

**Phase I Implementation Work Plan
USNRC Materials License No. SMB-911
Amendment No. 12
FMRI, Inc.
Muskogee, Oklahoma**

Prepared For:

FMRI, Inc.
10 Tantalum Place
Muskogee, OK 74403

**4000:PA4103
July 2004**

Prepared By:

Penn Environmental & Remediation, Inc.
359 Northgate Drive, Suite 400
Warrendale, PA 15086



Penn E&R
Environmental & Remediation, Inc.

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FIGURE 9-1: TIMELINE FOR FMRI PHASE I DECOMMISSIONING ACTIVITIES

INTRODUCTION

On behalf of FMRI, Inc. (FMRI) Penn Environmental & Remediation, Inc. (Penn E&R) has prepared this Phase 1 Implementation Work Plan (Phase 1 WP) to address applicable regulatory requirements and specific license conditions in U.S. Nuclear Regulatory Commission (NRC) Materials License No. SMB-911, Amendment No. 12, Docket No 40-7580 (License). In particular, Condition No. 37(a) of the License requires that a plan be submitted to the NRC by August 2, 2004, in accordance with 10 CFR 40.42(g)(4)(ii), to describe the planned decommissioning activities associated with the work-in-progress (WIP) residual materials contained in Pond Nos. 2 and 3 at the FMRI Muskogee, Oklahoma facility. These activities are identified in the January 14, 2003 Decommissioning Plan (DP) (amended May 8 and July 24, 2003) as Phase 1 of the decommissioning effort. Subsequent plans will be submitted to the NRC for the remaining three phases of decommissioning as the schedule in Condition No. 37 dictates.

This Phase 1 WP is also intended to address Condition Nos. 50, 51 and 52 of the License which require other submittals to the NRC on or about August 1, 2004. These conditions are addressed to the extent practicable in Chapters 5.0, 7.0 and 8.0 of this plan. However, the NRC hearing process has resulted in delays to the originally anticipated Phase 1 schedule and procurement and preplanning activities have just begun. Therefore, information regarding contractor specific data, along with project details to be developed in conjunction with the selected contractor, will be supplemented at a later date. A current project schedule is provided as a reference in Chapter 9.0.

As stated, Phase 1 of the decommissioning activities involves remediation work associated with Pond Nos. 2 and 3. Pond Nos. 2 and 3 (located in Area II as described in the DP) accepted residues from the WIP produced during the digestion and liquid-liquid exchange processes that occurred in the Chemical "C" Building. Materials stored in the ponds include digested ores and slags and fluid comprised of hydrogen fluoride (HF) and sulfuric acid (H₂SO₄) containing methyl isobutyl ketone (MIBK), heavy metals, and low-level radioactive species. During Phase 1 of decommissioning activities, the residual materials contained within Pond Nos. 2 and 3 will be excavated and removed for off-site disposition. In accordance with Condition No. 30 of the License, the excavation of materials will include WIP material that has migrated from the ponds. For the purposes of this Phase 1 WP, WIP that has migrated from the ponds shall be defined as material that exhibits the same physical characteristics as the sludge-like material contained in the ponds.

According to plant records, Pond No. 2 was placed into service in 1960 and was closed in place in 1979. The materials in the pond were covered with a polyvinylchloride sheet, a polyethylene sheet, and between 6 and 24 inches of soil to support vegetation. The pond is approximately 350 feet in length, 150 feet in width and 12 feet deep with no engineered liner or leak detection system.

Pond No. 3 was constructed by excavating the alluvial soils to the top of the local shale bedrock. Because groundwater was encountered in this alluvium, a French drain network was installed around the structure to collect groundwater and route it to a wet well (collection sump). (The original design of the French drain collection system allowed groundwater to discharge to a small valley east of Outfall 003.) The sump discharge was then pumped from the sump to Pond No. 3 or to the plant's

process water treatment system. A single synthetic liner was installed in the pond with the intent to retain all fluids and residues discharged to the structure. According to plant records, Pond No. 3 was constructed in 1979. The pond is approximately 400 feet in length, 250 feet in width and 25 feet deep with no leak detection system.

This Phase 1 WP and all contractor specific implementation plans are to be developed using applicable NRC regulations and FMRI's policies, programs and procedures.

1.0 SITE PREPARATION

After the ancillary work plans, project plans and specifications, and contractor procurement activities have been completed, preparations must be made in the field to perform the Phase 1 tasks. These preparations are discussed below.

1.1 Security

The facility is completely enclosed by a security fence designed to prevent unauthorized entry. The fence is inspected and maintained by FMRI and its contractors to ensure the fence is not compromised and remains functional. A security gate is in place and will be operated by FMRI to control site access. All personnel entering the active work area will be logged in and out and will not gain access to active work areas unless they are 1) authorized to do so by FMRI or its agents, 2) appropriately trained, and 3) outfitted with required personal protective equipment (PPE).

During non-working hours, the security gate will be locked. Access to the plant shall be gained through proper notification to FMRI personnel.

1.2 Mobilization/Demobilization

Prior to the start of remediation activities, resources must be mobilized to the site and established to allow for work to begin. These resources include labor, equipment and supplies necessary to perform the required project tasks. For example, heavy equipment selected by the contractor to excavate the material from the ponds will be transported to the site, off-loaded, serviced, fueled and placed in the active work area. Support facilities (office trailers, staging locations, decontamination areas, sanitary facilities, etc.) will be located on-site by the contractor as necessary. The contractor will be responsible for proper utility connections, including but not limited to, water, electric, and phone services. Monitoring equipment will be brought on-site, along with PPE and common field supplies including hand tools, power equipment, etc. The contractor will be responsible for all labor, equipment and supplies necessary to complete Phase 1 decommissioning activities, unless agreed upon through prior arrangement with FMRI. These resources must be marshaled and be in place prior to Phase 1 implementation.

At the project's end (based on the terms of the contract between the contractor and FMRI), the contractor will demobilize the remaining resources from the site. The contractor will ensure that all equipment and supplies have been properly decontaminated, surveyed, and released if used in active work areas. Support facilities (decontamination pads, office trailers, etc.) will also be surveyed and released prior to removal and utility connections will be terminated unless directed otherwise by FMRI. The site will be left in an improved condition as specified in the performance requirements contained with the project plans and specifications.

1.3 Access/Roads/Haulage

The selected contractor will be responsible for the layout and construction of site access roads to allow for the efficient access of equipment and vehicles to and from the active work area. This layout, when developed, will be evaluated to ensure that traffic on the site moves without restriction

while limiting the potential for cross-contamination. Prior to releasing vehicles leaving the work area, the vehicles will be decontaminated (if necessary) and surveyed to ensure they meet appropriate release criteria.

Hauling vehicles entering the site will be logged in and tracked by manifest number to determine the number of trucks entering and leaving the site and to track material flow from the site to the designated off-site facility. Hauling weights will be determined via load cells within a front-end loader, or by other means determined by the contractor and approved by FMRI.

Existing access road and parking areas will be used to the extent practicable. Access road construction will be dictated by contractor needs but will most likely involve the placement of a geotextile followed by a suitable thickness of coarse aggregate with fines to promote tight compaction. Vehicle speeds within the site perimeter will be limited to 15 mph maximum. Backup alarms will be required on all construction vehicles. All vehicles and equipment shall be in proper working order at all times.

1.4 Equipment

The majority of the construction equipment anticipated for Phase 1 activities is commonly used in commercial and industrial earthwork and should be readily available to qualified contractors. Equipment used will most likely include; excavators, loaders, tractors, tractor-scrappers, backhoe-loaders, graders, compactors; trucks, tanker trucks, frac tanks, etc. The contractor will be responsible for selecting the equipment necessary to complete the project in a safe, cost effective, and timely manner.

More specialized equipment may be required to install a sheet pile cutoff wall around the active work area. In addition, equipment needed to monitor site conditions and to provide adequate health physics and general health and safety coverage will be the responsibility of the selected contractor and/or FMRI designated agents for the project.

1.5 Decontamination Procedures

The focus of the contamination control program is on surveys of skin, protective and personal clothing, fixed and removable surface contamination, transport vehicles, equipment, and supplies. The contamination control program will be as follows:

- Control both access to (and work hours in) contaminated areas by workers, as required by 10 CFR 20.1702.
- Perform surveys to supplement personnel monitoring for workers during routine operations, maintenance, cleanup activities, and special operations.
- Perform surveys to determine the baseline of background radiation levels and radioactivity from natural sources for areas where decommissioning activities will take place.
- Follow the procedures for surveys as indicated in Regulatory Position C.1, Types of Surveys, in Regulatory Guide 8.21.

- Specify removable surface contamination action limits (i.e., actions taken either to decontaminate a person, place, item or area, or to restrict access, or to modify the type or frequency of radiological monitoring) for restricted and unrestricted areas. The applicable limits for contamination of surfaces and clothing included in Regulatory Position C.1 of Regulatory Guide 8.21, NRC FC 83-23, and NUREG-1660 will be considered.
- Specify that calculations of the surface activity of contaminated materials use a 4π surface-efficiency factor for gamma emitters.
- Require surveys of air quality based on Regulatory Guide 8.25.
- Test sealed sources and ensure that sealed sources are leak tested at appropriate intervals in accordance with the guidance in Annex A.2.1 of ANSI/HPS N43.6-1997 (for Part 70 licenses, as indicated in NRC's Branch Technical Positions for Leak Testing, April 1993).

Equipment and personnel will be decontaminated as necessary through physical means either through mechanical removal or application of wet methods, as determined by the contractor to fulfill the performance specifications. Decontamination facilities will be established during mobilization and set up activities. These facilities will most likely include a decontamination station with utilities and appropriate supplies for remediation personnel (contained within a trailer or similar structure) and a decontamination pad for larger equipment. Equipment and personnel will not be permitted to leave active work areas and the decontamination facilities until contaminated surfaces are no longer considered contaminated. Appropriate documentation of decontamination activities will be maintained by the contractor for record purposes. Any elevated survey or air monitoring results shall require immediate notification to the FMRI Radiation Safety Officer.

Contaminated materials and disposable supplies generated as a result of decontamination activities will be disposed of in accordance with the pertinent planning documents and applicable environmental regulations.

1.6 Water Management

Remediation of groundwater is not a component of Phase 1 decommissioning activities. However, management of groundwater, surface water, decontamination water, and interstitial water within affected material will be necessary during Phase 1 remediation activities. It is anticipated that the existing groundwater treatment program, utilizing the existing waste water treatment plant, will be maintained during Phase 1 decommissioning activities. Surface water will be managed so that contact with affected materials is controlled and surface water run-on into affected areas is minimized.

The existing waste water treatment plant at the site will most likely be used to process contaminated water that may be collected from excavation activities, material dewatering, decontamination activities, and surface water that may collect in open excavations, unless other means or processes are approved by FMRI. Contaminated water may be collected in portable tanks or other constructed facilities, as determined necessary by the contractor. The water will then be transferred from temporary storage, or directly from excavations, to the treatment plant for processing and eventual discharge through FMRI's OPDES permitted outfall.

The construction of storm water diversion structures is anticipated in order to prevent the introduction of storm water into the active work area, and to prevent the loss of potentially contaminated storm water from the active work area. Diversion channels and berms will serve this purpose. The contractor will be responsible for the design, construction, and maintenance of the storm water management controls at the site. Stormwater discharge will be controlled in accordance with the requirements of FMRI's OPDES Permit.

1.6.1 Effluent Sampling and Monitoring

Excess water may be sampled and analyzed for radiological contamination to determine if it is contaminated. Sample frequency will be dictated by either the applicable permit conditions or an agreement with our off-site disposal facility. The contractor will be responsible for all permitting requirements and off-site disposal agreements to maintain compliance with applicable environmental regulations. Final water management arrangements will be determined at a later date based on contractor recommendations and approval by FMRI.

1.7 Dust Control

Two factors should serve to limit the amount of dust generation at the site during Phase 1 activities. First, the residual materials to be excavated are anticipated to be wet of optimum moisture content and therefore less subject to potential dusting concerns. Second, the site access roads will be constructed with coarser grained materials to alleviate this particular concern. However if dusting should become a problem, the contractor can dampen the problem areas with water to prevent fines from becoming airborne. The vehicle decontamination station will also serve to remove finer grained materials from the vehicles leaving the active work area, and the site in general. Finally, stockpiles may be covered with tarps when not in active use.

1.8 Erosion and Sedimentation Controls

The selected contractor will be responsible for the generation and approval of the project Erosion and Sedimentation (E&S) Control Plan. E&S control measures must be in place and operational before Phase 1 operations can begin. Storm water discharges from the site must meet permitted discharge limits. E&S control measures shall be properly constructed and maintained until the disturbed areas are adequately stabilized. These measures may include:

- diversion channels and berms,
- sediment traps,
- temporary covers (such as plastic sheeting or tarps),
- silt fence and/or hay bale barriers,
- riprap linings,
- erosion control matting, and
- vegetative strips.

An inspection schedule and reporting protocol shall be prescribed in the selected contractor's plan. A record of inspection and all repairs made will be noted and kept on site. At a minimum, all E&S

control measures will be inspected weekly during Phase 1 decommissioning activities, every 2 weeks during inactive periods, and within 24 hours after each rainfall event exceeding 0.5 inch. During periods when rain is occurring continuously for days, control measures will be inspected at least daily. Repairs and maintenance will be performed as soon as practical.

2.0 EXCAVATION

The excavation and disposition of residual materials from Pond Nos. 2 and 3 are the primary focus of the Phase 1 decommissioning activities. It is anticipated that approximately 16,000 tons (20 percent moisture content by weight) of residues from the WIP will be excavated. In accordance with Condition No. 30 of the License, the excavation of materials will include WIP material that has migrated from the ponds. For the purposes of this Phase 1 WP, WIP that has migrated from the ponds shall be defined as material that exhibits the same physical characteristics as the sludge-like material contained in the ponds. In addition, the polyvinylchloride sheet and the polyethylene sheet covering the material in Pond No. 2 and the synthetic liner in Pond No. 3 will be removed for proper disposition.

The first anticipated activity associated with the excavation may involve the installation of a sheet pile cut-off wall around the Phase 1 work area to provide lateral support to the excavation and to limit groundwater intrusion. It is anticipated that the sheet piles will be driven to a depth below the projected base of the pond excavations (preferably to bedrock). The individual piles will be interlocked to provide for additional stability and to enhance the groundwater barrier. Sheet pile installation will be monitored by the contractor to insure the piles are driven without warping or damage. The depth of each pile will be monitored closely to accurately determine the base of the wall and the allowable depth of excavation. The stability of the wall, and consequently the excavation, may be compromised if the excavation undermines the interior support of the piling. The contractor will be responsible for the design, construction and installation of a sheet pile cut-off wall, or alternative means as required by the project plans and specifications.

Groundwater, residual pore water, and collected storm water that may be encountered within the excavation after a sheet pile wall is installed will be pumped from the excavation and handled as described in Section 1.6.

It is anticipated that the contractor will perform the excavation with commonly available excavation equipment such as hydraulic excavators. The excavation will be staged in a logical manner so that materials will be removed without compromising excavation stability or the traffic flow of equipment and transportation vehicles. Double handling of the materials will be limited to the extent practicable. Materials removed from the excavation will be transported using on-site transport vehicles to the designated stockpile area for processing, as required by the project plans and specifications.

3.0 MATERIAL PROCESSING

After the materials are removed from the excavation, the materials may be transported and stockpiled on-site for processing, depending on their condition. It is anticipated that the area northwest of the Sodium Reduction Building will be prepared and used as a stockpile and material processing area. The area is anticipated to be lined with 60-mil high-density polyethylene geomembrane, or equivalent, to prevent migration of contamination to the subsurface. A working surface of common fill or other earthen materials may be placed on the liner to facilitate heavy equipment operations. Berms and ditches will be constructed at the perimeter to contain precipitation falling within the area and to prevent storm water intrusion from exterior areas.

The material will be stockpiled to allow for tracking by excavation location, date of excavation and by stockpile identification. The contractor will be responsible for documenting material movement during this process. Once an acceptable quantity of material is ready, the material will be air dried or, if economically feasible, heat dried or pressed to further reduce the water content as required. Radiological controls shall be used to eliminate or control the potential spread of contamination including the potential spread of airborne contamination. After drying, the material will be loaded and transported off-site for final disposition.

4.0 EXCAVATION MAINTENANCE

Backfilling of the excavation created during Phase 1 decommissioning activities will not take place until additional site characterization is completed at a future date. The excavation will be maintained by FMRI and/or FMRI's designated contractor after Phase 1 is complete to ensure a secure and stable work environment. The selected contractor will be required to leave the open excavation in a suitable condition with allowances for appropriate site controls. Site controls may include construction fencing, site access restrictions, water management facilities, and the like. These controls will be specified further during the contractor procurement process.

5.0 MATERIAL MANAGEMENT

5.1 Transportation Management –Pond Residuals

Materials removed during excavation will either be loaded directly for transport off-site or stockpiled for processing as described in Section 3.0. Material tracking based on excavation location, excavation date and stockpile designation, as applicable, will continue until the material is loaded for transport. The material will be checked by the selected contractor prior to loading, as required by the project specifications, to ensure the material meets the appropriate acceptance criteria dictated by the receiving facility. The selected contractor is responsible for meeting acceptance criteria at the receiving facility.

Manifests will be created for each unit of transport (anticipated to be rail car) to allow for complete material tracking. A copy of the signed manifests as accepted by the recovery facility, with weight and tracking information included, will be maintained on site and provided to FMRI representatives. The contractor will be responsible for the logistics associated with transportation management, including the scheduling of the rail cars or transportation vehicles, and the coordination with the specified recovery facility. The selected contractor shall be responsible for any DOT fees for shipping hazardous materials (annual fees).

5.2 Acceptance Criterion – Pond Residuals

FMRI or the selected contractor will be responsible for the selection of the recovery facility or facilities for Phase 1 decommissioning activities. In any case, the selection will be subject to FMRI approval. Once the identity of the facility or facilities has been established, acceptance criterion will be identified and planned for as part of the material management portion of the project.

5.3 Remediation Waste Management Program (RWMP)

The purpose of the solid waste management program is to ensure that controls on solid waste stream generation, storage, handling, and disposal and/or reclamation will be protective of the public H&S and in accordance with NRC requirements. The applicable NRC requirements are 10 CFR Part 20 (Subpart K), 10 CFR 61.55, 61.56, 61.57, and 71.5.

The solid waste management program will include the following:

- Specify the types of solid radioactive waste that are expected to be generated during decommissioning operations, including (but not limited to) structural and component metal, concrete, activated components, contaminated piping, wood, and plastic.
- Specify the estimated volume, in cubic feet, of each solid radioactive waste type expected to be generated during decommissioning operations.
- Specify the radionuclides (including the estimated activity of each radionuclide) in each estimated solid radioactive waste type expected to be generated during decommissioning operations.

- Summarize the volumes of Classes A, B, C, and Greater-than-Class-C solid radioactive waste that will be generated by decommissioning operations.
- Specify on-site storage (prior to disposal and/or reclamation) requirements for each solid radioactive waste type expected to be generated during decommissioning operations.
- Describe treatment and packaging activities for stored wastes to conform to the waste acceptance criteria (WAC) for the intended disposal and/or reclamation facility.
- Describe transportation and disposal (T&D) requirements to conform to DOT requirements.
- Describe controls for volumetrically contaminated material (if required).
- Specify measures to prevent contaminated materials, or other loose solid radioactive materials, from being re-disbursed after excavation and collection.
- Specify the name and location of the intended disposal and/or reclamation facility for each solid radioactive waste type expected to be generated during decommissioning operations.

The purpose of the liquid waste management program is to ensure that controls on liquid waste stream generation, storage, treatment, disposal and/or reclamation will be protective of the public H&S and in accordance with NRC requirements. The applicable NRC requirements are 10 CFR Part 20 (Subpart K), 10 CFR 61.55, 61.56, 61.57, and 71.5.

The liquid waste management program will include the following:

- Specify the types of liquid radioactive waste that are expected to be generated during decommissioning operations.
- Specify the estimated volume, in liters, of each liquid radioactive waste type expected to be generated during decommissioning operations.
- Specify the radionuclides (including the estimated activity of each radionuclide) in each liquid radioactive waste type expected to be generated during decommissioning operations.
- Summarize the estimated volumes of Class A, B, C, and Greater-than-Class-C liquid radioactive waste that will be generated by decommissioning operations.
- Specify on-site storage (prior to treatment, disposal and/or reclamation) requirements for each liquid radioactive waste type expected to be generated during decommissioning operations.
- Describe treatment and packaging activities for liquid wastes to conform to the WAC for the intended treatment, disposal and/or reclamation facility.
- Describe the T&D requirements to conform to DOT requirements.
- Specify the name and location of the intended treatment, disposal and/or reclamation facility for each solid radioactive waste type expected to be generated during decommissioning operations.

The purpose of the mixed waste management program is to ensure that controls on mixed waste stream generation, storage, and disposal and/or reclamation will be protective of the public H&S and in accordance with NRC and USEPA requirements. The applicable NRC requirements are 10 CFR

Part 20 (Subpart K), 10 CFR 61.55, 61.56, 61.57, and 71.5. The applicable USEPA requirements are 40 CFR 260-270.

The mixed waste management program will include the following:

- Specify the types of solid and liquid mixed waste that are expected to be generated during decommissioning operations.
- Specify the estimated volumes, in cubic feet, of each solid mixed waste type expected to be generated during decommissioning operations.
- Specify the radionuclides (including the estimated activity of each radionuclide) in each type of mixed waste type expected to be generated during decommissioning operations.
- Summarize the estimated volumes of Class A, B, C, and Greater-than-Class-C mixed waste that will be generated by decommissioning operations.
- Specify on-site storage (prior to disposal and/or reclamation) requirements for each mixed radioactive waste type expected to be generated during decommissioning operations.
- Describe treatment and packaging activities for mixed wastes to conform to the WAC for the intended disposal and/or reclamation facility.
- Describe the T&D requirements to conform to DOT requirements.
- Specify the name and location of the intended disposal and/or reclamation facility for each mixed radioactive waste type expected to be generated during decommissioning operations.
- Describe the requirements of all other regulatory agencies having jurisdiction over the mixed waste expected to be generated during decommissioning operations.
- Provide evidence that FMRI possesses the appropriate USEPA or state permits to generate, store, and/or treat the mixed wastes expected to be generated during decommissioning operations.
- If appropriate and as applicable, incorporate USEPA conditional exemptions (40 CFR 266 Subpart N and 40 CFR 261.3[h]) for certain low-level mixed waste storage, treatment, transportation, and disposal and/or reclamation activities.

In response to License Condition No. 52, FMRI will make available (after contractor procurement activities are complete) the RWMP and subsequent revisions and updates for review on-site by the NRC. FMRI representatives, in conjunction with the selected contractor, will be responsible for generating the RWMP and the contractor will be responsible for program implementation. FMRI representatives will update and have available at the site the RWMP prior to the beginning of each phase of decommissioning.

6.0 SITE RESTORATION

After Phase 1 operations are complete, the selected contractor will restore the site in accordance with the project plans and specifications. The site restoration will include site grading to meet design site contours and the installation of permanent surface water and erosion and sedimentation controls. Designated disturbed areas will be prepared for seeding with the application of topsoil and the addition of soil conditioners as required. The designated areas will then be seeded and mulched to establish an appropriate vegetative stand to limit erosion and sedimentation. It is anticipated that the excavations will remain open, with proper controls, until final site characterization and site release is performed as part of Phase 3 of the decommissioning activities.

7.0 RADIATION PROTECTION METHODS

7.1 Personnel Training and Monitoring

Training focused on the objectives of the DP will be required. Annual training and refresher training, as needed, will also be required (in order to comply with 10 CFR 19 and 10 CFR 20). A training program will be established by the selected contractor to meet project specifications and the following goals:

- Meet or exceed the applicable training requirements specified by NRC, Occupational Safety and Health Administration (OSHA), and the USEPA.
- Ensure that all personnel are knowledgeable of job requirements and are competent in the operation of the equipment they use, are safe in their work practices, and understand the risks associated with their work environment.
- Ensure that personnel meet the requirements of FMRI to work at the Muskogee site.
- Indoctrinate new employees to ensure that they understand all requirements they are expected to meet.

The program will include general radiation safety training/monitoring, site orientation, site- and job-specific training, and training verification and documentation.

At a minimum, all site personnel will be required to have appropriate basic radiation safety training and to wear radiation-monitoring devices. The radiation safety training that will be provided to each employee will include pre-employment, annual/periodic training, and specialized training to comply with 10 CFR 19.

Prior to entry into any radiological restricted area at the FMRI site, visitors will be given a radiological orientation that may include orientation through a video provided by FMRI personnel. Objectives of this orientation will be to familiarize personnel and visitors to:

- recognize labeled or posted radioactive materials and understand the meaning of radiological warning signs;
- understand that as long as radiological control procedures and limits are followed, harmful effects to personnel and the environment from radioactivity will be minimized;
- understand they are required to stay with host personnel at all times; and
- recognize and understand the meaning of, and proper response to, emergency signals.

Site and job-specific training will be required of all contractor personnel involved in day-to-day operations of the remediation project, project and management personnel who visit the site regularly,

and other personnel identified by FMRI. Prior to being allowed unescorted access to the site and issuance of radiation dosimetry, each person shall demonstrate a basic knowledge of radiation worker training, and/or shall be trained in accordance with facility requirements. Periodic worker jobsite or tailgate training will be provided to familiarize workers with job-specific procedures or safety requirements.

Personnel working on site will present evidence of general radiation safety training as required by 10 CFR 20 and pertinent refresher training (e.g., training certificates and letter of certification) prior to being permitted to perform in a restricted area. All contractor personnel will be required to have OSHA 1910.120 training, and the contractor shall meet all the requirements in OSHA 1910.120. The contractor shall provide evidence of this training. In addition, all site personnel shall sign a statement certifying and acknowledging that they have received site-specific training and that they understand the potential site hazards and the necessary control measures to reduce and/or eliminate those hazards. Training documentation, including the content of site-specific training and any other subsequent training (e.g., periodic safety meetings and specific task safety meetings), will be submitted to FMRI and will be maintained over the course and completion of all remediation activities. This information will be available for inspection by FMRI and the agencies with jurisdiction over site operations.

7.2 ALARA

The Radiation Health and Safety Program (RHSP) discussed in Section 7.6 will describe the radiation safety controls and types of monitoring to be used to ensure that internal and external exposures to workers are as low as reasonable achievable (ALARA). These controls and types of monitoring will be implemented by the selected contractor using written procedures including a process for managing procedure change. The contractor will be responsible for the generation of the RHSP, in accordance with applicable regulator requirements and the project plans and specifications.

7.3 Environmental Monitoring Plan (EMP)

The selected contractor will implement an Environmental Monitoring Plan (EMP) during Phase 1 decommissioning activities for the specific purpose of evaluating whether the decommissioning activities comply with the regulatory requirements in 10 CFR Part 20 and the applicable ODEQ permits, and are adequate to protect workers, the public, and the environment from radiation during decommissioning activities. In response to License Condition No. 52, FMRI representatives will generate the EMP and update the plan prior to the beginning of each phase of decommissioning. A copy of the updated plan will be maintained on site by FMRI representatives.

7.4 Quality Assurance/Quality Control Plan (QA/QC Plan)

It is FMRI's intention to implement appropriate quality assurance (QA) / quality control (QC) program controls for Phase 1 decommissioning activities that may affect the health and safety of the public and personnel at the site, or the quality of the data generated. A written QA/QC Plan will be developed by FMRI representatives to guide the performance of data gathering activities to assure that the results are accurate and that uncertainties have been considered adequately. This program will operate in all stages of the data gathering through final validation of the data (as applicable) and interpretation of results. The program will be consistent with guidance contained in the following

document: NRC Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Program-- Effluent Streams and the Environment (NRC, 1979).

The QA/QC Plan will address the following areas, as applicable for Phase 1 decommissioning activities:

- Selection of instruments. Instruments will be selected for various surveying and screening activities that have sensitivities sufficient to produce data that satisfy the applicable study objectives.
- Sensitivity of measurements. The QA/QC Plan will establish required detection limits for various measurements. The QA/QC process will ensure that any measurement technique, laboratory analysis, or instrumentation is capable of generating data at the required limit of detection.
- Recording and management of data. The QA/QC Plan will specify the forms and methods for recording calibrations, performance checks, corrective actions, reports to management, exceptional circumstances, and all other information gathered during the decommissioning activity relating to data quality. The QA Officer for the project will be responsible for producing a complete documentary record of the quality aspects of the decommissioning operation.
- Data validation requirements. The QA/QC Plan will specify the frequency and quantity of data validation to be performed. Data validation will be performed by a third party not otherwise involved in the generation or interpretation of the data.
- QA/QC organizational structure. The QA/QC function will operate independently of the data gathering and interpretation operations. Specific persons with QA/QC responsibility and their reporting relationships to the entire decommissioning staff organization will be specified in the QA/QC Plan.
- Audits and inspections. The QA/QC Plan will have a specified schedule of required audits and inspections. In addition, the QA/QC Plan will specifically empower the QA Officer to conduct other audits and inspections at his sole discretion. Persons performing self-assessment activities are not to have direct responsibilities in the area they are assessing.
- Reporting requirements. The QA Officer will be required to submit periodic reports to project management and others involved in the conduct of the decommissioning operation. These reporting requirements will be specified in the QA/QC Plan.
- Corrective actions. The QA/QC process is expected to identify data, procedures, and practices that are unsatisfactory for purposes of meeting the decommissioning objectives. The QA/QC Plan will specify procedures for correcting or discarding data, recommending procedural changes, and modifying work practices that impact on overall data quality. Follow up and evaluation of modifications will be required in the

QA/QC Plan which also will specify how these evaluations will be conducted and documented.

- **Certification.** The QA/QC Plan will provide for the QA Officer to certify all final reports and determinations relating to satisfaction of specific decommissioning criteria as based on data that have been collected, managed, reviewed, and validated in accordance with the QA/QC Plan.
- **Training.** The QA/QC Plan will provide for instruction of personnel responsible for performing activities affecting quality pertaining to the purpose, scope, and implementation of the quality-related manuals, instructions, and procedures. Provision will also be made for training and qualification of personnel verifying activities affecting quality in the principles, techniques, and requirements of the activity being performed. Formal training and qualification program documentation will include the objectives and content of the program, attendees, and date of attendance.
 - Individuals who collect samples and/or operate survey instruments or analytical counting systems will be trained accordingly and such training documented. Training will be commensurate with the education, experience, and proficiency of the individual and the scope, complexity, and nature of the assigned activity.
 - Qualification. Individuals who collect samples and/or operate survey instruments or analytical counting systems will be qualified and such qualification documented. Qualification requirements will be commensurate with the scope, complexity, and nature of the assigned activity.
 - Documentation. Steps of the process including, but not limited to, training, calibration of the instrumentation, daily checks, surveys, sampling, and results analysis and interpretation will be documented. Records will be kept as part of the FMRI project file.

A QA/QC program for sample collection and analysis will address the following areas, as applicable for Phase 1 decommissioning activities:

- **Procedure.** Samples will be collected in accordance with written procedures. Sampling tools will be cleaned and monitored, as appropriate, after each use. Samples will be collected in clean/unused sealable containers.
- **Documentation.** Sample containers will be permanently labeled/marked in the field at the time of collection by the technician collecting the sample. At a minimum, the following information will be recorded on the sample container: sample date/time, sample identification number, sample location, and name of person collecting the sample. Samples which may contain radionuclide levels in excess of 100 times the baseline concentration or which, because of their form, may be a potential laboratory contamination concern will be identified on the outside of the container with a

“radioactive material” caution label. Written documentation on sample collection, analysis, and audits will be kept as part of the FMRI project file.

- **Chain of Custody.** An approved procedure will be used for strict chain of custody so that the integrity of the sample is maintained throughout sampling, transportation, analysis, and archiving.
- **Analysis Requirements.** For each type of laboratory analysis requested, a specification for the following (at a minimum) will be made: required analysis and/or analytical methodology, the required MDC value for each radionuclide, any result presentation requirements, sample disposition, and turnaround time require to support the project.
- **Analytical Laboratory.** For all analytical laboratories (vendors) used, at a minimum, the following QA/QC principles will be applied: proper maintenance, storage, and archiving of samples after transfer to laboratory will be practiced; and an approved internal QA program will be in place.

The QA/QC Plan will be finalized by FMRI representatives and provided to the NRC prior to implementation. No decommissioning activities subject to certification requirements will be performed prior to implementation of the approved QA/QC Plan.

The NRC will be notified of changes in procedures and personnel that would impact the commitments of the DP before implementation of the changes. Changes in organizational elements will require NRC notification within 30 days of implementation. Editorial changes or personnel reassignments of a non-substantive nature will not require NRC notification.

It should be noted that a distinction has been made between QC activities and QA activities, even though FMRI representatives will generate a QA/QC Plan covering both topics. QC activities are defined as the activities the contractor performs to ensure the work completed by the contractor is in accordance with applicable regulations and the project plans and specifications. The contractor will be required to submit a QC Plan for review and approval by FMRI representatives, based on the requirements of the QA/QC Plan. The contractor will be required to complete QC activities specified in the plan as part of the contractor’s contractual obligations for the project. The contractor will also be required to designate a QC Officer for the project who will be principally responsible for QC activities. The QC Officer will interact with the QA Officer employed directly on behalf of FMRI.

QA activities are defined as oversight activities performed by a designated representative of FMRI to ensure that contractor QC activities satisfy project requirements. The QA Officer for the project will monitor the contractor’s QC activities to confirm the project is being completed as intended and that defensible data is produced. The QA Officer will be also be responsible for independent data gathering and audits as required in order to independently validate that the project is being executed as intended.

In response to License Condition No. 52, FMRI will make available (after contractor procurement activities are complete) the QA/QC Plan and subsequent revisions and updates for review on-site by

the NRC. FMRI representatives will be responsible for generating the QA/QC Plan and both FMRI representatives and the contractor will be responsible for program implementation. FMRI representatives will update and have available at the site the QA/QC Plan prior to the beginning of each phase of decommissioning.

7.5 Final Status Survey Plan (FSSP)

The FSSP will be written in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575. An outline of the FSSP design is presented in Section 14.4 of the DP. The final plan will be generated by a FMRI representative for submittal to the NRC prior to the initiation of Phase 3 decommissioning activities. The FSS activities specified in the plan will be implemented by FMRI representatives.

In response to License Condition No. 51, minor or non-substantive changes to the FSSP may be implemented by FMRI without prior approval of the NRC. An example of this type of change would include changes in the equipment used and/or the personnel employed to perform the survey, provided FSSP requirements are still being met.

7.6 Radiation Health and Safety Plan (RHSP)

The RHSP will be generated by FMRI personnel to conform to the following two fundamental performance objectives:

- Compliance with the regulatory requirements in 10 CFR Parts 19 and 20 as required by NRC materials license conditions, thus assuring adequate protection of workers from ionizing radiation during decommissioning activities.
- Radiological safety measures (controls and monitoring) for workers will be commensurate with the risks associated with licensed activities at the Muskogee decommissioning site as required by 10 CFR 20.1101.

The current site RHSP and implementing procedures used to conduct licensed activities is compliant with NRC requirements and will be revised as necessary to include decommissioning activities outside of the current scope of site activity. In response to License Condition No. 52, FMRI representatives will update the RHSP prior to the beginning of each phase of decommissioning. A copy of the updated plan will be maintained on site by FMRI representatives. The selected contractor will be required to submit its own RHSP based substantially on the requirements contained within the FMRI RHSP.

8.0 CONTRACTOR INFORMATION

8.1 Contractor and Select Personnel Qualifications

The contractor selected for this project by FMRI will possess a demonstrated track record of radiological remediation projects. The contractor should be fiscally solvent and possess the capability to obtain the required financial sureties required for a project of this type.

In response to License Condition No. 50, the following should be considered the minimum qualification requirements for the select personnel listed below:

Health Physics Supervisor:

- An advanced degree or commensurate training as determined appropriate by FMRI;
- A minimum of 1 year of demonstrated field experience in applied health physics, industrial hygiene, or similar work relevant to radiological hazards associated with site remediation; and
- A thorough knowledge of the proper application and use of all health physics equipment used for the radiological present at the site, the chemical and analytical procedures used for radiological sampling and monitoring, and methodologies used to calculate personnel exposure to the radionuclides present at the site.

Construction Supervisor:

- An advanced degree or commensurate training as determined adequate by FMRI;
- A minimum of 1 year of demonstrated field experience supervising projects of similar size and scope to the project at hand; and
- A thorough knowledge of earthwork techniques, construction equipment, field operations, labor supervision, in addition to radiological and environmental health and safety activities.

Quality Assurance Officer and Quality Control Officer:

- An advanced degree or commensurate training as determined appropriate by FMRI;
- A minimum of 1 year of demonstrated field experience in applied health physics, industrial hygiene, or similar work relevant to radiological hazards associated with site remediation; and
- A thorough knowledge of the proper application and use of all health physics equipment used for the radiological present at the site, the chemical and analytical procedures used for radiological sampling and monitoring, and methodologies used to calculate personnel exposure to the radionuclides present at the site.

8.2 Contractor Responsibilities

The selected contractor's responsibilities will be as identified in the narrative of this Phase 1 WP and the project plans and specifications. The contractor will be tasked to complete the project based on

performance plans and specification which dictate the anticipated results of the project rather than a design specifying the means. Consequently, the selected contractor will be tasked to be especially innovative in order to 1) be awarded the project in a cost competitive environment and 2) comply with project plans and specifications in addition to regulatory requirements.

9.0 SCHEDULE

A schedule for Phase 1 decommissioning activities is provided as **Figure 9-1** to this document. The schedule reflects the currently anticipated progression of work associated with the project. The schedule will be revised after contractor procurement activities are complete and the selected contractor submits the anticipated schedule required under the terms and condition of the contract. A schedule reflecting the submittal of a supplement to this Phase 1 WP (after a contractor has been selected) will be included with the license amendment application to specify a revised start date for decommissioning activities.

Figure 9-1 - Timeline for FMRI Phase 1 Decommissioning Activities

