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Sent via Overnight Mail and Email

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Decommissioning & Uranium Recovery Licensing Directorate
Division of Waste Management & Environmental Protection
Office of Federal and State Materials & Environmental Management Programs
U.S. Nuclear Regulatory Commission 11545 Rockville Pike
Rockville, MD 20852-2738

**Subject: License SUA-1341, Docket No. 40-8502
Willow Creek Project
Submittal of Requested SOP's**

Dear Mr. Linton:

In accordance with License Conditions 9.8, and 9.12 of the above referenced license, Uranium One is submitting for review and verification of the following Standard Operating Procedures (SOP's):

- a) Contamination Control Plan (CCP) as specified in License Condition 9.8 is provided in Attachment 1.
- b) Resin Truck survey and specific training outline for personnel other than RSO or RST performing radiological surveys of resin trucks as specified in License Condition 9.12 is provided in Attachment 2.
- c) Training provided to Radiation Safety Officer (RSO) designee to perform daily and weekly inspection in the temporary absence of the RSO or Radiation Safety Technician as specified in License Condition 9.12 is provided in Attachment 3.

This correspondence is intended to meet the requirements for submittal of the above specified SOP's within 90 days of license renewal for SUA-1341.

Should you have any questions or need additional information in regards to this matter please contact Jon Winter at (307) 234-8235 ext. 331 or jon.winter@uranium1.com or myself at (307) 234-8235 ext.330 or scott.schierman@uranium1.com.

Sincerely,

A handwritten signature in blue ink that reads "Scott Schierman".

Scott Schierman
Sr. SH&E Specialist

cc: Donna Wichers
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Attachment 1

Contamination Control Plan

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1 PURPOSE

This Wellfield Contamination Control Plan describes how Uranium One handles equipment, materials and tools at wellfield areas and Module Buildings that are potentially contaminated with natural uranium radioactive materials from the in-situ recovery (ISR) mining process. The main purpose of the plan is to ensure that the handling and movement of contaminated equipment around, from and to wellfield areas and the Satellite facility, does not result in the uncontrolled release and contamination of non-operational (unrestricted) areas within the license area. This plan is intended to assist in ensuring that the potential release of radioactive contamination throughout the Willow Creek license area is kept As Low as Reasonably Achievable (ALARA).

Equipment and materials addressed in this Standard Operating Procedure (SOP) remain within the control of Uranium One and are utilized or stored in controlled or restricted areas within the Willow Creek Facility. Equipment or materials that are released outside the control of Uranium One requires that these items be physically surveyed to meet the guidelines for unrestricted use as described in License Condition 9.8 and SOP HP-10 "Equipment or Materials Release to Unrestricted Areas".

2 DEFINITIONS

Restricted Area means an area, access to which is limited by the licensee for the purposes of protecting individuals against undue risks from exposure to radiation and radioactive materials. At the Willow Creek facility the Christensen Satellite Plant, Irigaray Central Processing Plant and wellfield Modular building are considered Restricted Areas. Wellfield Modular Buildings are considered restricted areas due to elevated gamma levels and are posted as a "Radiation Area" as required.

Radiation Area means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent of 0.005 rem (5 mrem) in 1 hour. At the Willow Creek facility areas typically posted as "Radiation Areas" result from elevated external radiation levels associated with stored yellowcake, certain process tanks, and filter systems.

Contaminated Equipment means equipment or materials that have been potentially exposed to ISR licensed materials and could have radiological contamination present above background levels.

Controlled Area means an area, outside a restricted area but inside the site boundary (license area), access to which can be limited by the licensee for any reason. Wellfields at the Willow Creek facility are considered a Controlled Area as they are fenced and posted as "Any Area Within This Facility May Contain Radioactive Material".

Unrestricted Area means an area, access to which is neither limited nor controlled by the licensee. At the Willow Creek facility areas between wellfield and/or the Satellite Facility that are not specifically fenced by Uranium One are considered unrestricted and non-operational areas.

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Release means the act of abandonment or to relinquish control of equipment/materials for purposes of unrestricted use. Release of surface contaminated equipment, materials, or packages from restricted areas shall be in accordance with the NRC guidance document "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated April 1993 (ADAMS Accession No. ML003745526) (the Guidelines) or suitable alternative procedures approved by NRC prior to any such release (NRC, 1993). These releases must be conducted by a member of the Radiation Staff and documented.

Survey means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. A survey can be a visual assessment of potential surface contamination resulting from contact with ISR mining fluid which contain uranium. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurement or calculations of levels of radiation, or concentrations or quantities of radioactive materials present. A physical survey for the location and concentration of radiation levels present on equipment/materials will be performed for items released for unrestricted use.

3 APPLICABILITY

This procedure is applicable to all Willow Creek personnel that during the course of their job duties are required to transport potentially radioactive contaminated materials and equipment from operational areas through non-operational areas for use at other wellfield operations within the Willow Creek facilities, transport to the Satellite, or for disposal as 11e (2) by product material.

4 DISCUSSION

Uranium One has developed the Wellfield Contamination Control Plan to assist site personnel with the performance of their daily activities and ensure the proper implementation of control practices to limit the spread of radiological contamination from natural uranium. This plan is intended to assist in ensuring that the potential release of radioactive contamination throughout the Willow Creek license area is kept ALARA.

NRC regulations require that materials and equipment potentially contaminated with radioactive material at restricted areas, or other locations at ISR operations, be surveyed for contamination prior to unrestricted release from the control of the licensee to ensure that radioactive contamination release levels are not exceeded.

The alpha survey is the primary survey method used to determine surface contamination from uranium at ISR operations. The beta-gamma survey is also used to identify contaminated material. The beta-gamma survey is especially important when the equipment or material requiring release is of an irregular shape(s) and does not readily allow scanning with an alpha detector, or the potential contamination could be covered by an alpha absorbing material such as dust, dirt, or paint. These

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release protocols are discussed in Standard Operating Procedure (SOP) HP-10 Equipment or Materials Released to Unrestricted Areas.

5 RESPONSIBILITY

The Mine Manager with assistance from the Radiation Safety Department and the Radiation Safety Officer (RSO) are responsible for implementing and following this procedure.

6 PROCEDURE

6.1 Types of Contaminated Equipment Uranium One considers that equipment such as filters, pipe, tools etc that come in contact with ISR uranium production fluids are considered contaminated with uranium above background levels unless a radiological survey is conducted which verifies otherwise. Typically, contamination is greater on the inside surface of pipes, valves, flow meters and similar equipment where scale like deposits can accumulate from contact with production fluids. The external surfaces of these types of equipment typically have significantly less contamination, which may not even be easily visible. The potentially contaminated equipment at the wellfield and Modular Buildings include:

Wellfield

- Wellfield pumps
- Piping utilized within the wellfield and in production and injection wells
- Valves which have been in contact with production fluids or air relief valves
- Electrical cable/wires used to power pumps in production wells
- Well casing

Modular Buildings (Header Houses)

- Piping
- Valves/flow meters
- Filters and filter canisters
- Booster pumps
- Floor grates
- Basement floor surface
- Possibly inside walls/roof of the building

Note: wiring and fuses inside of electrical panels or other enclosed equipment is typically not considered to be contaminated.

If there are any questions regarding whether equipment is contaminated, the levels of contamination present, or proper transport or disposal procedures contact the Radiation Safety Department.

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6.2 Contamination Control Practices

- a) Employees must wear the appropriate PPE when handling potential contaminated equipment. At a minimum, this includes the use of gloves suitable for the conditions.
- b) Equipment must be transported by Uranium One employees using company wellfield or maintenance vehicles that do not leave the licensed area for unrestricted release without the proper radiological contamination surveys and documentation.
- c) If a visual inspection of the equipment shows contamination that appears loose, or easily removable, the equipment shall be placed in a plastic bag, chest, or other suitable dedicated container to catch any contamination that could fall off the equipment during transport, prior to placing it in the truck for transport.
- d) Contaminated equipment transported in company vehicles will be removed from vehicle in a timely manner at the appropriate area of the facility. If equipment requires storage at a Restricted Area it will be unloaded as soon as possible.
- e) Contamination control practices for common equipment include the following :

Wellfield

Wellfield pumps- are allowed to drip dry or are wrapped/packaged upon removal from the well prior to transport.

Piping- small pieces of pipe should be placed in a plastic bag, chest, or other suitable dedicated container. Large pieces of pipe such as trunk line, downhole tubing and well casing shall be evaluated for loose material inside the pipe. If loose material is present that could come out during transport the ends of the pipe should be sealed with a cover, tape, or plugged.

Valves- small valves should be placed in a plastic bag, chest, or other suitable dedicated container. Large valves may need to have the ends sealed, similar to pipe above.

Electrical cable/wires used to power pumps in production wells these materials are typically only slightly contaminated and can be placed directly in the truck bed. If significant loose contamination is present, it should be placed in a plastic bag, chest, or other suitable dedicated container.

Well casing materials are typically only slightly contaminated and can be placed directly in the truck bed.

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Modular Buildings (Header Houses)

Piping- piping at these facilities is typically limited to small pieces. They should be placed in a plastic bag, chest, or other suitable dedicated container.

Valves/flow meters- these are typically limited in size and they should be placed in a plastic bag, chest, or other suitable dedicated container.

Filters and filter canisters- filter canisters should have the opening secured prior to loading. Filters are drip dried or fed through a ringer to remove excess water prior to placing in new plastic bags for transport to the by-product material dumpsters.

Tools Used within Wellfields and Modular Buildings

Tools utilized in wellfields and module buildings will, to the extent practicable, be kept free of visually loose contamination. If required to be cleaned, tools are washed at the Satellite facility.

Tools utilized in wellfields and module buildings are stored at module buildings or in a designated area with the vehicle (such as a fixed or dedicated portable tool box).

- f) Contaminated equipment or materials not utilized within the wellfield or satellite facility will be stored in a controlled or restricted area of the Willow Creek Facility until released for unrestricted use or disposed of as 11 e (2) by product material. Any questions on appropriate storage locations should be directed to the RSO or your supervisor.

6.3 Transportation of Potentially Contaminated Equipment

To minimize the potential for the spread of contamination resulting from a vehicle accident carrying potentially contaminated equipment though non-operational, unrestricted areas to a wellfield or Satellite facility the following is required:

- Company vehicles utilized to transport contaminated equipment will be equipped with a radio for communication with the Satellite or main office personnel.
- If an accident occurs during transport of contaminated equipment the Radiation Safety Department and the supervisor must be notified immediately. If any contaminated equipment is thrown out of the vehicle as a result of the accident, or there is the possibility that contamination could be spread, mark the locations and notify the Radiation Safety Department immediately. In the event of an accident in which injuries are involved treatment of the injured individuals take precedence over radioactive contamination actions.

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The RSO or designee will investigate the event, assess if there was any spread of contamination, determine if any cleanup is needed, and assure cleanup is completed. The RSO or designee will document these activities in an incident report.

7 ROUTINE RADIOLOGICAL SURVEYS

In accordance with Section 5.7 of the approved license application the following surveys are conducted to augment the Wellfield Contamination Control Plan, as follows;

- Wellfield personnel entering Modular buildings or handling equipment or materials with the potential to have radiological levels above background from ISR licensed materials on their hands and clothing will perform an alpha contamination survey upon return to Satellite Facility or alpha survey at a location at the wellfield as provided.
- Quarterly spot alpha surveys will be conducted of by the Radiation Safety Department to observe and document employee practices and assess contamination levels on clothes.
- Quarterly alpha surveys will be conducted by the Radiation Safety Department on the site vehicles. Any vehicles with alpha contamination levels above the release criteria established in Table 2, Regulatory Guide 8.30 will be decontaminated and the cause investigated by the RSO.
- Quarterly alpha surveys will be conducted by the Radiation Safety Department on tools used at wellfield areas. Any tools with alpha contamination levels above the removable release criteria established in Table 2, Regulatory Guide 8.30 will be decontaminated and the cause will be investigated by the RSO.

The RSO will evaluate the results of the routine radiological surveys as a tool to measure the effectiveness of the site contamination control practices in minimizing the tracking of contamination to non-operational areas.

Attachment 2

Resin Truck Survey SOP and Training Outline

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1. PURPOSE

The Uranium One Willow Creek Uranium Project routinely ships radioactive materials to and from its uranium production facilities. These shipments typically fall into one of four categories:

- The most common type of shipment consists of ion exchange resin shipped between the Christensen Ranch satellite plant and the Irigaray central plant facility.
- The second type of shipment consists of dried yellowcake that is shipped from the Irigaray central plant by truck for further processing.
- A less common type of radioactive material shipment involves shipping radioactive waste (or byproduct material) to a licensed disposal site.
- Uranium One also routinely ships liquid and solid samples that may contain radioactive materials. Shipments of these materials require that a determination be made whether they meet the DOT definition of a radioactive material shipment and, if so, whether they may be shipped as an excepted package.

Uranium One also accepts radioactive materials shipments in the form of empty drums containing residual yellowcake from the fuel processing facilities.

2. REGULATORY REQUIREMENTS

The Department of Transportation (DOT) regulates all radioactive materials shipments under 49 CFR Subchapter C, "Hazardous Materials Regulations". In particular, the following regulations apply:

- Packaging - 49 CFR Part 173: Subparts A, B, and I.
- Marking and labeling--49 CFR Part 172: Subpart D and Subpart E.
- Placarding--49 CFR Part 172: Subpart F and Appendices B and C.
- Accident reporting--49 CFR Part 171: §171.15 and §171.16.
- Shipping papers and emergency information--49 CFR Part 172: Subparts C and G.
- Hazardous material employee training--49 CFR Part 172: Subpart H.
- Hazardous material shipper/carrier registration--49 CFR Part 107: Subpart G.
- Routing--49 CFR Part 397: Subpart D.

NRC also has requirements for transportation of radioactive materials:

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- 10 CFR §20.1906—Procedures for receiving and opening packages of radioactive materials.
- 10 CFR Part 71—Packaging and transportation of radioactive materials.

This section describes actions that will be taken to ensure that the receipt and shipment of radioactive materials meets the applicable regulations.

3. RESPONSIBILITIES

3.1. Mine Manager

The Mine Manager is responsible for assuring that all shipments are prepared in accordance with Federal and State rules applicable to shipping radioactive material, and that the shipment meets the applicable waste acceptance criteria for the receiving facility.

The Mine Manager is responsible for ensuring that all applicable standards have been adhered to before the shipment leaves the property. The Mine Manager will ensure the individuals loading or handling radioactive materials for shipment are aware of the necessary procedures to initiate and complete the task. The Mine Manager will also be responsible for shipping arrangements and the necessary documentation to ship radioactive materials on public highways. The Mine Manager will be responsible for arrangements with the consignee to receive the shipment including sending consignee a list containing the weight and contents of each container, pre-shipment notification of departure and estimated arrival of the shipment.

3.2. Radiation Safety Officer (RSO)

The Radiation Safety Officer (RSO) is responsible for ensuring the radioactive material shipment is acceptable for shipment including the necessary documentation, radiological surveys, and placarding prior to release.

3.3. Radiation Safety Technician (RST)

The Radiation Safety Technician (RST) is responsible for performing the radiological surveys associated with radioactive material shipments to comply with DOT regulations. The RST will ensure that applicable placarding is displayed on the required sides of the trailer before release.

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3.4. Individual

The individual performing work is responsible for the safe and proper loading and handling of radioactive materials as outlined in the appropriate procedures.

4. RECEIPT AND INSPECTION OF EMPTY DRUMS

4.1. General

Empty drums are generally supplied by the fuel processing facility. These drums are reused as much as possible to minimize the generation of byproduct material. The fuel processing facility is responsible to ensure that drums that are shipped for reuse are acceptable for the intended use and meet the requirements of DOT for packaging for radioactive materials. Similarly, it is the responsibility of Uranium One to ensure that any drum used for packaging yellowcake meets these same regulatory requirements. Therefore, it is important that incoming shipments of drums be inspected during unloading for physical condition and compliance with the regulations.

4.2. Drum Receiving and Inspecting

Upon arrival, an incoming shipment of drums will be moved to the unloading area. The employee accepting the shipment will review the shipping papers. Drum shipments are made in exclusive-use vehicles as "excepted packages for limited quantities of radioactive materials". These shipments are excepted from shipping paper requirements other than they must have a notice stating that the package conforms to 49 CFR §173.428 for radioactive material, excepted package-empty package, UN2910. Since empty drums are excepted packages, the NRC requirements for surveys in 10 CFR §20.1906 do not apply unless there is evidence of damage or degradation to the package integrity. In these cases, the empty drum must be surveyed as soon as practical after receipt but not later than 3 hours after the package is received at the facility. The NRC allows that if the shipment is not received during normal working hours, it must be surveyed with 3 hours from the beginning of the next working day.

Upon opening the trailer, to the extent practical, a visual inspection will be performed before unloading the drums. The contents will be inspected to ensure that the load has not shifted during shipment and that the visible drums are in an unimpaired condition and securely closed so that there is no leakage of radioactive material. Radiation and contamination surveys will be performed using the instructions contained in SOP HP-1, HP-2, and HP-3. This monitoring is to ensure that the empty drums meet the following limits from 49 CFR §173.421. Surveys will also be performed if there is evidence of degradation of the package integrity such as packages that are crushed, wet, or damaged.

Radiation level on external package surface: 0.5 mR/hr (0.005 mSv)

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Loose contamination, low toxicity alpha emitters: 22 dpm/cm² (2,200 dpm/100 cm²)

The RSO or designee will determine whether air monitoring is required during the unloading operation. Any air monitoring for airborne radioactive material will be performed in accordance with the instructions contained in SOP HP-6 and/or HP-18.

Due to the unknown extent of potential uranium contamination on the drums and in the trailer, other potential airborne contaminants from other types of shipments, and the confined nature of the trailer, the RSO or designee will determine whether respiratory protection is necessary for workers who enter the trailer to unload drums or clean the trailer afterwards.

Drums will be unloaded and placed in the drum storage area. Drums will not be subjected to rough handling during unloading operations that could cause damage or the leakage of radioactive material. Drums will be inspected for evidence of damage or leakage. The RSO or designee may perform surveys at any time during unloading operations to ensure that the radiation limits (contamination & surface) are not exceeded. If visible yellowcake is detected on the outside surface of the drums, unloading operations will cease and the RSO will be notified.

Drums will be visually inspected during unloading for proper labeling (if required) and specification marking. The specification marking indicates that the drum conforms to DOT specifications and is permanently stamped on the side of the drum. The marking will include "1A1" (steel drum, open-top). The specification marking will also contain the maximum net weight in kilograms. Drums intended for yellowcake packaging should be marked with "400S" (or higher), indicating a design specification of 400 kg (886 pounds) of solids.

Any drums that do not meet the requirements for physical integrity, labeling (if required), specification marking, radiation level, or loose alpha contamination will be segregated. The RSO will be notified and appropriate action will be taken. Drums that exceed the contamination or radiation level limits in 10 CFR §71.87(i) and §71.47, respectively must be reported to the transport carrier and the NRC Operations Center. Drums that do not meet the physical integrity requirements may not be used for packaging yellowcake unless they are properly reconditioned (49 CFR §173.28(c)). This type of reconditioning is typically performed by a company specializing in drum reconditioning.

Following completion of unloading operations, the interior of exclusive-use trailers must be surveyed for radiation levels and loose radioactive material. The trailer must meet the radiation and loose contamination limits.

After completion of the survey, the truck will be released or prepared for loading with full drums for shipment to the fuel processor.

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5. GENERAL INSTRUCTIONS FOR RADIOACTIVE MATERIALS SHIPMENTS

Willow Creek operations will routinely make shipments that may meet the definition of radioactive materials and require shipment under the DOT and NRC regulations. These shipments include environmental monitoring samples (e.g., water, air filters, soil, and vegetation samples), operational monitoring samples (e.g., air sample filters, pond water samples), and process samples (e.g., ion exchange resin and yellowcake samples). In order to comply with the appropriate regulations, the following steps must be followed.

5.1. Materials Classification

Each shipment of materials that may contain radioactive materials must be classified in order to determine the appropriate controls that apply. Proper classification first requires an understanding of the following terms:

Consignment is defined by DOT as one or more packages that are shipped together with one carrier for delivery to on location.

Activity Concentration is the total activity per unit mass in a package.

The DOT regulations define a radioactive material (49 CFR §173.403) as any material that contains radioactive materials in excess of the activity concentration limits *and* the total activity in the consignment. If the material does not exceed both of these limits, it is exempt from shipment under the DOT hazardous materials regulations and *may not be* shipped as radioactive material.

In addition to classification according to the total activity of the consignment and the activity concentration, certain materials are also excluded materials under DOT regulations. These excluded materials are discussed in 49 CFR §173.401 and include "natural material and ores containing naturally occurring radionuclides which are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in § 173.436" (49 CFR §173.401(b)(4)). This exclusion would potentially apply to ore zone core samples shipped from Willow Creek for analysis by an outside laboratory provided that they meet the limitation specified.

In order to classify the materials in a shipment, the RSO or properly trained designee will determine the expected activity and mass for each consignment. In many cases the shipments will involve materials for which the actual activity is not known. Generally this will be the case for virtually all environmental, operational, and process samples. However, Willow Creek has an extensive database of analytical results for all types of samples that may be consulted to determine the expected total activity and activity concentration. It is acceptable to estimate the expected activity of a consignment using historical data to determine whether the consignment is a radioactive material. The RSO or designee will document the data and assumptions used to make this determination for each shipment.

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Once the expected consignment activity and activity concentration is determined, the RSO or designee will consult the limits contained in the table contained in 49 CFR §173.436, "Table of Exempt Material Activity Concentrations and Exempt Consignment Activity Limits for Radionuclides". This table lists the concentration and activity limits for all radionuclides. In order to meet the definition of radioactive material, a planned shipment must exceed *both* the activity concentration limit and exempt consignment activity limit. If the shipment does not exceed both, it must be shipped as a nonhazardous material and *may not be* shipped as a radioactive material.

For a shipment that potentially contains a mixture of radionuclides, the known or expected total activity and activity concentration of each radionuclide should be determined. The fraction of each radionuclide in the mixture is then compared to its exempt consignment value to determine the exempt consignment limit for the mixture using the following formula:

$$\frac{1}{\sum_i \frac{f(i)}{[A](i)}}$$

Where: f(i) is the fraction of activity concentration of nuclide i in the mixture
[A](i) is the activity concentration for exempt material containing nuclide i.

The total activity of the consignment is then compared to the exempt consignment limit for the mixture to determine whether the mixture must be shipped as a radioactive material.

5.2. Shipping Excepted Quantities of Radioactive Material

If a shipment meets the DOT definition of radioactive (or Class 7) material as discussed in Section 5.1, it must be shipped in accordance with DOT regulations. However, DOT regulations in 49 CFR §173.421 allow the use of reduced controls for shipping excepted quantities of Class 7 materials. Shipments may be excepted from certain DOT requirements if the activity per package does not exceed the limited quantity package limits specified in Table 4 in 49 CFR §173.425. Limited quantity package limits are defined as:

Normal Form Solids:	$10^{-3} A_2$ value
Liquids:	$10^{-4} A_2$ value

The following A_2 values are specified in 49 CFR §173.435 for radionuclides that may potentially be present in sample shipments from Willow Creek:

<u>Radionuclide</u>	<u>A_2 Activity (Curies)</u>
U-nat:	Unlimited
Ra-226:	8.1×10^{-2}

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Th-230:	2.7×10^{-2}
Pb-210:	1.4
Po-210:	5.4×10^{-1}

5.3. Procedure

The RSO or qualified designee shall review sample shipments to determine whether the excepted quantities may be exceeded for any radionuclides. Expected concentrations of radionuclides can be determined based on historical analytical results of similar shipments if the activity is not known.

If the shipment does not exceed the excepted quantities, it is exempt from DOT requirements for specification packaging, labeling, marking (except for the UN identification number marking requirement) and, if not a hazardous substance or hazardous waste, shipping paper requirements. This exemption applies as long as the following requirements are met:

1. Each package meets the general design requirements of 49 CFR §173.410. Generally samples are shipped in coolers to the contract labs. In any case the package must meet the following:
 - a. The package can be easily handled and properly secured during transport.
 - b. Each lifting attachment that is a structural part of the package must be designed with a minimum safety factor of three against yielding.
 - c. The external surface will be easily decontaminated.
 - d. The outer layer of packaging will avoid pockets or crevices where water might collect.
 - e. The package will be capable of withstanding the effects of any acceleration or vibration that may arise under normal conditions of transport without any deterioration in the effectiveness of the closing devices or in the integrity of the package.
 - f. The materials of construction of the packaging and any components must be physically and chemically compatible with each other and with the package contents.
 - g. All valves or openings through which the package contents could escape will be protected against unauthorized operation.
 - h. Packages containing liquid contents will be capable of withstanding without leakage, an internal pressure that produces a pressure differential of not less than 13.8 lb/in².

2. The radiation level at any point on the external surface of the package does not exceed 0.5 mrem/ hour);

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3. The removable radioactive surface contamination on the external surface of the package does not exceed 22 dpm/cm² (2,200 dpm/100 cm²);
4. The outside of the inner packaging or, if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive";
5. The package does not contain fissile material unless excepted by 49 CFR §173.453;
6. The outside of each package must be marked with the four digit UN identification number;
7. Reporting of incidents and contamination per DOT regulations is required; and
8. Personnel training requirements for hazardous materials shipments must be met.

6. ION EXCHANGE RESIN TANKER SHIPMENTS

Ion exchange resin shipments are routinely made between the Christensen Ranch satellite plant and the Irigaray central processing plant. These shipments consist of shipping resin tankers with loaded ion exchange resin and with fresh eluted ion exchange resin.

6.1. General Requirements

Resin shipments between the Irigaray Central Plant and the Christensen Ranch Satellite Plant are made on approximately 13 miles of private road that is not open to the general public. The road contains prohibitive signs that restrict access to a limited number of users that pay a fee to road owner. Although USDOT regulations do not apply on this private road, as a best practice, Uranium One strives to meet those USDOT requirements that are reasonable for protection of the users of the road and the environment. Resin shipments will be transported by properly trained Uranium One employees.

Each resin haul truck is equipped with a 2 way radio and an emergency response package. Prior to transport, the driver is instructed to:

1. Notify the receiving site of their departure and when to expect their arrival.
2. Conduct a safety inspection of the truck and document it in the log book.

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3. Inspect the tank for leakage. The tank will again be inspected for leakage halfway to the receiving site and upon arrival at the receiving site. Any leakage found must be documented on the Bill of Lading and reported to the radiation safety department.

6.2. Surveys

Fill in the required information on appropriate form, including:

- Date, name of surveyor, and resin tractor number or resin load number.
- Alpha and gamma meter serial numbers and calibration date.
- Check if required placards are in place.
- Record whether resin is loaded or unloaded and whether it is from a Satellite or the Central Plant.

Perform pre-trip gamma and alpha surveys and record results on the appropriate form. Perform the gamma survey using the Model 3 survey meter equipment with a gamma probe, or equivalent.

- The Model 3 meter is equipped with a detector that has a beta window. When the beta window is open, the G-M detector is visible. With the window closed, the G-M detector is not visible, thereby limiting the measurement to only gamma radiation. Perform gamma surveys with the window closed.
- Conduct a battery check by selecting "BAT". The meter scale should deflect to the battery check portion of the meter scale. If the response is not acceptable, replace the batteries or contact the Radiation Safety Department for assistance.
- Conduct the instrument response check by selecting the lowest scale and placing the detector next to an appropriate gamma check source. The instrument must respond to the source to be considered in working condition. If response is obtained, check the box labeled "Response Check" in the upper left hand corner of the form.
- Perform the gamma survey at the surface and 2 meters from the trailer containing ion exchange resin at the locations shown on the form. Also, perform the survey at the driver's seat within the tractor. Record all readings in mR/hr on the form.

NOTE: It is not necessary to obtain a background gamma measurement.

- Perform the alpha survey using the Model 3 rate meter with the Model 43-5 alpha detector, or equivalent.
- Conduct battery check as above for the gamma meter.
- Conduct an instrument response check by holding the probe adjacent to an appropriate alpha check source.
- If the alpha meter does not appear to be operating properly, obtain a different meter and contact the Radiation Safety Department.

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- Holding the probe in the air determine background rate in cpm.
- Survey the tractor and trailer at the locations shown on the survey form by holding the probe within 1/8 to 1/4 inches of the surface. The probe should not be moved until the reading stabilizes. Subtract background from the survey reading and record on the form.
- Record the survey results on the survey form and then calculate the dpm/100 cm² using the following formula:

$$\text{dpm/100 cm}^2 = \frac{\text{cpm} \times \text{Size Correction Factor} \times \text{Wipe Efficiency}}{\text{Efficiency}}$$

where: Size correction is defined as the active sensing surface area of the specific probe used divided by 100.
 Wipe efficiency is defined as 0.10 in 49 CFR §173.443(a)(1) unless the actual wipe efficiency is known

Also record dpm/100 cm² on the form for each location.

- If the survey results indicate alpha activity greater than the limit of 2,200 dpm/100 cm², the contaminated area(s) must be cleaned and resurveyed to ensure contamination has been removed.

7. YELLOWCAKE SHIPMENTS

7.1. General

Yellowcake shipments are made in exclusive-use van shipments. Exclusive-use means that the shipment is for the sole use of the shipper and that any loading or unloading is carried out at the direction of the consignor (shipper) or consignee (the fuel processor).

Specific instructions must be provided to the carrier to maintain the exclusive-use status of the shipment. Shipping papers must meet the DOT requirements.

Yellowcake is typically packaged in 55-gallon drums that must meet the DOT definition of "strong, tight" containers. These containers must be capable of containing the yellowcake under "conditions normally incident to transport". All drums must be sealed and not have any damage that could allow yellowcake to leak during shipment.

Shipments must meet DOT requirements for radiation levels and loose radioactive contamination for exclusive-use shipments. Drums of yellowcake will not exceed the radiation limit of 200 mR/hr (2 mSv/hr) on contact for non-exclusive use shipments. The loose alpha contamination limit for drums at the beginning of transport is 2200 dpm/100 cm². Drums must be properly labeled.

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7.2. Prerequisites Before Shipment

Drums are prepared for use before loading them with yellowcake. This preparation includes inspection for damage to the integrity of the drum. Drums must not have damage that could affect the integrity of the container. The lids must have competent sealing rings and an intact lid gasket. Following inspection, the exterior surfaces of the drums are cleaned to remove any rust or foreign material. The drums may be painted and stenciled in preparation for loading, or this step may be performed after they are loaded. Any drums that do not meet the requirements for a strong, tight package may not be used for shipment of yellowcake unless a qualified drum reconditioner has reconditioned them (49 CFR §173.28(c)). These drums may be properly disposed of, used at the facility in an appropriate application, or may be used as a waste drum, provided all markings and labels are removed.

After packaging, check the lid ring and closure bolt for proper fit and tightness. Ensure the lid gasket is properly seated and there are no air leaks. Proper tightening of the lid ring may be checked by striking the bolt of the ring with a rubber mallet to determine if the ring moves. If a leak is detected, the drum needs to be removed to the packaging room where an operator will remove the lid and reseal the gasket properly. If this does not solve the problem, the lid and/or gasket should be replaced.

NOTE: Reseating the gasket and lid must be done in the packaging area to minimize and control the potential for airborne radioactive material.

After loading with yellowcake, the external surfaces of the drums are cleaned to remove any loose radioactive material. Initial cleaning is typically performed as the drum is removed from the packaging area. More thorough cleaning is performed at least once before shipment using a pressure washer or other suitable washing mechanism. Loose water is removed from the top of the drums with a sponge after washing. All visible yellowcake is removed during the cleaning operations.

Before shipment and after cleaning, all drums are surveyed for radiation levels and radioactive contamination. Drums must be completely dry before performing alpha contamination surveys. Particular areas requiring attention during surveys include the drum bottom, the lid, around the drum ring, and at the bolt closure. Alpha contamination surveys will be performed in accordance with the instructions in Section 6.2.

Important! : Yellowcake Drum Pressurization Inspection- Due to the unanticipated pressurization of drums of dried yellowcake shipped from the facility in mid 2012, it is critical that each drum is inspected for potential pressurization when being readied for loading into the van for shipment. The results of this inspection must be recorded on the "Release Form- Drums of Dried Yellowcake" in the appropriate column. **Important! If there is any concern that a drum of yellowcake could be pressurized it must not be loaded for shipment. Immediately notify the Irigaray Plant Supervisor and the RSO of the condition.**

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This inspection is typically completed when the alpha survey is done and the drums are being loaded into the van. The procedure is as follows;

1. Assess if the drum has a lid with a domed (convex) shape. This can be done visually, or with the aid of a straight edge, such as a 2X4 board that is straight.

2. If the drum lid is not domed, hit part of the lid with the rubber mallet to confirm that the lid deflects inward, confirming the lack of any pressure in the drum.

3. If the drum lid does have a domed (convex) shape there is a greater possibility that the drum could be pressurized (although the domed (convex) shape can be due to the "natural" shape of the lid, regardless of any pressurization in the drum). Hit the highest part of the domed lid with the rubber mallet. If the lid deflects inward the drum lid is not pressurized. If the drum lid does not deflect inwards and the mallet "bounces back", there is potential pressurization that merits further investigation. **In any case, if there is any concern that the drum may be pressurized, further investigation is required and the drum must not be loaded for transport.**

4. If the drum requires further investigation for pressurization, the drum must be moved to the Packaging Room. It will be further investigated after consultation with the Irigaray Plant Supervisor and/or the RSO.

5. Record the survey results on the form and include a description of the conditions observed for any potentially pressurized drum. **All drums showing suspected pressurization will not be loaded for transport until they are investigated by the Irigaray Plant Supervisor and the RSO and they approve the drums for loading**

Drums must be properly labeled. For domestic shipments, packages are excepted from the labeling and marking requirements in exclusive use shipments as long as the truck is placarded. However, they must be stenciled or marked "Radioactive – LSA". International shipments must be labeled "Radioactive – Yellow II" (49 CFR §172.402) on two sides. Label location on each drum is to be between the top drum chine and the lid, approximately 180 degrees apart, with the wording running horizontally. The label blanks must be filled with the following data:

- Contents: Natural Uranium/LSA
- Activity: 8 GBq
- Transport Index: As required

The Transport Index on the label refers to the maximum gamma dose rate at one meter from the package in mR/hr. Drums are also marked with production information such as Lot Number, weight, etc. The net weight in pounds must not exceed the maximum net weight of the drum contained on the specification marking.

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7.3. Making Yellowcake Shipments

Ensure that all of the preparations before shipment listed in Section 7.2 above have been completed for each of the drums to be shipped.

A gamma survey and an alpha contamination survey will be performed on the empty trailer before loading. The trailer must meet the limits discussed in Section 4.2. The results will be documented on the appropriate survey form. A total alpha contamination survey will be performed. If results indicate contamination in excess of 1,500 dpm/100 cm² (75% of the limit of 2,200 dpm/100 cm²), a removable alpha contamination survey will be performed. Removable alpha surveys must cover 300 cm² to meet DOT requirements and incorporate a wipe efficiency of 0.10 (49 CFR §173.443).

Drums of yellowcake will be loaded on the trailer. Drums will be handled in such a manner that will not cause damage to the drum. Drums must be loaded or braced such that they will not shift during transportation.

After completion of loading operations, a gamma survey will be performed on the truck. The results of the survey will be properly documented. The tractor and trailer will be surveyed to ensure that they meet the following limits:

Point of Measurement	Limit
Surface of truck (Front, sides and rear)	200 mR/hr
Two meters from the truck (accessible area)	10 mR/hr
Cab of truck	2 mR/hr (may be higher if driver has dosimetry)
Surface contamination (fixed)	5000 dpm/100 cm ²
Surface contamination (removable)	1000 dpm/100 cm ²

The truck will be properly placarded on four sides. Shipments of yellowcake require a "Radioactive - 7" placard. The identification marking (i.e., UN2912) is optional for non-bulk shipments and may be placed adjacent to the Radioactive placards using orange labels or white square-on-point signs.

Shipping papers will be prepared. The completed package consists of the following documents:

- Bill of Lading;
- Shipping Paper cover sheet with description of contents and Exclusive Use instructions (domestic shipments);
- DOE/NRC Form 741, Nuclear Material Transaction Report;
- DOE/NRC Form 740 (M), Concise Note (international shipments);
- Shipper's Export Declaration (international shipments);

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- Import License (international shipments);
- Radioactive Materials Shipment Survey form;
- Drum Survey Form;
- Removable Alpha Survey Form (if required);
- Emergency Telephone Number List;
- Accident Questionnaire;
- Emergency Procedures; and
- Driver Responsibility Statement.

Ensure that the driver has a current copy of the latest MSDS for yellowcake, a current DOT Hazmat Endorsement, an emergency procedure and contact list, and a spill kit. Additionally Uranium One will check the driver package to assess that driver/truck unit at the site agrees with the information provided by RSB.

8. BYPRODUCT MATERIAL SHIPMENTS

8.1. General

Byproduct material shipments are usually made in exclusive-use van or roll-off container shipments. Exclusive-use means that the shipment is for the sole use of the shipper and that any loading or unloading is carried out at the direction of the consignor or consignee (the disposal site). The shipper must provide specific instructions to the carrier to maintain the exclusive-use status of the shipment. Shipping papers must meet the DOT requirements.

Uranium One and Pathfinder Mines Corporation have entered into a contract for the disposal of byproduct material from Uranium One Irigaray and Christensen Ranch operations at Pathfinder's uranium mill tailings impoundment located at the Shirley Basin facility, Wyoming. The amended contract, dated July 20, 2007, specifies certain shipping procedures, byproduct material restrictions and sampling requirements for any byproduct material shipments from the Willow Creek operations.

8.2. Byproduct Waste Packaging, Preparation, and Loading

Waste should be prepared for shipment before arrival of the transport vehicle. This preparation includes inspection of the package for damage. Drums that have been found to be unacceptable for reuse for yellowcake shipping may be used as a waste drum under the following conditions (49 CFR §173.12(c)):

- The waste must be properly packaged;
- Transportation must be by highway only;
- Package is not offered for transportation less than 24 hours after it is finally closed;

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- Each package is inspected for leakage and is found to be free from leaks immediately prior to shipment;
- Package is loaded by the shipper and unloaded by consignee (disposal site) unless the carrier is a private or contract carrier;
- Package may be used only once and may not be reused unless it is reconditioned as described in 49 CFR §173.28(c).

The RSO or designee shall confirm that the waste meets the disposal site acceptance criteria discussed in SOP ENV-2 including specifications such as allowable void volume, pretreatment requirements (e.g., chipping or crushing), presence of liquid, and allowable radioactivity concentrations for specific radionuclides.

The personnel loading the drum (or package) will complete the appropriate inventory form. Contents will be described. Following loading, the package will be weighed and the weight will be recorded. The net weight packaged in drums must not exceed the maximum net weight in kilograms contained on the specification marking discussed in Section 7.2.

Each shipment must be packaged as follows:

- All byproduct material will be packaged in steel end dump trailers which are suitable for direct loading and unloading.
- The containers shall be covered to prevent blowing dust
- While all shipments of byproduct material shall have no free water the containers shall be lined and the dump gate sealed to prevent any loss of liquid during transportation.
- If there are any individual containers (e.g., drums), each container shall be marked and labeled as follows:

**RADIOACTIVE – LSA
UN 2912**

- Packaged material shall be loaded onto the transporter and secured to prevent shifting during transport
- Prior to leaving the site, the transporter shall be properly placarded. Each side of the transport vehicle, including the front and back end of the vehicle shall display the following placard:



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- Gross, tare, steer, front and rear, and net weights shall be determined and recorded on the Bill of Lading, the carrier Weight Ticket, and the Manifest, if required.
- The disposal site must be notified before actual delivery of the waste shipment in accordance with the disposal agreement.

8.3. Making Byproduct Material Shipments

8.3.1. Disposal Site Notification

The results of all sample analyses will be provided to Pathfinder at least 5 days prior to shipment, by fax if possible, to the following:

Pathfinder Mines Corporation, Shirley Basin Mine
 Fax: 307/356-4604 Telephone: 307/356-4312

After faxing the analysis results to Pathfinder, check to make sure that the analyses were received. If the results of the analyses are not acceptable to Pathfinder, Uranium One will be notified within 3 days of receiving the results. In any case, approval must be received from Pathfinder prior to shipping.

8.3.2. Surveys

A gamma survey and alpha contamination survey will be performed on the empty trailer before loading. The trailer must meet the limits as previously discussed. The results will be properly documented. A fixed alpha contamination survey will be performed as discussed in Section 6.2. Removable alpha surveys will be performed if fixed contamination levels indicate an alpha activity greater than 1000 dpm/100 cm². Removable alpha surveys must represent at least 300 cm² to meet DOT requirements.

After completion of loading operations, a gamma survey will be performed on the truck. The tractor and trailer will be surveyed to ensure that they meet the following limits:

Point of Measurement	Limit
Surface of truck (Front, sides and rear)	200 mR/hr
Two meters from the truck (accessible area)	10 mR/hr
Cab of truck	2 mR/hr (may be higher if driver has dosimetry)
Surface contamination (fixed)	5000 dpm/100 cm ²
Surface contamination (removable)	1000 dpm/100 cm ²

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8.4. Required Documentation

Shipping papers shall include a Bill of Lading, Byproduct Material Shipping and Disposal Manifest Form, and Vehicle Release Survey. The Byproduct Material Shipping and Disposal Manifest must include the proper DOT shipping name, hazard class as follows:

Radioactive Material, LSA 1, 7, UN2912

The Bill of Lading shall have the proper registration number for Uranium One's Shipper ID and hazardous materials registration number. Ensure that the driver has a current copy of the emergency procedure(s) and contact list.

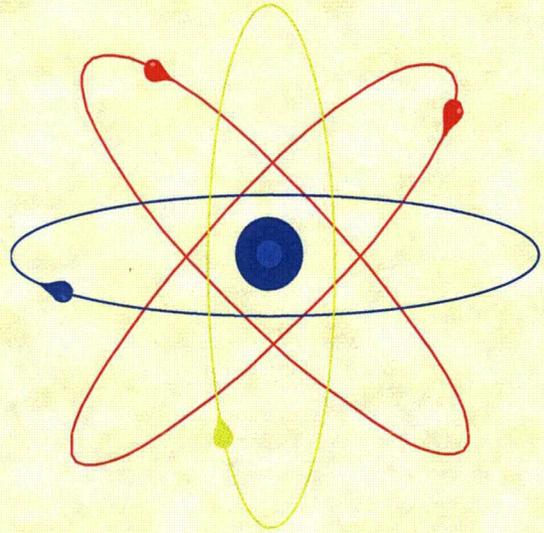
8.5. Transfer of Shipment to Carrier

After the vehicle has been loaded and all shipping papers have been completed, the shipment shall be transferred to the carrier. Prior to the vehicle leaving the property, the shipper (Uranium One) must ascertain the following:

- Verify that the driver knows that the shipment contains hazardous material, that he has been trained in the handling of such material, and that he has a spill kit.
- That the load is properly braced and secured against movement under normal conditions.
- That the load is properly labelled and secured.

8.6. Records

- A current copy of the Pathfinder Mine Radioactive Materials License
- Byproduct Material Shipping and Disposal Manifest Form (Pathfinder Mines Corporation Form)
- Drivers Statement of Acknowledgement
- Bill of Lading
- Surface Contamination Survey
- Byproduct Material Activity Calculation
- Weight Ticket
- Hazardous Materials Certification of Registration
- Emergency Contact List
- Analytical Reports Showing the Results of the Required Analyses



URANIUM ONE

OUTLINE

RESIN TRUCK TRANSPORTATION

Regulatory Requirements

Resin Transfers are Regulated by the
Following Agencies

- ◆ Department of Transportation (DOT)
49 CFR Parts 172 and 173
- ◆ Nuclear Regulatory Commission
10 CFR Part 71

Release Limits Exclusive Use Shipments

- ◆ **Removable Alpha**
 - ◆ *1000 dpm/100 cm²*

- ◆ **Fixed Alpha Contamination**
 - ◆ *5000 dpm/100 cm²*
 - ◆ *15,000 dpm/100 cm²*

Release Limits

Exclusive Use Shipments Cont.

Removable Alpha

***Reading greater 1000 dpm/100cm²
require a wipe survey***

***Under DOT Standards a wipe is
considered to remove 10% of the
contamination present***

Release Limits

Exclusive Use Shipments Cont.

Gamma

- ***Inside Truck Cab*** ***2 mR/hr***
- ***3 feet from Tank Surface*** ***10 mR/hr***
- ***Tank Surface*** ***200 mR/hr***

What Needs to be Surveyed?

Gamma and Alpha Surveys Performed

Tank

All four sides

Trailer Frame and Piping

Tires

Cab of Truck

Instrument Function Checks

- ◆ Alpha
 - Determine Efficiency
 - Establish Efficiency Factor
- ◆ Gamma
 - Meter response check

Determination of Efficiency and Efficiency Factor

- ◆ **Efficiency**

Instrument response/source activity

1250 cpm/7000 dpm/100cm²

- ◆ **Efficiency Factor**

100/Inst Efficiency x 100/probe surface area

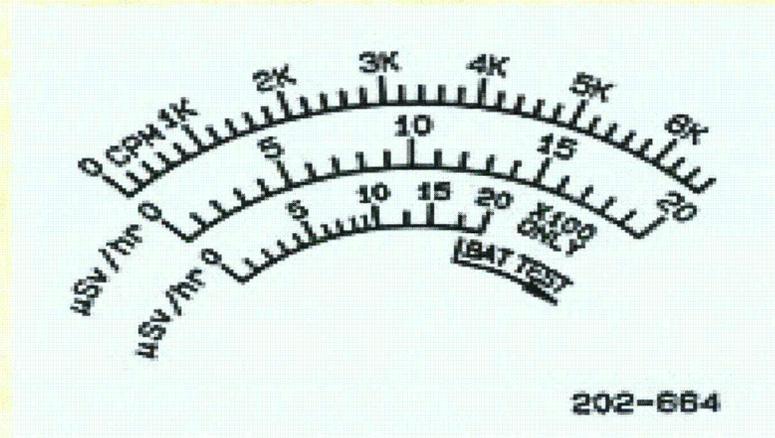
100/18% x 100/63 cm²

Gamma Meter Response Check

- ◆ Cs-137 Source
Record meter response
- ◆ No meter efficiency or correction factor associated with gamma meter

Meter Responses

- ◆ Scale for meters vary



- ◆ Multiplier setting on meter

X0.1 X1 X10 X100

Survey

- ◆ Alpha radiation survey
 - ◆ Establish background for area before beginning survey
 - ◆ Probe distance of $\frac{1}{8}$ to $\frac{1}{4}$ inch from surface being monitored
 - ◆ Probe should be allowed to stabilize before moving
 - ◆ If monitored surface is wet will shield alpha activity

Survey Continued

- ◆ Gamma
 - ◆ Establish a background for the area
 - ◆ Conduct survey at following locations
 - tank surface
 - 3' from surface
 - Truck Cab

Record all Alpha and Gamma Readings

- ◆ Document all monitoring readings on the Resin Shipment Survey and Release Form
- ◆ Gamma and Alpha meter response checks need to be documented on the forms located on the clipboard in the Rad Tech Office

Standard Operating Procedure (SOP)

- ◆ The Standard Operating Procedure for Shipment of Radioactive Materials which includes Resin Shipments is SOP **HP-19**

Field Training Activity

- ◆ Hands on training with instruments
 - Perform Efficiency Calculation
 - Determine Instrument Correction Factor

- ◆ Survey of resin truck
 - Complete Radiation Survey Paperwork
 - Fill out Bill of Lading

RSO/RST Observation

- ◆ Trainer observes resin truck survey assists as needed.
 - Trainee assisted for first resin truck survey and until RSO/RST are comfortable the trainee has demonstrated proficiency with the task

Uranium One

Willow Creek

Radioactive Transportation Survey Examination

1. Prior to conducting a Alpha or Gamma survey meters are to be source checked to verify meters are functioning properly:
 - a. True
 - b. False
2. A meter set on the X0.1 scale that reads 1.2K counts per minute would be an instrument response of:
 - a. 12 counts per minute
 - b. 1200 counts per minute
 - c. 1.2 counts per minute
 - d. 120 counts per minute
3. If an alpha check source with an activity of 6000 dpm/100cm² is utilized and the alpha meter response to the check source is 860 cpm with a 20 cpm background the instrument efficiency is _____.
4. To convert the alpha meter response from counts per minute (cpm) to disintegrations per minute a meter efficiency factor must be determined. Using the meter efficiency from **Question 3** above the meter efficiency factor for a meter with a 63 cm² alpha probe is _____.
5. Any questions or concerns on the transportation of Ion Exchange Resin Tanker Shipments should be directed to your Foreman or the RSO
 - a. True
 - b. False
6. If Alpha radiation levels are detected above 1000 dpm/100cm² a removable wipe survey of the area exceeding 1000 dpm/100cm² is **not required**.
 - a. True
 - b. False

7. DOT regulatory guidance 49 CFR 173.443(a)(1) specifies a wipe efficiency of 0.10, therefore if a wipe sample returned a count of 150 count per minute the removable contamination present would be _____ dpm/100cm². Does the shipment meet the release limits for removable alpha contamination? Yes _____ No _____
8. A gamma meter set on the X0.1 scale that reads 5.4 mR/hr would be an instrument response of:
- 5.4 mR/hr
 - 54 mR/hr
 - 540 mR/hr
 - 0.54 mR/hr
9. Transportation shipments for Resin transfer from Christensen to Irigaray are regulated under which of the following:
- OSHA, WDEQ
 - DOT, NRC
 - NRC
 - DOT, MSHA
 - None of the above
10. Radiation survey limits for Ion Exchange Resin Tanker Shipments for Alpha radiation surface levels are as follows:
- 1000 dpm/100cm² Removable, 5000 dpm/100cm² Fixed (Average) and 15,000 dpm/100cm² Fixed (Maximum)
 - 100 dpm/100cm² Removable, 1000 dpm/100cm² Fixed (Average) and 5000 dpm/100cm² Fixed (Maximum)
 - 1000 dpm/100cm² Removable, 1000 dpm/100cm² Fixed (Average), 5000 dpm/100cm² Fixed (Maximum)
 - None of the above
11. When conducting Alpha surveys on the resin transfer vehicle the distance the meter is from the surface being surveyed is not relevant and surfaces which are wet will not affect alpha radiation readings
- True
 - False

12. Radiation survey limits for Ion Exchange Resin Tanker Shipments for Gamma radiation levels are:

- a. 2 mR/hr Inside truck cab, 10 mR.hr 1meter from tank, 200 mR/hr at Tank surface
- b. 10 mR/hr Inside truck cab, 100 mR.hr 1meter from tank, 200 mR/hr at Tank surface
- c. 20 mR/hr Inside truck cab, 10 mR.hr 1meter from tank, 100 mR/hr at Tank surface
- d. 1 mR/hr Inside truck cab, 2 mR.hr 1meter from tank, 100 mR/hr at Tank surface

13. Alpha surveys are to be performed on the following Ion Exchange Tanker locations:

- a. Tank
- b. Trailer frame and piping
- c. Tires
- d. Truck cab
- e. All the above
- f. Only a and c above

14. Gamma radiation surveys for Resin Tanker Shipments are performed:

- a. Sides only
- b. Front and Back only
- c. Front, Sides and Rear
- d. Not required

Name: _____

Date _____ Grade _____

Instructor: _____

Date: _____

Uranium One

Willow Creek

Radioactive Transportation Survey Examination

1. Prior to conducting a Alpha or Gamma survey meters are to be source checked to verify meters are functioning properly:
 - a. True
 - b. False
2. A meter set on the X0.1 scale that reads 1.2K counts per minute would be an instrument response of:
 - a. 12 counts per minute
 - b. 1200 counts per minute
 - c. 1.2 counts per minute
 - d. 120 counts per minute
3. If an alpha check source with an activity of 6000 dpm/100cm² is utilized and the alpha meter response to the check source is 860 cpm with a 20 cpm background the instrument efficiency is _____.
4. To convert the alpha meter response from counts per minute (cpm) to disintegrations per minute a meter efficiency factor must be determined. Using the meter efficiency from **Question 3** above the meter efficiency factor for a meter with a 63 cm² alpha probe is _____.
5. As per SOP 19 what three things prior to transport will a driver of an IX resin transport truck perform _____, _____, and _____.
6. A tank inspection of the resin truck tanks is required only at exiting and receiving locations
 - a. True
 - b. False

7. Any questions or concerns on the transportation of Ion Exchange Resin Tanker Shipments should be directed to your Foreman or the RSO
- True
 - False
8. If Alpha radiation levels are detected above 1000 dpm/100cm² a removable wipe survey of the area exceeding 1000 dpm/100cm² is **not required**.
- True
 - False
9. DOT regulatory guidance 49 CFR 173.443(a)(1) specifies a wipe efficiency of 0.10, therefore if a wipe sample returned a count of 150 count per minute the removable contamination present would be _____ dpm/100cm². Does the shipment meet the release limits for removable alpha contamination? Yes _____ No _____
10. A gamma meter set on the X0.1 scale that reads 5.4 mR/hr would be an instrument response of:
- 5.4 mR/hr
 - 54 mR/hr
 - 540 mR/hr
 - 0.54 mR/hr
11. Transportation shipments for Resin transfer from Christensen to Irigaray are regulated under which of the following:
- OSHA, WDEQ
 - DOT, NRC
 - NRC
 - DOT, MSHA
 - None of the above
12. Radiation survey limits for Ion Exchange Resin Tanker Shipments for Alpha radiation surface levels are as follows:
- 1000 dpm/100cm² Removable, 5000 dpm/100cm² Fixed (Average) and 15,000 dpm/100cm² Fixed (Maximum)
 - 100 dpm/100cm² Removable, 1000 dpm/100cm² Fixed (Average) and 5000 dpm/100cm² Fixed (Maximum)
 - 1000 dpm/100cm² Removable, 1000 dpm/100cm² Fixed (Average), 5000 dpm/100cm² Fixed (Maximum)
 - None of the above

13. When conducting Alpha surveys on the resin transfer vehicle the distance the meter is from the surface being surveyed is not relevant and surfaces which are wet will not affect alpha radiation readings
- True
 - False
14. Radiation survey limits for Ion Exchange Resin Tanker Shipments for Gamma radiation levels are:
- 2 mR/hr Inside truck cab, 10 mR.hr 1meter from tank, 200 mR/hr at Tank surface
 - 10 mR/hr Inside truck cab, 100 mR.hr 1meter from tank, 200 mR/hr at Tank surface
 - 20 mR/hr Inside truck cab, 10 mR.hr 1meter from tank, 100 mR/hr at Tank surface
 - 1 mR/hr Inside truck cab, 2 mR.hr 1meter from tank, 100 mR/hr at Tank surface
15. Alpha surveys are to be performed on the following Ion Exchange Tanker locations:
- Tank
 - Trailer frame and piping
 - Tires
 - Truck cab
 - All the above
 - Only a and c above
16. Any leakage found that is associated with the resin transfer tankage must be included on the Bill of Lading and reported to the RSO
- True
 - False
17. DOT regulations are not applicable to the 15 miles of private road with public access utilized to transport resin between the Irigaray Central Processing plant and the Christensen Satellite facility
- True
 - False
18. Resin transfer trucks are shipped exclusive use and therefore do not require any placarding
- True
 - False

19. Which of the following would not be considered a hazmat employee as defined by DOT

- a. a person who loads or unloads hazardous materials
- b. a person who prepares packages for transportation
- c. a operator of a transportation vehicle hauling placarded materials
- d. a person who prepares shipping papers
- e. a person placarding shipments
- f. a person filing shipment paperwork

20. Gamma radiation surveys for Resin Tanker Shipments are performed:

- a. Sides only
- b. Front and Back only
- c. Front, Sides and Rear
- d. Not required

Name: _____

Date _____ Grade _____

Instructor: _____

Date: _____

SURVEY AND RELEASE FORM ; RESIN SHIPMENT

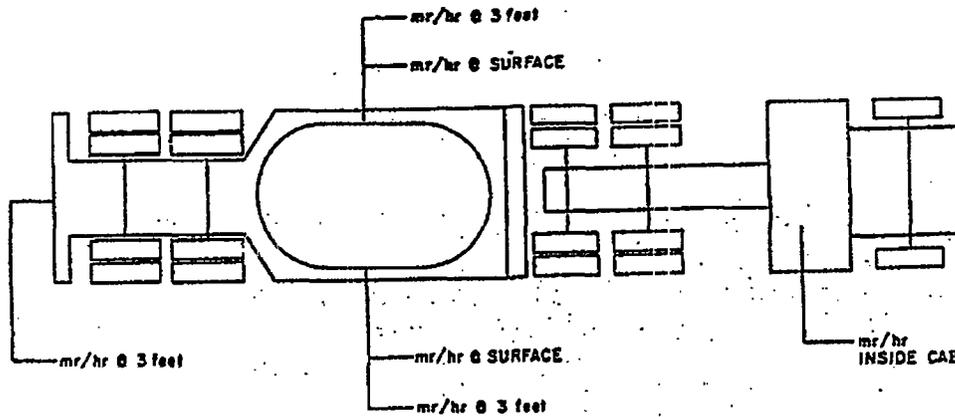
Date _____ Surveyor _____ Trailer ID # _____ Shipment # _____

Released from the Irigaray Plant restricted area (RA) to the Christensen Plant RA

ALPHA SURVEY (DPM / 100 CM2)

Survey Location	Total: CPM/E.F. = DPM/100 cm2		Removable (see attach.)	Comments
	CPM	DPM		
Tank				
Trailer: frame and piping				
Tires				
Truck cab				

GAMMA EXPOSURE RATE SURVEY (mR/hour)



INSTRUMENTS

Alpha: ID # _____

Gamma: ID # _____

RELEASABLE LIMITS

Alpha (NRC): Removable 1,000 DPM/100 cm2
 Total (average) 5,000 DPM/100 cm2; area no greater than 1 square meter.
 Total (maximum) 15,000 DPM/100 cm2; area no greater than 100 cm2.

Note that if the total exceeds 1,000 DPM/100 cm2, a swipe must be taken to ensure the removable limit is not exceeded.

Gamma (DOT): Inside truck cab 2 mR/hour
 3 feet from tank surface 10 mR/hour
 Tank surface 200 mR/hour

LOTUSRAD-FROMRTRAILER (8-18-98 JV)

Attachment 3

Daily and Weekly Inspection SOP

No.:	Uranium One Americas, Inc.	
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Purpose and Description

This procedure outlines the appropriate procedure, equipment, materials, methods, and recordkeeping requirements for conducting daily and weekly inspections of the facilities at the Willow Creek Project to ensure compliance with Radioactive Materials License SUA-1341 License Conditions 9.12 and 11.5.

These inspections will be conducted in all areas of the Willow Creek Project facilities where radiological material is processed and / or stored to ensure proper implementation of good radiation safety procedures, including good housekeeping and cleanup practices that would minimize unnecessary contamination to keep exposures to employees As Low as Reasonably Achievable (ALARA).

Responsibility

The Radiation Safety Officer, (RSO), Radiation Safety Technician (RST) or their designee is responsible for conducting the inspections as outlined in this procedure. Daily radiation safety inspections are typically conducted by the RST except on weekends or holidays at which time trained operations personnel will perform these inspections. During periods when the RST is absent due to vacation or other circumstance and the RSO is present at the site, the responsibility of conducting the daily inspections belongs to the RSO or other appropriate designee.

Weekly inspections are typically performed by the RSO and it is encouraged to have the operation supervisor or representative accompany the RSO for this inspection. In the absence of the RSO the RST will typically perform this inspection as the RSO designee. In the event the RSO and RST are absent a management representative familiar with radiation control practices will perform this inspection as the RSO designee.

Equipment and Materials

Minimum equipment is needed to complete the required inspections. Appropriate Personal Protective Equipment is required to be worn by the inspector(s) at all times. A clipboard, pen and the accompanying forms will be utilized for the inspections.

Procedure

Daily Inspections

Daily Inspections will be performed at the Willow Creek Project at the Christensen Ranch Satellite facilities and the Irigaray Processing Plant facilities.

Christensen Ranch Satellite

Visual inspections of the Satellite Plant should include, but not be limited to, evaluations of:

1. Work Practices

- Operations personnel are wearing the appropriate PPE for the task being conducted;
- OSL dosimetry badges are being worn by on-shift badged personnel. Off-shift badges are stored on the control board appropriately;

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- Bay door gates are being utilized to prevent access to facility by general members of the public. Bay door gates are locked to prevent unauthorized access;
- Lock system for the doors accessing the Satellite Plant are working properly and are locked when door is closed;
- Ventilation/Exhaust fans are operating and are effective in controlling build-up of radon daughters;
- Personnel monitoring stations are functioning properly and being utilized by all personnel entering/exiting the Satellite Plant;
- Sumps and drains are operational;
- Gates to the evaporation ponds are locked;
- Doors to Deep Disposal Wells are locked to prevent unauthorized access;

2. Housekeeping

- Designated eating areas are clean and posted as "Designated Eating Area"
- Change room is clean;
- Resin transfer bay is clean, absent of resin spillage, equipment leaks, and visual surface contamination;
- Floor and sumps are free of standing solutions, pumps are working properly and grating is in place for sumps;
- Reagent storage system is clean and absent leaks or standing solutions in the catchment facility;
- Deep Disposal Well Building DDW-1 and DDW 18-3 are clean absent spills, leaks from piping or tanks, and sumps are absent solutions;
- Fence to CR evaporation ponds is adequate to prevent access to ponds;

3. Working conditions (e.g., noise, dust, and temperature)

- Other jobs being conducted at the time of inspection such as RWP or confined space entry are being conducted in a manner that would not impact atmospheric conditions of the Satellite Plant (ie tank ventilation systems are exhausted outside the building);
- Process waters are not accumulated on floor without actively being pumped and ventilation control systems operational and or bay doors open to provide sufficient ventilation;
- Background levels on personnel frisking stations are not elevated without building ventilation systems operational;
- Soda ash and Bi-Carb Area is clean of spillage that could become re-suspended;
- , No pipe or transfer ducting leakage is observed and visual surface contamination is absent;
- Bi-Carb ventilation system is operational;
- Process associated piping is not leaking or broken.

It is not required but is encourage that periodically the RST should conduct the daily inspection with a gamma scintillator to confirm facility gamma levels.

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Irigaray Processing Plant

Visual inspections of the Satellite Plant should include, but not be limited to, evaluations of:

1. Work Practices

- Operations personnel are wearing the appropriate PPE for the task being conducted
- OSL badges are being worn by on-shift badged personnel. Off-shift badges are stored on the control board when not in use;
- Bay door gates are being utilized to prevent access to facility by general members of the public. Bay door gates are locked to prevent unauthorized access;
- Lock system for the doors accessing the Processing Plant are working properly and are locked when door is closed;
- Personnel monitoring stations are functioning properly and being utilized by all personnel entering/leaving the Plant;
- Gates to the evaporation ponds are locked;
- Sumps and drains are operational;
- Particulate Air Station monitors operational (during drying operations);

2. Housekeeping

- Designated eating areas are clean and posted as "Designated Eating Area";
- Change room is clean;
- Resin transfer area is clean, absent of resin spillage, equipment leaks, and visual surface contamination;
- Elution Bay Area is free of spills, leaks and surface contamination;
- Precipitation Area is free of spills, leaks and surface contamination;
- Filter Press area is free of spills, leaks and surface contamination;
- Yellowcake Storage Area is free of spills, leaks and surface contamination;
- Dryer Area is free of spills, leaks and surface contamination;
- Soda Ash and Salt storage areas are free of spills, leaks and surface contamination;
- Floor and sumps are free of standing solutions, pumps are working properly and grating is in place for sumps;
- Reagent storage system is clean and absent leaks or standing solutions in the catchment facility;
- Fence to ponds is adequate to prevent access to ponds;

3. Working conditions (e.g., noise, dust, and temperature)

- Other jobs being conducted at the time of inspection such as RWP or confined space entry are being conducted in a manner that would not impact atmospheric conditions of the Processing Plant (ie tank ventilation systems are exhausted outside the building);
- Emission control system is operating within established parameters;
- Dryer and Packaging enclosures are being maintained under negative pressure;
- Respiratory protection is being stored appropriately to minimize contamination;
- Background levels on personnel frisking stations are not elevated without building ventilation systems operational;

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- Soda Ash and Salt storage areas are free of spills, leaks and surface contamination that could become re-suspended;
- No pipe or transfer ducting leakage is observed and is absent visual surface contamination;
- Process associated piping is not leaking or broken.

It is not required but is encourage that periodically the RST should conduct the daily inspection with a gamma scintillator to confirm facility gamma levels.

Weekly Inspections

Weekly inspections will be performed at the Willow Creek Project at the Christensen Ranch Satellite facilities and the Irigaray Processing Plant facilities. Although not required it is encouraged to have the operation supervisor or a operations representative accompany the RSO or his designee for this inspection.

Christensen Ranch Satellite

Visual inspections of the Satellite Plant should include, but not be limited to, evaluations of the following:

1. Daily Inspection items discussed above with emphasis on

- Ventilation Control Systems;
- Areas Posted Appropriately
 - Gamma levels are periodically verified to ensure posting are appropriate at the satellite and wellfield;
- General housekeeping and effectiveness of contamination control practices;
- Spill and leak containment and cleanup practices;
- Inspection of 11 e(2) waste containers;
- ALARA considerations and opportunities for improvement.

2. Summary of Weekly Radiological Activities

- Radiation Work Permits (RWP's) issued;
- Weekly Alpha survey results and discussion of trending for surveyed areas;
- OSL badge results and practices;
- Summary of airborne gross alpha and radon daughter results, quick review of trending for these results compared to site established action levels;
- Discussion of bioassay results collected during the week.

3. Security

- Doors and access to satellite plant secure;
- Wellfield module building access secure;
- DDW buildings access secure;
- Evaporation pond access secure including fence.

Weekly inspection reports are provided to the Plant Manager, Site Manager of SHE, Operations Supervisor and Radiation Technician in a memo format. There is no form at this time for the weekly inspection.

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Irigaray Processing Plant

Visual inspections of the Processing Plant should include but not be limited to, evaluation of the following:

1. Daily Inspection items discussed above with emphasis on

- Scrubber system Ventilation Control Practices;
- Areas Posted Appropriately
 - Gamma levels are periodically verified to ensure posting are appropriate at the satellite and wellfield;
- General housekeeping and effectiveness of contamination control practices;
- Spill and leak containment and cleanup practices;
- Inspection of 11 e(2) waste containers;
- ALARA considerations and opportunities for improvement;
- PPE stored appropriately to minimize contamination when not in use.

2. Summary of Weekly Radiological Activities

- RWP issued;
- Weekly Alpha survey results and discussion of trending for surveyed areas;
- OSL badge results and practices;
- Summary of airborne gross alpha and radon daughter results, quick review of trending for these results compared to site established action levels;
- Discussion of bioassay results collected during the week.

3. Security

- Doors and access to process plant are secure;
- YC loading trailer is fenced and posted appropriately and access restricted;
- Bone yard access is secured;
- Pond access secure including fence.

It is not required but is encourage that periodically the RSO should conduct the weekly inspection with a alpha or beta/gamma instrument to confirm facility radiation levels and look for areas where trends in radiological levels may exist.

Weekly inspection reports are provided to the Plant Manager, Site Manager of SHE, Operations Supervisor and Radiation Technician in a memo format. There is no form at this time for the weekly inspection.

Date: _____

Name: (Print) _____

Signature: _____

CHRISTENSEN SATELLITE FACILITY - DAILY INSPECTION

As per License Section 11.5 "the RSO or designee shall document a daily walk-through of the Christensen facility to determine that radiation control practices are being implemented appropriately".

Radiation safety control practices are to be inspected in the following process areas. Did you note any radiation safety problems or violations of NRC regulations?

LOCATIONS	TO BE CHECKED	Ok	Not Ok	COMMENTS IF NOT OK
Control Room	Designated eating and/or drinking areas posted, Clean,			
Lunch Room	Designated eating and/or drinking areas posted, Clean,			
Change Room	Clean,			
Waste Disposal System	Spills, leaks, surface contamination			
Resin Bay	Spills, leaks, surface contamination			
Ventilation Fans/Exhaust	Fans Operational			
Floor Sumps, Pumps & Drains	Working condition, Grating			
Soda Ash & Bi-Carb Area	Spills, leaks, surface contamination			
Doors	Locked, key pads functioning			
Bay Door	Gate utilized when doors open			
Deep Wells DDW-1 & 18-3/Tank House	Spills, leaks, surface contamination, sumps			
Evaporation Pond Gates	Locked			
Personal Monitor Stations	Working Order			
OSL Badges	On Shift/ Wearing Badge Off Shift/ Badge on Control board			

RSO Review: _____

Date: _____

Name: (Print) _____

Signature: _____

IRIGARAY CROSSING PLANT - DAILY INSPECTION

As per License Section 11.5 "the RSO or designee shall document a daily walk-through of the Irigaray facility to determine that radiation control practices are being implemented appropriately".

Radiation safety control practices are to be inspected in the following process areas. Did you note any radiation safety problems or violations of NRC regulations?

LOCATIONS	TO BE CHECKED	OK	Not Ok	COMMENTS IF NOT OK
Control Room	Designated eating and/or drinking areas posted, Clean, no respirators, Y.C. coveralls, Y.C. boots			
Lunch Room	Designated eating and/or drinking areas posted, Clean, no respirators, Y.C. coveralls, Y.C. boots			
Change Room	Clean, no respirators, Y.C. coveralls, Y.C. boots			
Waste Disposal System	Spills, leaks, surface contamination			
Resin Bay	Spills, leaks, surface contamination			
Elution Areas	Resin, spills, leaks, surface contamination			
Precipitation Area	Spills, leaks, surface contamination			
Y.C. Storage	Spills, leaks, surface contamination			
Dryer Area	Spills, leaks, surface contamination			
Ventilation Fans/Exhaust	Fans Operational			
Sumps/Drains	Working condition, Grating			
Soda Ash & Salt Area	Spills, leaks, surface contamination			
Doors	Locked, Key Pads			
Bay Door	Gates used when open			
Evaporation Ponds	Gates locked			
Personal Monitor Stations	Working Order			
OSL Badges	On Shift/ Wearing Badge Off Shift/ Badge on Control Board			
DP Air Sampling Stations (11)	Running (only on during drying operations)			

RSO Review: _____