PLEASE READ AND UNDERSTAND THE ENTIRE DOCUMENT BEFORE OPERATING MACHINERY
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WARRANTY

Hub City Iron Works, Inc. of Lafayette, Louisiana warrants its equipment, accessories and supplies will be free from defects in material and workmanship for ninety (90) days from the date of customer purchase of the product. Hub City Iron Works, Inc. will replace any accessories and supplies, and repair, or at its option, replace equipment which is found to be defective under this warranty. Hub City Iron Works, Inc. will within a period of one year from date of customer purchase, repair or replace any defective or failure of the construction members of its product, provided proper maintenance and care were exercised. This warranty does not cover any damage caused by negligence, abuse or tampering with the product.

To obtain service under warranty, the product to be repaired must be returned postage paid to:

    Hub City Iron Works, Inc.
    3110 Cameron Street
    Lafayette, LA  70506
    (337) 233-9100

Any repairs to any construction failures of the product must be done by Hub City Iron Works, Inc. personnel or any company (in the buyer's area of operation) authorized by Hub City Iron Works, Inc..

This warranty applies only to those items manufactured by Hub City Iron Works, Inc. and not vendor products. Vendor warranties will be supplied to customers upon request.
GENERAL MAINTENANCE PROCEDURES

1. The following items should be greased once a week:
   a. Brush shaft bearings
   b. Brush housing pivot bearings
   c. Idler wheel shafts
   d. Load/unload arm assemblies
   e. Variable conveyor bearing plates
   f. Refill oil lubricator bowl for brush housing support cylinder.

2. Wire brushes should be changed every 3000-3500 joints.
   **Note:** Inspect daily for excessive wear.

3. Hydraulic reservoir:
   a. Return filter should be checked daily.
      Instructions: While operating machine, depress red alarm button on cap of return filter. If alarm button rises, the filter cartridge must be replaced.
   b. Hydraulic reservoir should be drained and cleaned with a suitable solvent every 4000 hours of operations.
      **Note:** When tank is drained, remove suction strainers, clean with solvent and replace.

4. When using air motors with lance system, refill oil lubricator on rear lance support daily. While operating inspect oil level on an hourly basis.

*Please read and understand this entire document before operating machinery.*
“START-UP” PROCEDURE

1. Verify all hydraulic fittings, hoses, and mechanical assemblies (bolts, nuts, etc.) are secure.
2. Hydraulic power supply (HPS):
   a. Inspect oil reservoir and remove any foreign materials (dirt, metal filings, etc.)
   b. Fully open oil pump suction valves and secure all valve handles using malleable wire.
   c. Fill reservoir with Gulf Harmony 32AW oil or equivalent.
3. On starting electric motors for HPS:
   a. Verify that the pump closest to oil reservoir (Vickers) rotates in a clockwise manner when viewed from the cooling fan end of the electric motor.
   b. Verify that the pump farthest from the oil reservoir (Hydura) rotates in a counter-clockwise manner when viewed from the cooling fan end of the electric motor.
4. Start electric motor for main hydraulic pump and observe pressure gauge reading
   (Note: Should be 1000 – 1200 psi).
5. Start electric motor for hydraulic pump for brush housing.
6. Drain air supply filter separator (supplied by Hub City Iron Works, Inc.).
7. Back pipe up and raise box cleaner and run the pipe to load / unload position.
8. Unload pipe by moving the job and PCM conveyor sticks up on the box cleaner control table.
9. To turn off the machine, depress any red stop button on the control heads.
OPERATING PROCEDURE FOR PCM 13375 (INSPECTION)

1. Start machine by pressing (green) start button on the main (center) control table.
2. To load a joint of pipe: move kicker arm to unload position by pushing up on job and PCM conveyor joy sticks and then move PCM conveyor stick down. This will load the pipe on the machine.
3. Turn on the brush pumps, blower 1 and blower 2 controls on the main (center) control table.
4. Adjustments to the pin and box cleaners and external brush units should be made with each pipe size change; also the centering of the lance on the pipe should be checked to allow proper cleaning of the pipe.
5. After pipe is used to check adjustments, run pipe back to load / unload area.
6. Lower box cleaner by using control lever and jog pipe into position on cleaning brush. Turn on brush with control lever and clean box end of pipe.
7. Back the pipe up and blow off the pipe with control lever on the right of the table. Raise box cleaner unit and run pipe through External Brush Cleaner.
8. Walk to pin cleaning table and lower pin cleaning unit. Jog pipe into cleaning position on brush and clean 3 feet into the box end of the joint by jogging pipe back and forth on brush.
9. Back the pipe up and raise pin cleaner, then run pipe down the lance.
10. Lower pin cleaning unit with control lever and jog pipe into cleaning position on brush. Turn on brush with lever and clean pin end of pipe.
11. Back the pipe up and blow off the pipe with lever on the right of the table. Raise pin cleaner unit and run pipe back through external brush cleaner.
12. Walk back to box cleaning table and lower box cleaning unit to job pipe into cleaning position on the brush and clean three (3) feet into the pin end of the joint by jogging pipe back and forth on the brush.
EXTERNAL BRUSH HOUSING

CONTROL TABLE

CONTROLS FOR EXTERNAL BRUSHING
OPERATING THE LOAD/UNLOAD ARMS

STEP ONE
ARMS SHOULD REMAIN IN LOAD POSITION WHILE PIPE IS RUN THROUGH THE CLEANING CYCLE TO AVOID INTERRUPTING MOVEMENT OF PIPE ON THE MACHINE. CYLINDER RAM IS RETRACTED, WITH CONTROL LEVER IN THE NEUTRAL POSITION. THE PIPE IS RESTING AGAINST ARM ON KICKER ASSEMBLY IN THIS POSITION.

STEP TWO
CONTROL LEVER IS MOVED TO UNLOAD POSITION. CYLINDER RAM EXTENDS RAISING ARMS TO UNLOAD POSITION, PIPE AT STOP IS LIFTED OVER THE PIPE STOP AND ROLLS TO REST ON THE CONVEYOR WHEELS TO BEGIN THE TRIP THROUGH CLEANING SECTION. THE NEXT PIPE ROLLS TO REST AGAINST KICKER ARM.

STEP THREE
CONTROL LEVER IS MOVED TO LOAD POSITION. CYLINDER RAM RETRACTS LOWERING ARMS TO LOAD POSITION. PIPE AT STOP IS LIFTED OVER THE PIPE STOP AND ROLLS TO REST ON THE CONVEYOR WHEELS TO BEGIN THE TRIP THROUGH CLEANING SECTION. THE NEXT PIPE ROLLS TO REST AGAINST KICKER ARM.

STEP FOUR
AFTER CLEANING, THE PIPE SHOULD BE RETURNED TO LOAD/UNLOAD AREA. CONTROL LEVER IS MOVED TO UNLOAD POSITION. CYLINDER RAM EXTENDS LIFTING CLEANED PIPE WHICH ROLLS DOWN ONTO THE CLEANED PIPE RACK. THE NEXT PIPE RESTING ON ARM WILL ROLL TO THE PIPE STOP AND REST. REPEAT STEP NUMBER THREE (3).
1. Place ordinary carpenters level on top edge of drive wheel and adjust idler wheel to 1/16" below top of drive wheel. Adjust all drive-idler combinations before proceeding.

2. For idler wheels with no drive, place straight joint of heavy pipe (4’ or larger) on machine. Adjust idler wheels so that surface contact is made with both idler wheels.
The lance is a \( \frac{3}{8} \) nominal pipe 38 in. long with an air supply inlet which is stationary; supported by counter-balanced saddles or optional automatic supports. The brushed pipe encircles the lance which usually has an air motor (rattler) screwed on its end, (the air motor is supplied by others). The air supply line, which is supplied, has a valve on the control table and is operated by pushing the Air control lever forward (as shown above).

The Internal Cleaning System offers several options; internal coating, water, water and air, high pressure water and steam. Information on these options may be obtained in detail from Hub City Iron Works, Inc.
EXTERNAL SCRAPER

CONTROL Valve AND AIR REGULATORS ARE LOCATED ON FRAME AS SHOWN

Option 12A
OPERATING EXTERNAL SPRAY SYSTEM

OPERATING PROCEDURES:
1. After pipe has been cleaned, unload pipe (Machine Unload Arm).
2. Turn Paint Rollers on by pressing control lever forward (pipe will roll clockwise) and turn External Coating on (lever on far left of table).
3. Run Paint Car down the length of the joint (see Table drawing above to see which direction to move lever for car direction). NOTE: It is not necessary to coat the pipe twice.
4. Turn off External Coating and Paint Car at the same time, then the Paint Rollers.
5. Unload pipe (Cable Unload Arm) and repeat process on next cleaned joint.

Option – Applies to PCM 13375-P
FOUNDATION DETAILS
SCALE: 3/4" = 1'-0"

PLAN

SIDE ELEVATION

FRONT ELEVATION

RACK HEIGHT IS GREATER THAN OR EQUAL TO A+B

EXAMPLE: IF THE RACK IS 38" TALL
THEN:
38 + A + B
38 + 22 + B
38 + 22 + B
16 + B

B = DEPTH

5/8" ANCHOR BOLT

RACK HEIGHT IS LESS THAN OR EQUAL TO A+B.
RACK LAYOUT (2.3/8" - 5" O.D. PIPE)

NOTE: Rack Spacing Is Arbitrary, Only Requirement Is That Racks Be Centered On Loading/Unloading Arms As Shown.

RACK LAYOUT (1" - 2.7/8" O.D. PIPE)

Top of racks are to be level with top of kicker frame or with a max slope on loading side of 1" on 30'.

Align pipe rack runner end at 5' of loading arm pivot point.

1/2" cap screw to be used as a pipe stop.

SECTION A-A
NORM (NATURALLY OCCURRING RADIOACTIVE MATERIAL)  

POLICY AND PROCEDURE MANUAL  

INTRODUCTION  

“Naturally Occurring Radioactive Material (NORM)” is defined as any nuclide that is radioactive in its natural physical state (i.e., not man-made) but does not include source or special nuclear material. The presence of Naturally Occurring Radioactive Material (NORM) in oil production and gas processing operations has been recognized for many years.

In Exploration and Production Operations, NORM originates in subsurface oil and gas formations where the radioactive isotopes occur naturally. They are dissolved and brought to the surface in produced fluid (usually water). Due to process changes in the produced fluid (i.e., temperature, pressure, etc.) precipitates collect in tubing strings and surface equipment in the form of scales and sludges. Examples of the surface equipment referenced include heater treaters, separators and salt water tanks.

The exception to the above scenario is radon gas. It usually follows the gas production stream and radon daughters may accumulate in gas processing equipment such as inlet filters and natural gas liquid streams.

OVERVIEW / GENERAL DESCRIPTION  

NORM, an acronym for Naturally Occurring Radioactive Material is a problem of concern in the oil and gas industry. The industry is concerned with Radon-222 and its decay products. The Figure I gives the occurrence of Radon-222 and its decay products. Radon-222 can migrate as a gas or dissolve in water without being removed by chemical reaction. Radon is produced with natural gas at the well-head. As long as it is contaminated and controlled within vessels, equipment, and piping, radon is not generally a health hazard to employees and the public. Even in the event of a release of radon-contaminated propane, the threat of fire or asphyxiation would far outweigh the hazard of a short lived radiation exposure.
a. Radon Decay Products:

As shown in Figure I, the radon-222 eventually decays to lead-210 and subsequently to bismuth-210 and polonium-210 before decaying to stable lead-206. The concentrations of radioactive lead, bismuth, and polonium will continue to increase in pipelines, gasoline plants, tank cars, and trucks over 100 years. These long-lived radon decay products present a growing problem to the industry, especially to personnel who may be exposed to contaminated surfaces, sludge, and other waste materials.

![Radioactive Decay of Uranium -238](image)

1: Radioactive Decay of Uranium -238
(Adopted from Gray)

b. Radiation

There are mainly three types of radiation emitted by NORM. They are alpha (α), beta (β) and gamma (γ) radiations. Radon-222 emit energetic gamma radiation’s which can be detected by using a scintillating detector. However, the radon decay products emit less energetic gamma radiation’s and can only be detected by using an alpha/beta probe by holding the probe closely to the contaminated surface. Other radioactive element of concern is radium, which emit energetic gamma radiation’s that can be detected by a scintillation detector.

These radioactive materials are not a health hazard unless they are ingested or inhaled into the body, e.g. during maintenance on the facility. If inhaled, the dust and aerosols containing NORM can attach to the lung surfaces where they emit alpha radiation into the tissue of the lung lining, which can cause biological damage.
The state and federal agencies have potential jurisdiction over NORM, but their application to radon and radon decay products is not clear. NORM does not fall under the definition of source specific nuclear or byproduct materials as currently defined in the Atomic Energy Act. NORM is not subjected to the NRC regulations.

NORM CHARACTERIZATION AND ASSESSMENT

a. Types of Contamination:

The contamination with radon and radon decay products is more prevalent in natural-gas production and processing facilities. Facilities that remove ethane and propane from natural-gas facilities are especially susceptible to NORM contamination. Contamination of gas wells, pipelines, and gas processing facilities results primarily from radon produced with natural gas.

The types of contamination in the NORM sites can be classified as follows.

1. Loose Contamination: It is of concern when personnel are working near it or on contaminated equipment.
2. Fixed Contamination: Fixed contamination is a problem when maintenance activities such as grinding, cutting, welding or other abrasive actions are performed.

Radioactive films, coating, or plating can form during natural gas production or processing. Often invisible to the naked eye, these films contain radon and its decay products normally with no radon precursors associated with them.

Radioactive sludge in pipelines, processing plants, pigging operations, and gas lines and other filter assemblies can be contaminated with radon and its decay products in the natural gas. These decay products may attach to dust particles and aerosols to become part of the sludge. Sludge also may be contaminated with several thousand picocuries/gm of long-lived radon decay products (i.e. lead-210m, bismuth-210, and polonium-210). Filter assemblies in gas lines remove the radon decay products from the gas with other particular matter and can become very radioactive.
b. Instruments and Calibration:

There are many types of detectors being used to detect the radiation. Most scientists recommend an audible response scintillation detector (Ludium Model 2) to measure the radiation in the field. This works on the principle that a material, after exposed to the radiation, gives off light. The light that is emitted will be proportional to the amount of radiation that the crystal was exposed to. The light can be measured and converted to radiation exposure.

The sodium iodide, zinc sulfide, and anthracene will be used to detect gamma, alpha, and beta radiation respectfully. The alpha and beta radiation will be detected by using a pancake probe.

The scintillation detector will be calibrated as follows:

1. at intervals not to exceed six months and after each instrument servicing;
2. at energies and radiation levels approximately for use; and
3. so that accuracy within plus or minus 20 percent of the true radiation level can be demonstrated on each scale.

c. Radiation Survey:

The following survey protocols are recommended by most scientists.

1. Prior to performing the radiation survey, a site map should be obtained from the company and the background radiation in the area will be measured. The background reading is to establish the level above which NORM should be considered present.
2. The area of suspected contamination should be marked with a 10-meter grid pattern, including all areas of double-background activity.
3. For each point of elevated radioactivity that should be found, attempts should be made to locate the peak reading for that area. Areas in which measurements greater than or equal to 50 uR/hr are detected should be further delineated into a 3-meter grid pattern. Where measurements greater than or equal to 250 uR/hr are found, a 1-meter grid pattern should be marked.
4. When performing NORM surveys on equipment and tubulars, probe should be held within 1 cm of the surface.

5. The equipment and tubular that are stored in close proximity should be separated. This will prevent the interference of the readings.

6. When surveying tubulars, the inside of the pipe will be checked by placing the probe a few feet inside each end.

7. All locations including pits and ponds will be marked as potential sampling locations if found to read twice background.

8. Surveys for loose contamination will be performed using 1 inch cloth disks called “smears” (wipe or swipe technique). The activity of the smear will be determined after wiping it over an area of approximately 100 cm². The activity will be determined by Ludlum Model 2 pancake probe. Cloths or other materials generated during the performance of such tests will be subject to the same chain-of-custody requirements as are other samples.

d. Other Sampling Protocols:

1. For each contiguous area of elevated radioactivity, the peak measurement will be identified as closely as possible. Each such peak will be sampled using a pick axe or shovel that penetrates no greater than 6 inches into the subsurface of the site, and has a maximum cross section or diameter of 2 inches. The device will permit to the maximum extent possible, the removal of samples from the device in a manner that will maintain the structural integrity of the removed sample. Also, the top and bottom of each sample will be identified.

2. Where contamination is suspected to be the result of horizontal flow of a liquid across the land surface, as from a leak, spill or point of discharge, or where the radioactive emissions correspond roughly with visible discoloration of the surface, samples should be taken by scooping or scraping the contaminated surface and placing the material in a sample container.

3. Separate samples of active leaks, and/or of standing fluids or accumulations of material will be obtained. Where open or exposed areas of the internal portions of an item of equipment exist, samples of any accessible residues or encrustation should be taken.
4. The area extent of contamination at any pit or other areas where wastes or equipment have been discarded, disposed or accumulated will be determined using a conductivity meter which measures the conductivity of the soil.

5. As close as possible to the center of any suspected pit or area, at least one sample will be retrieved that will represent a continuous column of soil from the surface to a depth representing the greater of (a) 6 feet; or (b) 3 feet below the bottom elevation of the suspected it.

6. If necessary, sampling of the water of the ponds, creeks, streams, and other water bodies will be conducted in accordance with guidelines and procedures established by the U. S. Environmental Protection Agency and/or applicable and appropriate state procedures.

7. Sampling for airborne radioactivity should be conducted, if necessary. It will be accomplished using a sample pump system to draw air through a sample filter. To obtain valid results, minimum volume of $1.0 \times 10^6$ ml of air will be collected.

e. Laboratory Procedures:

Each sample should be numbered and precisely identified as to origin, including both depth and grid coordinates (or other indication of lateral position). All samples will be sent to a reputable laboratory for analysis.

Regardless of the method chosen for handling of samples, chains of custody will be recorded and maintained for each sample. The sample should be stored in accordance with applicable regulations governing placarding and labeling and other restrictions.

**TRAINING / HEALTH, SAFETY, AND STORAGE**

a. Monitoring Personnel for Contamination:

1. Anyone who has been working in a restricted area should have a whole body frisk using a pancake type probe, before leaving the site.

2. The scintillation devices do not measure the amount of radiation actually interacting with our bodies and causing biological damage.
For this, each employee will be given a thermoluminescent dosimeter (TLD) or a film badge. These devices are very similar to scintillation detectors except that they store energy from radiation until heated. Alpha will be regulated to minimize the internal exposure of personnel by preventing or minimizing the inhalation or ingestion of alpha contamination.

3. Other training will include educating the employees concerning radioactive elements and how to protect themselves from the radiations.

b. Safety:

The contamination will be controlled by identifying the contaminated areas to make other workers aware of the problem. Posting of contaminated areas with warning signs, barrier tapes, or rope shall warn other workers that the possibility of contamination exists.

The building of long-lived radon decay products (specifically lead-210) in gas pipelines requires that specific procedures be implemented for inspection and maintenance personnel to ensure their safety when working on the internal parts of equipment and facilities where radon may be present. If these compounds are found to be significant, the following precautionary safety measures to maintenance personnel should be taken.

1. When employees open equipment and vessels, precautions must be taken to prevent exposure to radioactive contamination.
2. Maintenance procedure will include the use of respirators and good hygiene to prevent inhalation of radioactive materials.
3. Grinders, if necessary, should be sprayed wet to minimize the dust.
4. Although pipelines and equipment in dry-gas service may be only marginally contaminated, filter assemblies in dry-gas service may be contaminated with very high concentrations of NORM and require special handling to prevent inhalation of the radioactive dust and contamination of the environment during changing of the filters and other required maintenance.
HEALTH EFFECTS & PERSONNEL EXPOSURE MONITORING

It is important to control the exposure of personnel to NORM. If harmful levels of radiation contact body tissue or organs, biological damage may occur in the individual exposed or their descendants, which may increase the risk of cancer or birth defects.

Exposure to NORM can be external by working in an area where contaminated equipment or materials are present. Additionally, exposure can occur through the inhalation or ingestion of NORM in the form of dust, radon gas or contaminated water.

Ra-226 is a long lived nuclide (1620 year half-life) which can concentrate in bones if ingested and emit very energetic alpha particles. Ra-226 decays to Rn-222 gas, which has a half-life of 3.2 days. Rn-222 gas decays in Pb-210, Bi-210 and Po-210, which are particulates. If inhaled, these particulates can become entrapped in airways where their radioactivity can damage nearby cells.

Work places where surveys indicate radiation levels which would constitute a radiation area (5 millirem/hr), an area where 2 millirem/hr is present, or areas where an occupational dose in excess of 25% of the permissible exposure limit (P.E.L.) could occur (.50 millirem/hr), shall require employees to utilize personal dosimeters and record personal radiation exposures.

These personal exposure records will become a part of the employee’s permanent medical records and should be forwarded to the company Safety Representative on a quarterly basis.

PERMISSIBLE DOSES, LEVELS AND CONCENTRATIONS

<table>
<thead>
<tr>
<th>PART OF BODY</th>
<th>REMS PER CALENDAR QUARTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole body; head and trunk; active Blood forming organs; lens of eyes, and gonads</td>
<td>1.25 Rem (1250 millirem)</td>
</tr>
<tr>
<td>Hands and forearms; feet and ankles</td>
<td>18.75 Rem (18,750 millirem)</td>
</tr>
<tr>
<td>Skin of whole body</td>
<td>7.5 Rem (7,500 millirem)</td>
</tr>
</tbody>
</table>
NORM SURVEYS

NORM Surveys should be conducted at facilities every year when the current level is from 20-49 our/hr, and every two (2) years for levels between 0-19 our/hr or two (2) years, or, when production characteristics of the well changes (i.e., different formation, increased water, etc.) or when a recompilation or work over occurs to determine if Naturally Occurring Radioactive Materials are present at concentrations high enough (50uR/hr) to warrant work over protection, and regulation by state agencies. These surveys are conducted with scintillation detectors (Ludlum Model 19 and 3A).

Once a facility becomes a licensed facility, (reading at or above 50 our/hr), all materials must be handled as radioactive materials unless survey results indicate that the radioactivity of the material does not exceed background radiation levels. Handling procedures are discussed in another section of this document.

Surveys should be conducted to verify that handling and decontamination procedures are adequate to protect personnel and the surrounding environment.

NORM contaminated materials which are placed in containers shall be surveyed and the activity of the materials shall be indicated on the container label (see Site Safety & Health Section).
SURVEY INSTRUMENTS

READ, UNDERSTAND AND FOLLOW THE MANUFACTURER’S INSTRUCTIONS PERTAINING TO THE INSTRUMENT.

Portable survey meter detectors (probes) are fragile and subject to damage or destruction if not handled properly.

General care for all meters is:

- Connecting cables should not be sharply bent.
- Battery contacts should be kept clean.
- Always keep the survey instrument and probe clean and free of NORM residue (use plastic bags over probes when necessary).
- Remove the batteries when the unit is not in use.

NORM survey instruments shall be calibrated by the manufacturer or a manufacturer’s authorized repair/calibration agent at least semi-annually. Meters, detectors (probes) and connecting cables are calibrated as a unit. Switching components between units voids the calibration.

INITIAL AND FOLLOW-UP SITE SURVEY PROCEDURES

Prior to each use (once daily if multiple surveys are conducted the same day) instrument operational checks should be conducted to verify proper operation. After connecting the detector (probe) to the meter via the cable, the following operational check should be conducted:

- Battery check – switch the meter dial to the “Battery” position and observe that the meter indicator moves into the remains in the accepted range.
- Source check – expose the detector (probe) to a source of radioactivity of known strength and confirm that the meter registers a reading +/- 15% of the known strength of the sources.

If the meter is more +/- 15% of the known strength of the source it must be returned to the manufacturer or authorized manufacturer’s agent for calibration prior to use.
Once the meter is properly assembled and the calibration check successfully performed, obtain and record the background radiation at the location to be surveyed.

Conduct the background check at least 50 feet from paved surfaces, production equipment, buildings or work areas.

- Obtain and record readings while facing north, east, south and west.
- The average of the four readings is that reference background radiation for that particular site.

**NOTE:** Background radiation concentrations vary. Nationally the average is 10 our/hour. Some sites have background readings as high as 40 our/hr.

Proceed with the survey after placing the meter on fast response and the highest meter reading. If a highly variable source is found, causing rapid (unreadable) meter deflection, use the slow setting to slow needle movement.

Gradually adjust the scale selector switch down to obtain the correct reading.

Detectors (probes) should be placed close to (e.g., on) the suspected source. Gamma radiation probes can be protected from contamination with plastic bags.

The person taking the survey must be careful that contaminated bags are replaced or cleaned before the next reading is obtained. Otherwise, the reading may include the contamination on the bag carried from the first locations. Place probe inside hydrocarbon free equipment openings or over both ends of piping or tubing and rotate slowly. 100% of a “potentially” contaminated are (piece of equipment) must be surveyed prior to removal from the site. The probe must be placed within one centimeter of the surveyed surface.

**ISOTOPE ACTIVITY SURVEY PROCEDURE**

As previously discussed, the activity (Pico/gram) of an isotope is of special interest when determining disposal options, site redemption, or transportation of NORM contaminated materials from a licensed facility. The analytical procedure for establishing these concentrations is outlined and should be utilized only by trained personnel only.
DOCUMENTATION

The following documentation shall be available at the licensed facility and made available for inspection:

- NORM surveys of the work site.
- Records showing receipt, storage, transfer and disposal of all sources of radiation.
- Employee exposure records (Form DRC4 or similar).

The following documentation shall be posted at the licensed facility and made available for inspection:

- Title 33 Part XV, Nuclear Energy, Chapters 4 and 10
- The license or certificate of registration and documents incorporated into the license.
- Operating procedures (this plan).
- Any notice of violation.
- If impractical to post the above, it is acceptable to post a notice indicating where the documentation may be examined.
- Form DRC-3 – Notice to Employees

NORM Survey forms should be performed and retained for all facilities (both regulated and unregulated) in the following circumstances:

- Initial and periodic (every 2 years) surveys of operating equipment.
- All equipment involved in material transfers.
- All materials which are scheduled for disposal.
- When purchasing used oil and gas equipment.

Copies of these surveys shall be kept by the group who will operate or have possession of the equipment and a copy shall be sent to the company Safety/Environmental Representative.

The NORM “Information Sheet” shall be utilized as a Material Safety Data Sheet (MSDS) to inform personnel of the potential hazards associated with NORM. This sheet shall be provided to the transporter and end receiver of NORM contaminated materials and equipment. A completed NORM Survey form should be included with all manifests, transfer papers, etc., to indicate a non-regulated level.
DISPOSAL REQUIREMENTS

Disposal requirements for non-licensed facilities will generally be regulated by the type of material being scheduled for disposal (i.e. NOW waste, industrial waste, hazardous waste, etc.). However, NORM surveys shall be performed and documented for all materials that will be sent to disposal facilities. Disposal facilities may have restrictions for survey results that may be more restrictive than State regulations. Immediately notify your Environmental Representative if NORM surveys exceed 45 our/hr from a non-licensed facility.

Disposal requirements for licensed facilities must observe the 30 picoCurie/gram limitation for all materials in the State of Louisiana. All materials (including NOW wastes) which have an activity level at or above 30 peccaries/gram may not be land disposed of in the State of Louisiana. Contract your Environmental Representative to discuss disposal options for these materials. Materials that have an activity below 30 peccaries/gram may be disposed of referencing the facilities’ Waste Management Plan.

TRANSPORTATION REQUIREMENTS

The Department of Transportation (DOT) regulates the transportation of hazardous materials affecting interstate commerce through its regulations in 49 CFR Part 171-180. Intrastate transportation of hazardous materials are regulated by state agencies which have generally adopted the federal regulations.

DOT DEFINITIONS

In addition to substances listed in the DOT’s Hazardous Material Tables (49 CFR Part 172.101), DOT regulates the transportation of radioactive materials (any materials having a specific activity greater than 2,000 peccaries/gram). Materials having a specific activity between 2,000 peccaries/gram and 100,000 peccaries/gram are defined by DOT as Low Specific Activity (LSA) material. Most NORM from oil and gas operations is below 2,000 peccaries/gram and therefore is not defined as LSA.

Oilfield waste containing NORM at levels above 2,000 peccaries/gram are considered to be LSA for DOT purposes and are required to comply with DOT regulations for shipping papers, container packaging and marketing requirement, and emergency procedure information. Below is a summary of those requirements:
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Shipping Papers (49 CFR 172.202)

Shipping papers must include the proper shipping name, hazard class, identification number, quantity, reportable quantity designation, each radionuclide, chemical and physical description, activity in each package, category of label applied and shipper certification. The shipping papers description should read: RQ, Radioactive Material, Low Specific Activity (LSA), N.O.S. – UN 2912, number of drums or total weight, RA-226, solid, number of microcuries, Radioactive White I or Radioactive Yellow I, and the transport number for radioactive Yellow II.

Marketing (49 CFR 172.301 and 310)

Packages less than 110 gallons capacity must be marked with the proper shipping name, identification number, weight, and type package. Packages greater than 110 gallon capacity must be marked as Radioactive LSA, UN 2912, Type A package.

Labeling (49 CFR 172.400.403 and 406)

The labels used must correspond to the dose rates:

Drums less than 500 our/hr must be labeled White I. Drums greater than 500 our/hr but less than 50,000 our/hr must be labeled Yellow II. The labels must be placed on opposite sides (not top or bottom) of the drum.
Packaging (49 CFR 172.504)

The package required for transporting Radioactive LSA is a DOT specification 7A. The documentation for a 7A package must be kept by the shipper.

Placarding (49 CFR 172.504)

No placarding is necessary or would be required under DOT regulations, if shipped in this manner.

Emergency Response Information (49 CFR 172.600)

A Material Safety Data Sheet or equivalent document with a 24 hour emergency response telephone number must be sent with the shipment.

Levels Below 2,000 peccaries/gram

Oilfield equipment and wastes containing NORM at levels below 2,000 peccaries/gram are not regulated by DOT, but should meet the minimum requirements as outlined below.

Shipping Papers

A shipping order, bill of lading, manifest, or other document should accompany the NORM shipment which will identify the material as Naturally occurring Radioactive Material, the container identification code, the amount of NORM being transported, the dose rate in millirem/hour (see Figure 8.1), the consignee and consignor, and emergency response information.

Packaging

The package used for shipping NORM should be designed and constructed to prevent release of NORM to the environment. Loose or free NORM should be shipped in DOT approved closed containers. Equipment contaminated with NORM should be shipped with all openings closed and/or sealed.
Marketing

The package should be marked “This End Up” or “This Side Up” when applicable. The package should also be marked with the surface dose rate in microroentgens/hr, location, type of material, Caution Radioactive Materials (see Appendix VII).

Labeling

The NORM packaging should be labeled on two sides:

WARNING
NATURALLY OCCURRING RADIOACTIVE MATERIALS
DO NOT OPEN – AVOID BREATHING DUSTS

SITE SAFETY & HEALTH PROCEDURES

The following guidelines address practices for handling and storage of NORM so that employees at sites are not exposed to excessive levels of radiation.

Notification of Employees and Contractors

Employees or contractors who enter licensed facilities should be informed of the presence of radioactive materials, the safety problems associated with exposure to radioactive materials, and the methods of minimizing exposure to radiation. This will be accomplished by posting the State Form DRC 3 – “Notice to Employees”, a copy of applicable State regulations and through the site safety orientation.

Warning Signs

All licensed facilities shall be identified with signs at all entrances, bearing the three-bladed radiation symbol (magenta blades on yellow background) and words such as “Caution, Radioactive Materials”. If whole-body radiation exposure at any point within the storage area exceeds 5 millirem/hour, or exposure could exceed 100 millirem for any 5 consecutive days, the sign should contain the words “Radiation Area”.
Container Labeling

All containers containing NORM shall be labeled. The label shall contain the following wording and should include an identification code that corresponds to permanently maintained records of the material (date stored, type and source of material, radiation measurements, etc). Separate labels are not needed for each joint of casing, tubing or pipe if the joints are stored together.

CAUTION – RADIOACTIVE MATERIAL

Storage

Containers and equipment containing NORM should be stored in a secure ventilated area with limited access. If the NORM material is stored at a site with conventional oilfield equipment, the NORM area should be appropriately marked, and access should be limited to authorized personnel. To minimize radiation levels at the perimeter, material with higher radioactive levels should be stored near the center of the area. Containers or equipment containing NORM should be secured against unauthorized removal from the storage area. Loose NORM (scale from tubing, sludges from vessel cleaning, etc.) should be stored in sealed and marked containers on pallets or racks. Containers and equipment should be handled, moved and stored in such a way to prevent the escape of loose radioactive material into the environment. Containers and equipment should be inspected monthly and should be immediately repacked or resealed if found to be leaking.

All openings on stored equipment or tubing containing NORM should be capped, plugged or wrapped in plastic to prevent the spread of radioactive materials.

To protect soil, surface water and ground water from contamination in the NORM storage area, plastic ground covers should be utilized when handling unsealed containers or equipment. NORM waste that falls on the plastic cover should be recovered and stored in sealed containers. Water discarded for unrestricted release should not exceed 30 peccaries/liter.
Routine Work Practice Procedures

During normal operating conditions at NORM contaminated sites, external exposure is below levels of concern. Consequently, no changes to normal work procedures are required. However, during well workovers and P&A’s, equipment maintenance, equipment handling and/or repair and vessels entry, employees may have direct physical contact with NORM contaminated sand, scale and sludges. The following work practice procedures should be followed when working with NORM contaminated materials to minimize any potential internal exposure hazards.

1. Employees and contractors should be advised of the presence of NORM and of the procedures to minimize exposure.
2. Eating, drinking, smoking, chewing, or applying cosmetics should not be allowed in the immediate work area where NORM contaminated equipment and/or soil is being handled.
3. Opening on NORM contaminated equipment should be capped, sealed or wrapped in plastic to minimize the generation of any dust or the displacement of scale or sludge that may contaminate the surrounding soil.
4. Personnel radiation exposures at NORM contaminated sites should be evaluated as discussed in HEALTH EFFECTS & PERSONNEL MONITORING.
5. When moving, handling or transporting tubular or other open equipment that has been identified as NORM contaminated, every effort should be made to eliminate or contain scale and dust. Approved personal protection equipment (e.g. boots and gloves) shall be worn.
   a. Gloves – latex rubber or neoprene
   b. Boots – rubber work boot
   c. Coveralls – rubber slicker suits or impermeable disposable paper suit are recommended
   d. Respirator – as listed above
6. NORM scale and sludge materials should be kept wet to minimize dust generation during handling.
7. If the work required on the equipment has the potential to generate airborne particulate, an approved respirator for radionuclides must be worn in addition to gloves, boots and
coveralls. This applies even if the material is wet. Such work may include cutting, grinding, drilling, polishing or welding. At a minimum, the approved respiratory protection should consist of a half face-piece respirator approved for radionuclide dust. These respirators have a magenta or hot pink color code. Full face-piece as well as supplied are type respirators are other options.

8. Temporary plastic ground covers should be used when or where possible to contain any displaced NORM contamination and to facilitate cleanup when work such as cutting, grinding, drilling, etc., is performed on NORM contaminated equipment. Concrete paving should be considered wherever repetitive cleaning is done.

9. After working on contaminated equipment, personnel should wash their hands and face before eating, drinking, smoking, chewing or applying cosmetics to prevent any possible ingestion of NORM contaminated material.

VESSEL ENTRY PROCEDURES

The following vessel entry procedures are required for NORM contaminated vessels.

Ventilate the vessel. In addition to eliminating most hydrocarbon vapors, this will also remove any radon that the NORM deposits may have generated. The ventilation period should be at least four hours for the purpose of allowing the decay of short lived radon daughters to insignificant levels.

**NOTE:** These instruments are not intrinsically safe. There is some potential for sparking when detector cables are connected or disconnected, or when switches are turned on or off. Where explosive atmospheres may be encountered, explosive gas measurements should be made prior to the radiation survey.