Callahan	12/23/15
Amended Appendix B to reflect the currently owned radioactive material sources at Wilmington.	John Sullivan	Sharon Callahan	6/21/2016
No updates required.	John Sullivan	Sharon Callahan	7/18/2017
Amended Section 5.7 Survey (Monitoring) Equipment to reflect the currently owned equipment at LAR. Amended Appendix A to reflect the currently owned radioactive material sources at Carson. Amended Appendix C to reflect the currently owned radiation machines at Wilmington.	Pearl Lee	Sharon Callahan	5/7/2018
Amended 7.0 radiography to require radiography contractor to notify DHS and the health group when radiography is being conducted in the North Area of LAR Carson close to Wilmington Avenue and 223rd Street	John Sullivan	Sharon Callahan	5/15/2019

Summary of Changes	Changes Completed by:	Approved by:	Date
Added Appendix G for recipients of notification email required in the above change			
Amended Section 2.0 "References" to incorporate MPC HES&S HLT-2016 Amended Section 3.0 Table 1 to align definitions with MPC HES&S HLT-2016 definitions In Section 3.0, added names of RSO and ARSO in definition of RSO In Section 4.0, added language to clarify responsiblilites of "All Personnel" (4.2) separate from persons who wish to bring a radiation source into LAR or remove one (4.3). Following responsibility group numbers adjusted accordingly. In Section 4.7, added verbiage to further define types of services that a Radiation Contractor provides to LAR In Section 5.1, added verbiage to indicate that Radiography Contractor has a secure storage location for radiography cameras at LAR-Wilmington In Section 9.0, added that Health Group maintains a dose calculation to show radiation exposure to a "Member of the Public" is below maximum allowable level. In Section 11.0, rewrote Appendices A and B to provide a more detailed inventory of the radioactive material sources possessed by LAR and align wit MPC HES&S HLT-2016	John Sullivan	Sharon Callahan	8/3/2020
Reviewed and No Change to current document	John Sullivan	Sharon Callahan	12/10/2021
In Section 3.0 "Definitions", amended "Occupationally Exposed Individual" to include the RSO and ARSO (per conversation with CDPH RHB during RAM License Review). In Section 3.0 "Definitions", amended "Member of the Public" to exclude RSO and RSO. This change is predicated on the same discussion with RHB mentioned in the item above. In Section 5.3 "Employee Health and Exposure Limits", I added to item (b) "with the exception of the RSO and ARSO" to reflect the amendments in Section 3.0 "Definitions" cited above. In Section 8.0 "Training", clarified requirements for RSO/ARSO and all MPC LAR employees.	John Sullivan	Sharon Callahan	07/20/2022

Summary of Changes	Changes Completed by:	Approved by:	Date
In Appendix H, "Emergency Notification Process", added information to reflect the change in the ESS Manager position.			
In Appendix B "Radioactive Material Sources at LAR-Wilmington", deleted the RAM sources that had been transferred to QSA Global earlier this year, and are no longer listed on the Wilmington Radiaoctive Material License (FAC0078-19)	John Sullivan	Sharon Callahan	12/27/2023