Appendix C – Transport Vehicle Radiation Screening and Decontamination Plan

Introduction

Transport vehicles leaving the Piñon Ridge Mill Facility (the "Facility") are subject to the requirements of Part 49 of the Code of Federal Regulations ("49 CFR") and Nuclear Regulatory Commission ("NRC") Regulatory Guide 1.86 ("Reg Guide 1.86"). This screening and decontamination plan includes procedures necessary to release transport vehicles that are leaving the Facility site following delivery of low specific activity I ("LSA-I") material. Procedure No. RH-100 in the Energy Fuels Radiological Health & Safety Plan provides the scanning and shipping requirements for shipments of LSA-I materials leaving the site, which include yellowcake and contaminated materials shipments. Transport vehicles used exclusively for hauling of LSA-I material (including uranium ore, wastewater treatment residues and loaded ion-exchange resin) will undergo radiation screening prior to leaving the Facility site. Transport vehicles that require release for unrestricted use, service, or repair will undergo decontamination and a more stringent radiation survey than those transport vehicles that will be used solely to transport LSA-I material (i.e. exclusive use). The screening and decontamination requirements are outlined below.

Vehicles Used Solely for Purposes of Transporting LSA-I Material to the Facility

Transport vehicles used solely for transporting LSA-I material to the Facility must be labeled "FOR RADIOACTIVE MATERIALS USE ONLY" with three-inch high, stenciled letters located in a conspicuous place on both sides of the exterior of the transport vehicle. Additionally, these vehicles must be kept closed (e.g., via a tarpaulin) at all times other than during loading and unloading activities (49 CFR 177.843(b)).

Radiation surveys will be conducted on transport vehicles prior to allowing them to leave the restricted area. Vehicles that unload from the ore dumping platform (i.e. vehicles that do not enter the restricted area) will be scanned following initial delivery to the Facility, following a delivery in which the material source (mine) changes from previous deliveries, and at least annually thereafter. Radiation testing of transport vehicles will also be available at any time for vehicles that need to be released without restrictions. The gamma exposure rate from the typical uranium ore grade of 0.25-0.30 percent uranium oxide ("U_3O_8") for Colorado Plateau uranium ores is one mrem/hr, which is substantially less than the radiation limits for exclusive use vehicles (see Table C-1, Radiation Limits for Exclusive Use Transport Vehicles). As a result, the radiation survey requirements for exclusive use transport vehicles are expected to be satisfied in all cases.

Vehicles that unload from the ore dumping platform do not enter the Mill License Boundary (restricted area) and do not require decontamination unless they fail to pass a radiation survey. All transport vehicles that need to dump directly on the ore pad will be washed at the truck wash facility prior to undergoing a radiation survey. The radiation survey will consist of measuring radiation in the cab, on the external surface of the vehicle, and at one meter away from the exterior of the vehicle. The applicable radiation limits for vehicles used solely for transportation of LSA-I material are shown in Table C-1 below.

Table C-1
Radiation Limits for Exclusive Use Transport Vehicles

In cab	At exterior surface	Transport Index (1)	3 meters from exterior surface	Regulatory Reference
2 mrem/hr	---	---	---	49 CFR 173.441(b)(4)
---	200 mrem/hr	10	---	49 CFR 173.427(a)(5) and 49 CFR 173.441(a)
---	---	---	1,000 mrem/hr	49 FR 173.427(a)(1)

(1) The Transport Index is unitless and equal to the average mrem/hr measurement taken one meter from the exterior surface of the conveyance.

All radiation measurements will be conducted in accordance with Energy Fuels' standard operating procedures (Procedure No. RH-121) found in the Radiation Health & Safety Plan. These surveys will be recorded and kept on file. At a minimum, the radiation survey will consist of:

1. at least one measurement taken in the cab of the transport vehicle;
2. various measurements taken on the exterior surface of the transport vehicle; and
3. various measurements taken one meter from the exterior of the transport vehicle for the Transport Index (multiple measurements will be averaged).

Measurements do not need to be taken three meters from the exterior (per 49 CFR 173.427(a)(1)) because radiation limits at the surface and at one meter are more stringent than the limit at three meters.

Transport Vehicles that will be Released for Unrestricted Use

Unless the transportation contractor advises mill staff otherwise, mill staff will assume that each transport vehicle released from the Facility site will be returning solely for transporting LSA-I material from the mine to the Facility and does not require release for unrestricted use. The transportation contractor will advise mill staff prior to sending any vehicle in for repairs, servicing, or alternate use so that mill staff can ensure that the vehicle is decontaminated, surveyed, and released for unrestricted use. No transport vehicle that has carried LSA-I material may be used for non-radioactive materials transport or sent in for servicing or repair unless it has been released for unrestricted use by mill staff. This plan provides procedures for performing decontamination and radiation surveys required for transport vehicles released to unrestricted use. For a more detailed outline of the following decontamination and radiation survey procedures, refer to the Radiological Health & Safety Plan.

The transport vehicles to be released for unrestricted use will be decontaminated prior to radiation surveys as outlined below. Following decontamination, the vehicle will undergo a more stringent radiation survey than is performed for exclusive use vehicles. A vehicle may not be returned to service (i.e., released from the Facility for unrestricted use) until the following requirements are met.

1. The radiation dose rate at every accessible surface (including the interior of the bed) is 0.5 mrem/hr or less (49 CFR 177.843(a));

2. The radiation dose rate at one centimeter from every accessible surface is 0.2 mrad/hr on average and 1.0 mrad/hr maximum or less (NRC Policy Guidance FC 83-23);

3. The removable (non-fixed) radioactive surface contamination is not greater than 22 dpm α/cm^2, averaged over 300 cm^2 per sample on external surfaces (49 CFR 173.443(a)); and

4. Surface contamination is at or below the Reg Guide 1.86 acceptable surface contamination levels in Table C-2, NRC Regulatory Guide 1.86 Acceptable Surface Contamination Levels.

Table C-2
NRC Regulatory Guide 1.86 Acceptable Surface Contamination Levels

Nuclide(1)	Average(2)	Maximum(3)	Removable(4)
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Beta-gamma emitters	5,000 dpm β-γ/100 cm^2	15,000 dpm β-γ/100 cm^2	1,000 dpm β-γ/100 cm^2

(1) Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

(2) Measurements of average contamination should not be averaged over more than one square meter.

(3) The maximum contamination level applies to an area of not more than 100 cm^2.

(4) The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with a dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe.

Reg Guide 1.86 establishes acceptable surface contamination levels for unrestricted release of components from a nuclear reactor. These levels will be adhered to for any transport vehicles being released from the Facility for unrestricted use.

Radiation measurements will be conducted in accordance with Energy Fuels' standard operating procedures (Procedure No. RH-121) found in the Radiation Health & Safety Plan. These surveys will be recorded and kept on file. At a minimum, the radiation survey will consist of measurements taken on:

1. The interior and exterior of the trailer;
2. One tire;
3. The driver-side door handle;
4. The driver's seat;
5. The floor inside of the vehicle; and
6. Any dirty or suspect areas.

After a vehicle has been decontaminated and passed the radiation survey for unrestricted release in accordance with this Section, the vehicle markings indicating "FOR RADIOACTIVE MATERIALS USE ONLY" will be removed or painted over.

Transport Vehicle Decontamination

Transport vehicles being released for unrestricted use and vehicles that have entered the Mill License Boundary area (i.e. have dumped directly on the ore pad) will be decontaminated prior

to a radiation survey. Additionally, any transport vehicles that do not pass an initial radiation survey or require decontamination for any other reason will be decontaminated.

Decontamination of transport vehicles will consist of pressure-washing at the truck wash facility, located immediately northeast of the ore pad. The truck wash is a partially enclosed and fully automated touch-less system consisting of a platform constructed of heavy-duty angle iron with high-pressure water sprays mounted both below and on the sides. The high-pressure sprays remove dirt or mud and requires between one and two minutes to wash a truck. A handheld, high-pressure hose is also available to selectively wash portions of the vehicle where residual ore and mud may have collected.