LMS/SHL/S07305

Fluid Management Plan
Subsurface Corrective Action Unit 447
Shoal, Nevada, Site

September 2011

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

CAU	Corrective Action Unit
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
FMP	Fluid Management Plan
LM	DOE Office of Legacy Management
MCL	maximum contaminant level
mg/L	milligrams per liter
NDEP	Nevada Division of Environmental Protection
pCi/L	picocuries per liter
PPE	personal protective equipment
PSA	Project Shoal Area
SDWA	Safe Drinking Water Act
TSDF	treatment, storage, and disposal facility
RCRA	Resource Conservation and Recovery Act

Definitions

Action Levels: Established contaminant concentrations for the contamination indicators (tritium and lead). Action levels are used to make daily decisions or to trigger actions based on field monitoring results obtained from the on-site analysis of samples collected while fluid-producing activities are in progress.

***Containment*:** A structure made of earthen materials or fabricated from metal or other suitable material that is designed to contain fluids generated from site activities. Typical containment structures identified in this plan are unlined sumps, infiltration areas, and tanks.

Contamination Indicators: Tritium and lead are the contamination indicators for fluid-producing activities at the Project Shoal Area. Tritium was chosen as the indicator for radioactive contamination based on its physical and chemical properties. It is a radioactive isotope of hydrogen that is readily transported in groundwater and provides the earliest detection of groundwater contamination resulting from underground nuclear testing. Lead was chosen as the indicator for chemical contamination in groundwater at near-field-designated wells because lead-laden "racks" were commonly used in the design and construction of underground nuclear tests, and lead was also used as shielding in the design of some underground nuclear devices.

***Discharge*:** The release of fluids for final disposal. Fluids discharged for disposal must meet applicable fluid management criteria. "Discharge" also describes the physical process whereby fluids are released from the flow line or discharge line and/or portable mud tank during drilling operations. Drilling discharges are typically routed to an appropriate containment structure (e.g., unlined sump) prior to final disposal.

***Disposal*:** The act of discharging fluids that will not receive further management. On-site disposal options include discharge to an unlined sump/infiltration area or to the ground surface.

***Fluid Management Plan Criteria*:** Established standards or contaminant concentrations used to make decisions for disposal of fluids and other materials after fluid producing activities have been completed. Different standards apply to different contaminants (e.g., Safe Drinking Water Standards, Maximum Contaminant Levels, and Nevada Drinking Water Standards).

***Fluid Transfer*:** The physical transfer of well-derived fluids from one appropriate fluid containment structure to another containment structure. Fluids can be conveyed using mechanical means or gravity through appropriate piping or hoses

***Ground Surface*:** The natural, relatively undisturbed area of soil or bedrock. Dry washes, intermittent stream beds, or other natural depressions identified by the Nevada Division of Environmental Protection as "waters of the state" are not included in this definition.

***Infiltration Area*:** An area of the ground surface with defined boundaries that has been designated for discharge and infiltration of well fluids in compliance with applicable fluid management criteria.

***Lined Sump*:** An engineered, constructed, earthen structure designed for the storage of well fluids that might exceed applicable fluid management criteria. Sump construction includes the placement of an appropriate liner material to ensure containment of the fluids and solids.

***Unlined Sump*:** An engineered, constructed, earthen structure designed for the storage and infiltration of well fluids meeting applicable fluid management criteria. Sump construction might accommodate the later introduction of a liner, if that is required as part of the Well-Specific Fluid Management Strategy Letter.

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) has prepared this Fluid Management Plan (FMP) in support of subsurface investigation activities at the Project Shoal Area (PSA) Corrective Action Unit (CAU) 447 and in accordance with the Federal Facility Agreement and Consent Order (FFACO) (1996, as amended). The subsurface CAU 447 is associated with the underground nuclear test and is located approximately 25 miles southeast of the city of Fallon, in Churchill County, Nevada (Figure 1). Responsibility for environmental restoration of the site was transferred from the DOE National Nuclear Security Administration to LM on October 1, 2006.

1.1 Scope

This FMP will be used in lieu of a Nevada Division of Environmental Protection (NDEP)-approved water pollution control permit for management of all fluids produced during the drilling, construction, development, testing, experimentation, and sampling of wells by LM at the PSA. The FMP provides guidance for the management of fluids and associated materials generated during subsurface investigation activities and provides the standards that govern their final disposal. Although the NDEP Bureau of Federal Facilities is not a signatory to this FMP, it is involved in the negotiation of the contents of this plan and approves the general conditions contained within. All fluids produced during the drilling, construction, development, testing, experimentation, and/or sampling of wells supporting activities at the PSA shall be managed in accordance with this FMP.

The major elements of this FMP include (1) establishment of well-site operation strategies, (2) site design/layout, (3) monitoring of contamination indicators (monitoring program), (4) establishment of FMP Criteria for fluid disposal and action levels for contamination indicators, (5) other waste management activities, and (6) reporting requirements.

2.0 Investigation Activities

This FMP serves as the governing document for all fluid-producing activities conducted in support of investigations at the PSA. For the purpose of this FMP, investigation activities are considered either (1) drilling activities that advance the borehole or (2) other well-site activities.

2.1 Drilling Activities

Drilling activities that advance the borehole involve only those that disturb or penetrate new subsurface material. Presumably, groundwater and rock cuttings generated as part of these operations are from geologic materials that have not been specifically characterized with regard to their chemical and radiological properties. Occasionally, well recompletion may involve advancing boreholes into new subsurface material. Solids generated during the drilling activities will be managed in the same manner as the drilling fluids, and will be based on field screening results obtained from the analysis of drilling fluids. Any change in the strategy for managing drilling fluids would similarly affect the management of associated solid materials. Any activity that involves penetrating new subsurface material (e.g., advancing the borehole) shall be considered a “drilling” activity for the purposes of this FMP.

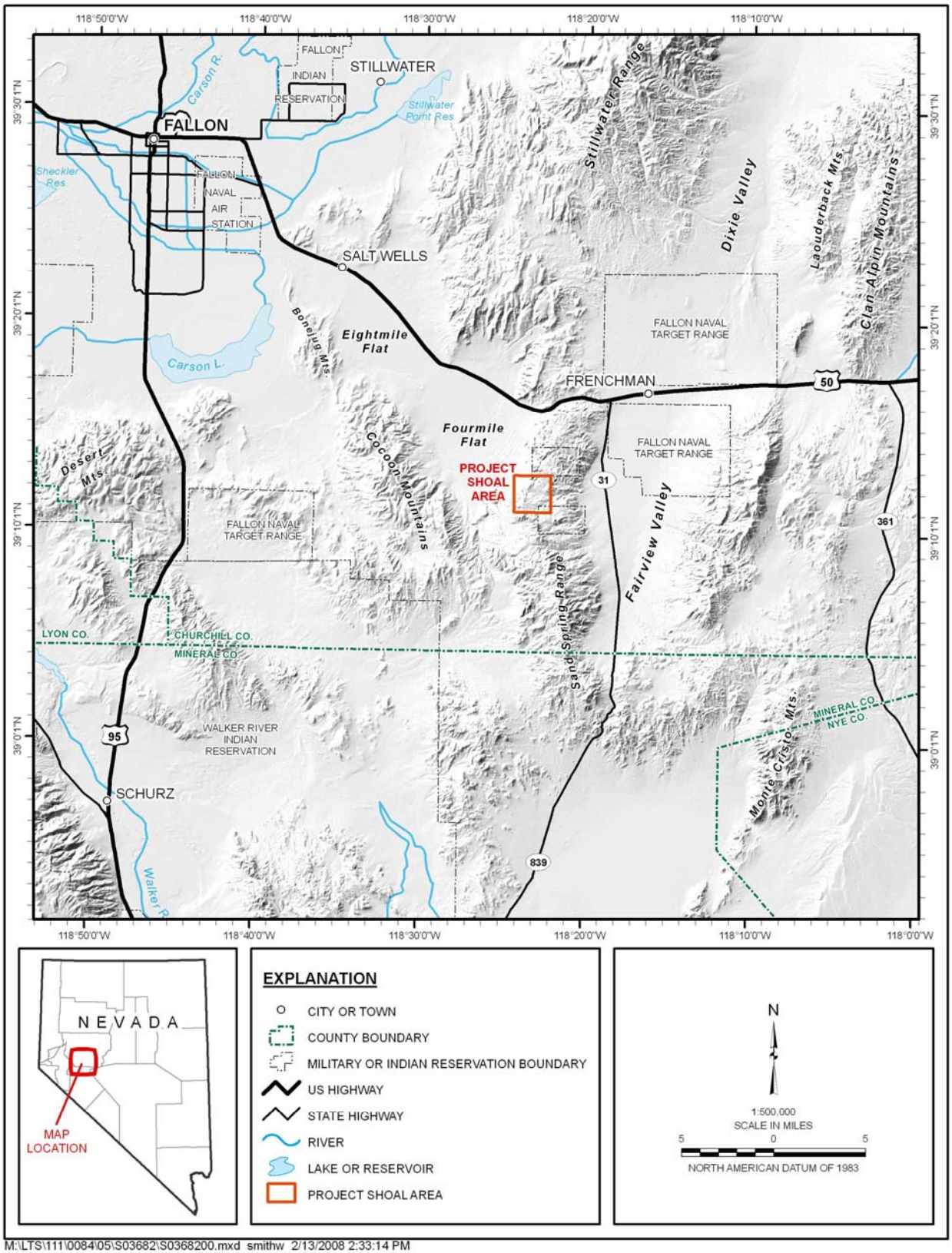

Figure 1. Location Map of the Project Shoal Area

2.2 Other Well-Site Activities

Other well-site activities include those that contact subsurface formations that were previously penetrated or contacted in some way. Examples of other well-site activities that typically occur without advancement of the borehole include cleaning and conditioning the borehole, well completion operations such as casing and stemming of annular materials, well development, aquifer testing, and periodic sampling events. Well completion designs and associated well construction activities vary depending on well-specific objectives. The activities may include setting casing; installing well/piezometer tubing to specified depths; and isolating productive zones with gravel, cement, packers, and sliding sleeves. Other well-site activities may be conducted within a discrete time period (e.g., a one-day well-sampling event) or over a span of time (e.g., a series of well-purging and aquifer-testing activities that may span months). Many of the wells drilled or recompleted may support long-term monitoring and may be sampled periodically. Typically, well sampling involves purging the well for a period of time, during which fluids are produced. The volume of fluids produced varies from well to well and may range from several gallons to thousands of gallons, depending on the activity being performed.

3.0 Well-Site Operation Strategy

The well-site operation strategy is site-specific and will vary on the basis of available historical knowledge of the site and on the scientific and technical objectives of the investigation. Figure 2 outlines the basic process to be followed in preparing for any fluid-producing activity at the PSA. This process shall be completed before field investigation activities begin.

The well-site operation strategy is determined by the potential for encountering contamination and will dictate the type of containment required for the operation and the initial monitoring requirements for the site. Two basic well location types, far-field and near-field, are considered as part of the evaluation for determining the well-site operation strategy (Figure 2). The far-field and near-field designation generally refers to the closeness to the detonation site and potential for encountering radioactive contamination in the well. A comprehensive assessment of historical information (or "process knowledge") that may be relevant to the site operation strategy is typically conducted to determine the appropriate strategy. Information to be used in support of this decision may include, but is not limited to, the following:

- Proximity of the proposed wells to the location of the underground nuclear detonation.
- Hydrogeologic setting of the proposed wells and surrounding areas.
- Potential for chemical or radiological contamination in the groundwater due to the underground test.
- Historical information provided through site documents or interviews.
- Analytical and site monitoring data associated with the well or surrounding area wells.
- Groundwater flow and transport modeling results.
- Other applicable process/historical knowledge.

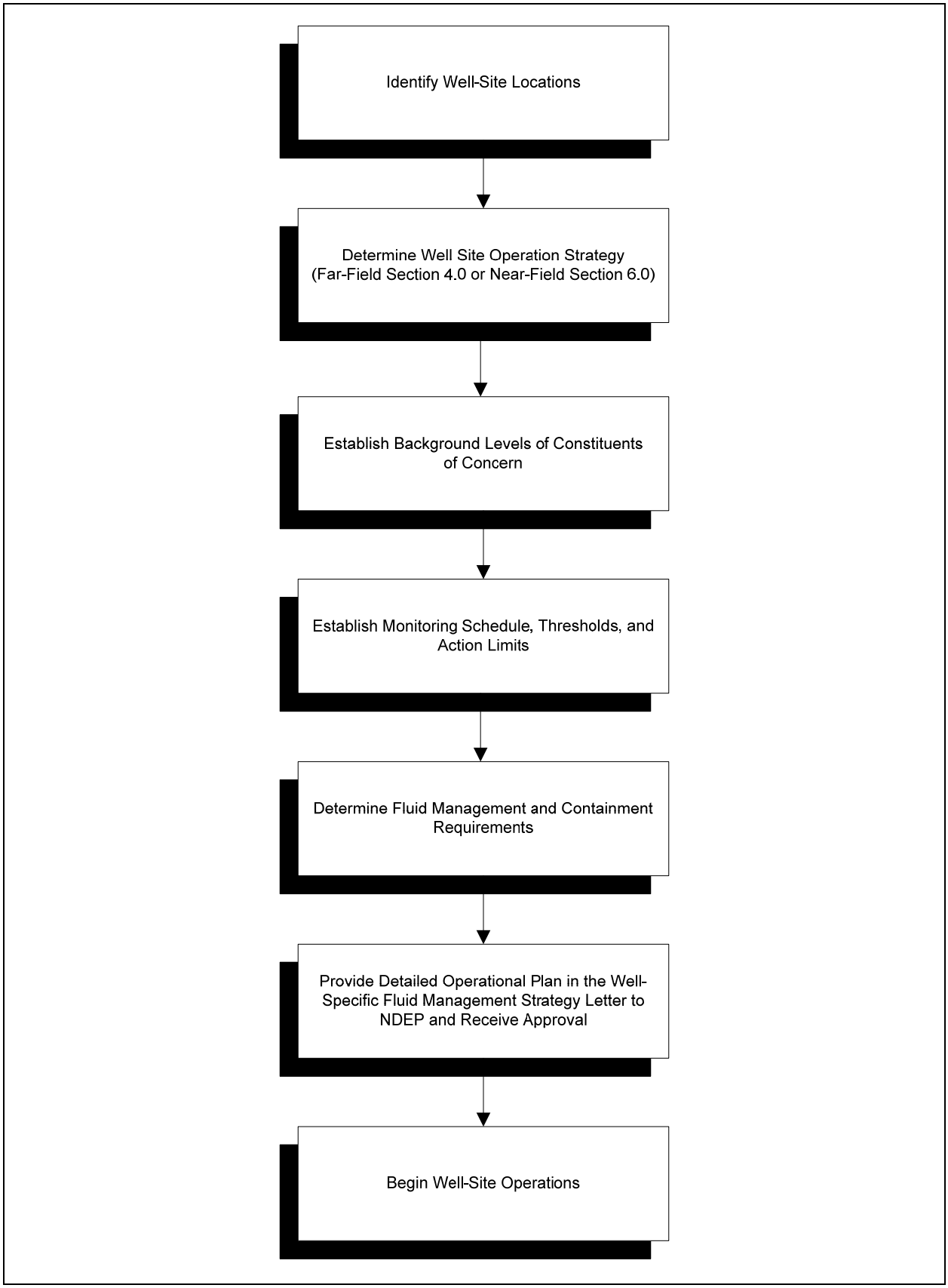

Figure 2. Fluid Management Planning Process

3.1 Well-Specific Fluid Management Strategy

A Well-Specific Fluid Management Strategy Letter shall be developed and submitted to NDEP for approval as specified in Figure 2. The letter will include the well-site operation strategy (e.g., Near-Field or Far-Field), site information, specific details pertaining to the nature and configuration of the planned fluid containment, and transition contingencies. The following information may also be included in the letter:

- Background levels and expected levels of contaminants or constituents of concern in groundwater, if applicable.
- Monitoring requirements (initial and operational). The monitoring program supports the daily management of fluids produced during an investigation activity. The monitoring program for PSA is based on the use of the contamination indicators (tritium and/or lead) to make decisions regarding fluid containment and the progression of investigation operations. Decisions are based on analysis performed on site while operations proceed. Tritium was chosen as the indicator for radioactive contamination based on its physical and chemical properties. It is a radioactive isotope of hydrogen that is readily transported in groundwater and provides the earliest detection of groundwater contamination resulting from underground nuclear testing. Lead was chosen as the indicator for chemical contamination in groundwater at PSA near-field designated wells because lead-laden "racks" were commonly used in the design and construction of underground nuclear tests, and lead was also used as shielding in the design of some underground nuclear devices. Either of these sources may be potential contributors of lead contamination in groundwater.
- On-site monitoring frequency, thresholds for contamination indicators, and action levels.
- Configuration of site discharge areas, (e.g., unlined sump, lined sump/containment, boundaries for infiltration area) and site-specific fluid containment requirements. Figure 3 depicts a typical well-site layout detailing the drill-rig pad, discharge lines, and sumps. The configuration may be modified based on the site-specific information identified in the strategy letter.
- Potential access points to the infiltration area (roads), and designated posting, as required.
- Notification requirements.

Field operations will not generate discharge fluids until NDEP approves the strategy letter. The initial operation strategy for a particular well site will be applied to all subsequent well-site activities, such as aquifer tests or routine sampling, unless site process knowledge or other site factors change. For example, if a well is drilled under a far-field strategy and site conditions continue to support this determination, subsequent investigation activities will continue under a far-field strategy unless an alternate strategy is justified, or required. If LM plans to operate a particular investigation activity using a different strategy than initially determined for the well site, LM shall notify NDEP. Such notification may be provided via telephone, fax, or e-mail and will be followed by a letter requiring formal approval and describing any agreed-upon operational changes.

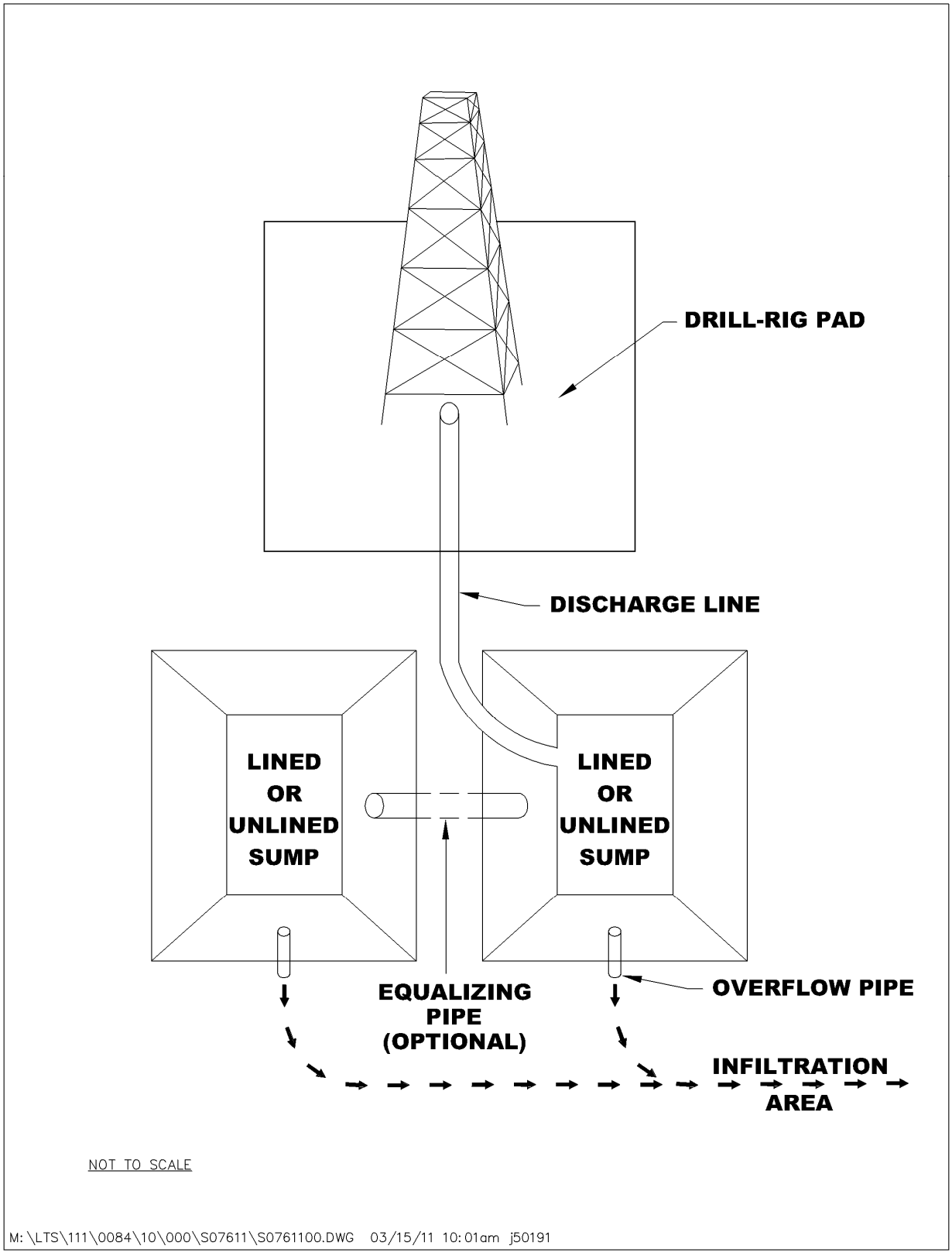

Figure 3. Far-Field Site Layout

4.0 Far-Field Fluid Management Strategy

At far-field wells, radioactive constituents or metals contamination from underground testing are not expected to be encountered in excess of 20 × FMP Criteria (see Appendix A). The far-field strategy involves monitoring for the contamination indicator tritium and if necessary lead. Historically, far-field wells do not exceed 20 × FMP Criteria for tritium, allowing for discharge of fluids to a constructed unlined sump or unrestricted ground discharge to an infiltration area. If field monitoring results indicate concentrations of tritium above FMP Criteria (see Appendix A), then access to sumps and infiltration areas will be controlled and posted to avoid human contact with discharge fluids while evaporation/infiltration is in operation. For this operational strategy, investigation activities are considered either activities that advance the borehole as part of drilling operations or other well-site activities.

4.1 Well-Drilling Activities

Section 2.1 describes well drilling activities covered by this FMP.

4.1.1 Fluid Containment

The type of fluid containment required will be based on available process knowledge and probable quantity of water generation and will be identified in the well-specific fluid management strategy letter to be approved by NDEP. In a typical far-field scenario, fluids from the well may be temporarily contained in a portable mud tank prior to discharge directly to the ground surface, an unlined sump, or aboveground containment. An unlined sump is a constructed unlined basin or pit within which fluids and rock cuttings may be placed. An equalizing pipe may be constructed between the unlined sumps to allow for the transfer of fluids from one basin to the other. An overflow pipe may be constructed in one of the sumps to allow for discharge to the ground surface or infiltration area. In some situations, one sump may be lined as a contingency in the event that monitoring identifies tritium concentrations in fluids that exceed 20 × FMP Criteria (see Appendix A). To avoid human contact with discharge fluids, access to a discharge area may be controlled and posted when evaporation/infiltration is in operation. Figure 3 provides an example of a typical far-field fluid containment configuration.

4.1.2 Monitoring Program

The monitoring program supports the daily management of fluids produced during an investigation activity. This program is based on the use of tritium as a contamination indicator to make decisions regarding fluid containment and/or the progression of investigation operations. Based on its physical and chemical properties, tritium has been chosen as the indicator for radioactive contamination. Tritium is a radioactive isotope that is readily transported in groundwater and provides the earliest detection of groundwater contamination resulting from underground testing.

Monitoring results are not used to support final fluid disposition decisions; rather, monitoring results prompt daily operational decisions. Figure 4 outlines the decision points in the monitoring program for far-field well sites. LM and NDEP shall be notified immediately if monitored tritium levels reach or exceed 20 × FMP Criteria (see Appendix A). Notifications to LM and NDEP shall follow established protocol described in Section 8.0.

4.1.2.1 Tritium Monitoring

During advancement of the borehole at a far-field site, a tritium screening sample will be collected every hour at the discharge line. The following criteria will apply to fluid management decisions:

- Fluids with tritium levels less than 20,000 pCi/L are unrestricted for discharge to ground surface.
- Fluids with tritium levels greater than or equal to 20,000 pCi/L but less than 400,000 pCi/L shall be discharged to an unlined sump or infiltration area that is controlled and posted until the discharge fluid has infiltrated or evaporated.
- Reduction or elimination of tritium monitoring shall be based on process knowledge and approval from LM and NDEP.

NDEP will be notified via telephone, fax, or e-mail should monitoring levels reach or exceed 20,000 pCi/L for tritium; this is a courtesy notification only and will not result in operations being altered or suspended. Figure 4 outlines the decision points in the monitoring program for far-field well sites. If monitoring levels exceed 400,000 pCi/L for tritium, LM will be notified; subsequently, LM will notify NDEP. Discharge will be routed to an access controlled and posted lined sump, and the transition strategy from far field to near field will be implemented as identified in Section 5.0 of this FMP. Monitoring results will be available to NDEP in accordance with Section 8.0.

4.1.2.2 Lead Monitoring

The potential for metals from underground testing to be present in drilling fluids in a far-field well is remote. Monitoring for lead is not required unless it was identified in the Well-Specific Fluid Management Strategy Letter.

4.2 Other Well-Site Activities

Section 2.2 describes well-site activities other than drilling that are covered by this FMP.

4.2.1 Fluid Containment

During other well-site activities, fluid containment options under the far-field strategy will typically be the same as those described in Section 4.1.1. To avoid inadvertent contact with discharge fluids, access to the unlined sump and infiltration area will be controlled and posted during evaporation/infiltration operations. Previously constructed sumps will be visually inspected and upgraded as necessary prior to use.

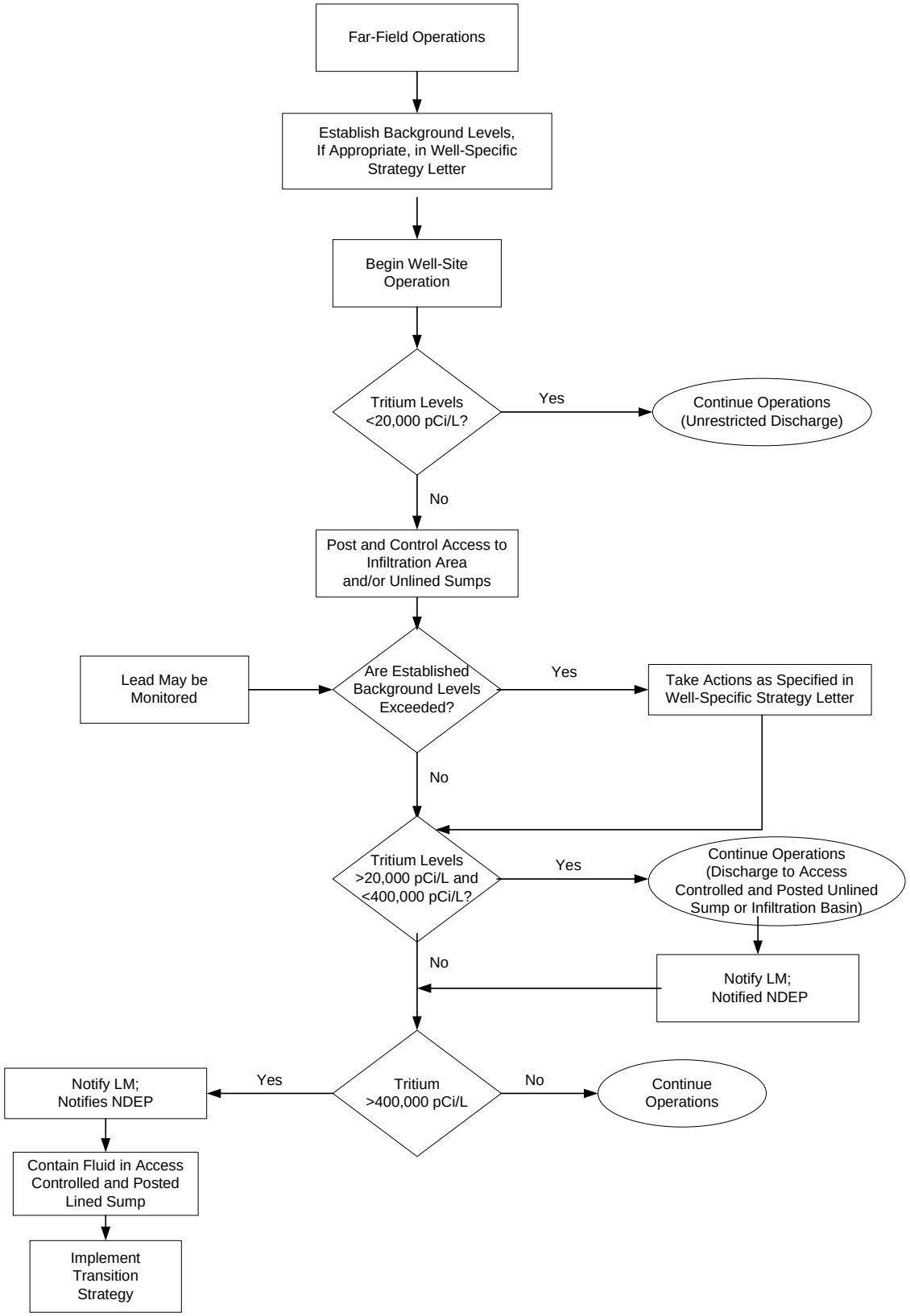

Figure 4. Far-Field Monitoring Decision Diagram

4.2.2 Monitoring

During other well-site activities, a tritium sample will be collected once daily at the discharge line. Monitoring samples will be analyzed weekly or as stated in the Well-Specific Fluid Management Strategy Letter. Reduction or elimination of tritium monitoring shall be based on process knowledge and approval from LM and NDEP.

4.2.3 Final Disposition of Far-Field Fluids

Under a far-field strategy, it is expected that fluids will be contained and managed in unlined sumps until they infiltrate into the ground or evaporate. Minor amounts of fluids may require spreading or movement during regrading, recontouring, or other reclamation activities.

5.0 Transition Strategy

A transition to near-field well strategy is required if monitoring at a designated far-field well site detects tritium concentrations that exceed 20 × FMP Criteria (i.e., tritium concentrations greater than 400,000 pCi/L) or other FMP Criteria identified in the Well-Specific Fluid Management Strategy Letter. If the appropriate fluid containment is not available (i.e., lined sump or portable tank), activities will be stopped until LM and NDEP have been notified and appropriate fluid containment is made available at the well location. Discharge will be routed to the new fluid containment, the area will be posted and have controlled access, and the transition strategy will be implemented.

The following transition strategy actions will be employed to transition well-site operations from a far-field strategy to a near-field strategy.

- The well site will change to a near-field site, with tritium being monitored hourly and lead monitored every 8 hours.
- A minimum of one single-lined sump will be constructed to contain fluids with tritium concentrations that exceed 20 × FMP Criteria.
- Near-field actions will be implemented as specified in Section 6.0.
- LM and NDEP will be notified during monitoring as required and as specified in Section 6.1.2.

Notification of subsequent monitoring results to LM and NDEP shall follow established protocol described in Section 8.0.

6.0 Near-field Fluid Management Strategy

The fluid management strategy provides reasonable assurance that fluids produced at near-field wells will be managed in compliance with applicable state and federal regulations. The near-field strategy involves analyzing monitoring results (tritium and lead) regularly and containing fluids in sumps. To avoid human contact with discharge fluids, access to sumps and infiltration areas will be controlled and posted when evaporation/infiltration is in operation. For this operational strategy, investigation activities are considered either drilling operations (i.e., activities that advance the borehole) or other well-site activities.

6.1 Well Drilling Activities

Section 2.1 describes well drilling activities covered by this FMP.

6.1.1 Fluid Containment

Fluid containment under a near-field strategy will be identified in the Well-Specific Fluid Management Strategy Letter. Sump construction and use decisions will be based in part on predicted fluid volumes, background contaminants, and the potential for radiological and/or chemical contamination in the well. Once contamination indicators (tritium or lead) are detected above established action levels, the discharge of fluids to the ground surface, unlined sump, or to an infiltration area is generally not acceptable. However, this practice may be approved on a case-by-case basis if identified in the Well-Specific Fluid Management Strategy Letter and approved by NDEP.

Figure 3 provides a typical fluid containment configuration. Site-specific characteristics and restrictions will determine the actual site layouts that are described in the letter. To avoid human contact with discharge fluids, access to the infiltration area and sumps will be controlled and posted during the evaporation/infiltration period.

The following example describes a near-field sump construction and use scenario. This scenario may be considered generally applicable to the given site conditions; however, actual sump construction and use may vary among well sites.

> In a near-field scenario, two lined sumps may be constructed, with drilling fluids discharged to the first sump until the contamination indicators (tritium and lead) are detected at concentrations that exceed applicable action levels. At that time, discharge fluids shall be diverted to the second lined sump. A sample is then collected from the first sump and analyzed at a laboratory for FMP parameters (see Appendix A). The comparison of sample results with FMP Criteria will dictate final fluid disposition and/or whether the fluids from the first sump may be discharged directly to an unlined sump, infiltration area, or to the ground surface. The fluid volume in the second sump when filled will undergo the same procedure.

6.1.2 Monitoring Program

The monitoring program supports the daily management of fluids produced during an investigation activity. This program is based on the use of the contamination indicators, tritium and/or lead, to make decisions regarding fluid containment and/or the progression of investigation operations. Decisions are based on analyses that are performed while operations proceed. Figure 5 outlines the decision points in the monitoring program for near-field well sites. Monitoring results are not typically used to support final fluid disposition decisions; rather, monitoring results prompt daily operational decisions.

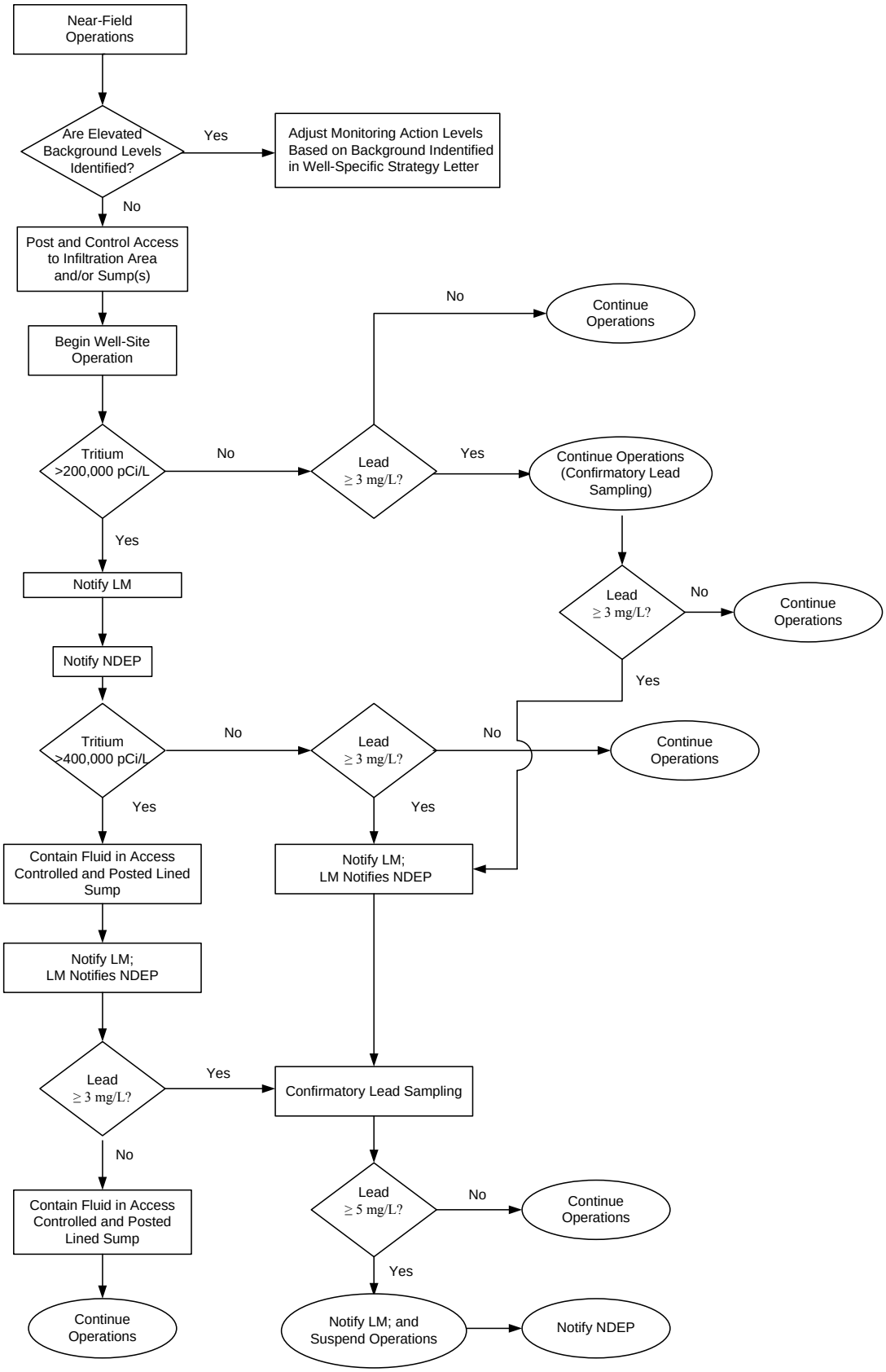

Figure 5. Near-Field Monitoring Decision Diagram

Fluids generated during near-field operations will be analyzed for lead and tritium while the borehole is being advanced. Monitoring may be initiated in vadose zone drilling to account for possible prompt injection phenomena encountered above the water table. For example, in a near-field scenario, the tritium action level of 400,000 pCi/L (20 × FMP Criteria) would prompt the diversion of fluids to a lined sump. The lead action level of 3 milligrams per liter (mg/L) indicates when fluid lead concentrations are approaching the Resource Conservation and Recovery Act (RCRA) hazardous waste concentration of 5 mg/L.

LM shall be notified immediately when monitoring of tritium and/or lead meets or exceeds the established action level; subsequently, LM will notify NDEP. Notification of subsequent monitoring results to LM and NDEP shall follow established protocol (see Section 8.0).

6.1.2.1 Tritium Monitoring

During advancement of the borehole, a tritium screening sample will be collected hourly and analyzed from the discharge line. NDEP will be notified via telephone, fax, or e-mail when tritium monitoring levels reach or exceed 200,000 pCi/L; this is a courtesy notification only and will not result in operations being altered or suspended. The action level for tritium is 400,000 pCi/L. If this level is exceeded during borehole advancement activities, LM will be notified, and LM will subsequently notify the NDEP that fluids will be discharged to a lined sump, and the well site will be considered and managed as "radiologically contaminated" from that point forward, unless proven otherwise.

6.1.2.2 Lead Monitoring

A lead sample shall be collected from the return discharge line once every 8 hours while the borehole is being advanced. Monitoring samples may be analyzed on or off site but will, at a minimum, be analyzed daily. Lead may be monitored with a digital voltammeter, colorimetric method, or other appropriate method.

Background levels for metals may be identified in the Well-Specific Fluid Management Strategy Letter that is submitted to NDEP for approval. Any site-specific changes to the sampling protocols detailed below will be identified in the strategy letter. Lead is monitored primarily to ensure that the RCRA level for lead (5 mg/L) is not exceeded. Exceeding the RCRA level for lead may result in the generation of a hazardous or mixed waste in the sump(s). To provide early warning of lead levels approaching the RCRA standard, the level of 3 mg/L was chosen as the initial decision point for lead monitoring under this FMP. Therefore, the lead monitoring method must be capable of indicating lead at concentrations of less than 3 mg/L. That is, if lead concentrations detected are 3 mg/L or greater, the confirmatory sampling protocol will be initiated. The detection of lead at any concentration less than 5 mg/L will not prompt the shutdown of operations; only a confirmed lead concentration of 5 mg/L or more mandates that fluid generating operations cease.

If a quantitative method is used to monitor lead, the action level for lead is 3 mg/L. If a semi-quantitative method is employed, any indication of the presence of lead shall serve as the action level and prompt confirmatory sampling. In the following example, the lead action level referred to is associated with the RCRA hazardous waste lead level. The following example describes confirmatory sampling to be initiated when the lead action level is exceeded.

> If a monitoring sample yields lead concentrations at or above the action level, an additional discharge line sample shall be collected immediately and analyzed. If this confirmatory sample yields lead concentrations less than the action level, the regular eight-hour monitoring schedule shall resume. If the confirmatory sample results in lead concentrations at or above the action level, a composite sample shall be collected immediately from the active sump. The sump sample shall be analyzed for lead. If the sump sample results fall below the action level, regular eight-hour discharge monitoring shall resume. If the sump sample yields lead levels at or above the action level, drilling operations shall cease and a second composite sump sample shall be obtained for laboratory analysis of lead (see Appendix B).

6.1.3 Fluid Management Decisions

Laboratory analytical results will be compared with the FMP Criteria (Appendix A) to determine the options for final fluid disposition. The FMP Criteria are based on the Nevada Drinking Water Standards, federal standards, and NDEP guidance. Based on historical knowledge, the following parameters were selected for establishing fluid disposition: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, tritium, gross alpha, and gross beta. The FMP Criteria indicate the thresholds at which fluid disposal decisions are made. The FMP Criteria are based on the concentration of dissolved constituents. Samples to determine disposal will be collected in accordance with the sump sampling program and will be analyzed for total and dissolved RCRA metals, gross alpha, gross beta, and tritium (see Appendix B). Only the dissolved metals results will be compared with the FMP Criteria (see Appendix A) when making fluid disposal decisions.

In Appendix A, the FMP Criteria represent the maximum constituent concentrations below which fluids may be disposed of by discharging to the ground surface. That is, if all radiological parameters and dissolved metals in Appendix A are less than FMP Criteria, fluids may be discharged directly to the ground surface. Similarly, if all parameters in Appendix A are less than 20 × FMP Criteria, fluids may be discharged into an unlined sump or infiltration area that is access controlled and posted.

6.1.4 Sump Sampling Program

The primary purpose of this sampling program is to determine final fluid disposition. The collection of samples for laboratory analysis applies to fluids contained or stored in sumps. The analytical results received from the laboratory are compared to the FMP Criteria in Appendix A. to allow the discharge of fluids to an unlined sump, infiltration area, or the ground surface.

If a sump is used to contain drilling fluids from an investigation activity, a sump sample shall be collected and analyzed to determine proper fluid disposition of the sump fluids. The primary purpose of these samples is to characterize the contained fluids. While fluids are being added to

the sumps, as during borehole advancement or well completion, a sample does not need to be collected. However, once operations that affect containment volume have ceased or a change in fluid containment is to occur, a sample must be collected for laboratory analysis. The sample must be collected from the sump to which fluids were discharged (active sump), and from all sumps to which fluids may have been transferred in the course of the immediate investigation activity. Samples shall be collected, or appropriate analytical data available, for each containment that holds fluid at a site prior to completing the project and vacating the site. Contained fluids will be analyzed for the parameters listed in Appendix B. Analysis following the RCRA Toxicity Characteristic Leaching Procedure is required for a determination of whether RCRA constituents are regulated.

6.1.5 Fluid Disposition

This section discusses fluid disposition options for fluids that are contained in a lined sump. This FMP allows the discharge of investigation fluids on site when specific FMP Criteria are met. The options for on-site disposal of investigation fluids are an infiltration area, unlined sump, and the ground surface. An infiltration area is a pre-designated bounded area on the ground surface within which fluids may be discharged. The "ground surface" refers to the natural or relatively undisturbed condition of an area of surface soil or rock. Decisions on fluid disposition are based on laboratory sample results, as compared to FMP Criteria. In no event will fluids be discharged to an infiltration area or the ground surface from a lined sump if analytical results indicate that FMP Parameters exceed 20 × FMP Criteria as provided in Appendix A. The on-site disposal options for fluids stored in lined sumps are:

- **Direct discharge to the ground surface**. Fluids documented to be less than FMP Criteria for all required FMP analytical parameters may be discharged to the ground surface. Caution shall be taken to ensure that erosion is controlled.
- **Discharge to an access-controlled and posted infiltration area or unlined sump**. Fluids documented to be less than 20 × FMP Criteria for all required FMP analytical parameters may be discharged to an access-controlled and posted infiltration area or unlined sump.

If fluids do not meet the FMP Criteria for discharge/disposal on site, then fluids will be allowed to evaporate in access controlled and posted lined sumps. The sediment will be sampled, analyzed, and managed as required by state and federal regulations and applicable DOE Orders.

6.2 Other Well-Site Activities

Section 2.2 describes well-site activities other than drilling that are covered by this FMP.

6.2.1 Fluid Containment

Fluid containment options during other well-site activities operating under the near-field strategy will typically be the same as those described in Section 6.1.1. Lined sumps used during borehole advancement may be used for fluid containment during well development, testing, and periodic sampling activities.

If well-site conditions have changed from near-field to far-field, alternative fluid containment options will be available during other well-site activities, to include discharge to an infiltration

area, unlined sump, or to the ground surface. LM will notify NDEP of any change in well-site operation strategy or any deviations from the Well-Specific Fluid Management Strategy Letter.

6.2.2 Monitoring

The primary difference between monitoring during borehole advancement and during other well-site activities is the frequency of monitoring sample collection. In a near-field scenario during other well-site activities, a minimum of one tritium sample and one lead sample will be collected daily from the discharge line and, at a minimum, analyzed weekly. The results of each sample will be used to make decisions regarding fluid containment and/or the progression of investigation operations. See Section 6.1.2 for detailed information on tritium and lead monitoring in a near-field scenario.

6.2.3 Fluid Management Decisions

Laboratory analytical results will be compared with the FMP Criteria (Appendix A) to determine the options for final disposition of fluids generated during other well-site activities. See Section 6.1.3 for further detail.

6.2.4 Sump Sampling Program

The sump sampling program for other well-site activities is the same as that during borehole advancement. A sump sample shall be collected once fluid-producing operations have ceased. For example, in a near-field situation, if a well is being purged in preparation for periodic sampling, fluids may be discharged to a lined sump. A sump sample will be collected from the sump to which fluids were discharged (active sump) and from all sumps to which fluids may have been transferred in the course of the activity. Sump samples shall be collected, or appropriate analytical data available, for each containment that holds fluid at a site before discharging or the project vacating the site. Sump fluids will be analyzed for the parameters listed in Appendix B.

6.2.5 Fluid Disposition

The same decision process for fluid disposition of near-field drilling fluids is to be implemented for fluids generated during other well-site activities. See Section 6.1.5 for further detail.

7.0 Management of Miscellaneous Materials

To promote a site sustainability work ethic, work conducted under this FMP shall be conducted in a manner that prevents pollution through the use of less toxic, biobased, and recycle-content products; minimizes wastes that are not from radioactive materials areas through reuse and recycling; and conserves natural and cultural resources by reducing areas of disturbance to the extent practical. The following miscellaneous materials may be generated during activities identified in this FMP:

- Disposable sampling equipment, including filtration devices, filters, tubing, and sample containers

- Disposable personal protective equipment (PPE)
- Decontamination fluids
- Excess samples
- Rock cuttings
- Excess drilling mud and additives
- Grout
- Cement

7.1 Far-field Solid Waste Management

All disposable equipment and materials generated during far-field operations will be rinsed off and managed as solid waste. Disposable PPE and other trash from far-field activities will be disposed of as solid waste.

Statements of work for far-field drilling activities will be developed to specify the use of nonhazardous chemical additives in drilling mud, grout, and other materials. Material Safety Data Sheets shall be reviewed prior to awarding the subcontract to ensure that the bidder has intentions of complying with the specifications in the statements of work. Subsequently, wastes generated during far-field operations will be managed as nonhazardous waste. The decontamination fluids and excess samples can be placed in the fluid containment areas and managed with the drilling. Assuming fluid concentrations of tritium remain below 400,000 pCi/L during drilling; the rock cuttings may be placed in an access controlled and posted unlined sump and covered with surface soils at the completion of site activities.

If during far-field operations, the drilling materials are changed due to site conditions, and the mud or other materials are known to contain chemical additives that are not environmentally friendly, any resulting wastes must be containerized and sampled for known additives prior to off-site disposal. Excess grout and cement will be managed as construction debris or municipal solid waste.

7.2 Near-Field Miscellaneous Waste Management

All disposable equipment generated during near-field operations are assumed to have contacted contaminated groundwater and will be decontaminated with clean water and scanned for radioactivity to determine if it can be managed as solid waste. Disposable PPE and other trash from near-field activities will be scanned for radioactive contamination. If radioactivity exceeding background is detected, then the contaminated disposable equipment, PPE and/or trash will be placed in bags labeled ‘radioactive material’ and managed as residual low-level waste. If no radioactivity exceeding background is detected, the disposable equipment, PPE and trash will be disposed of as solid waste.

Statements of work for near-field drilling activities will be developed to specify the use of nonhazardous chemical additives in drilling mud, grout, and other materials. Material Safety Data Sheets shall be reviewed prior to awarding the subcontract to ensure that the bidder has intentions of complying with the specifications in the statements of work. Subsequently, wastes

generated during near-field operations will be managed as nonhazardous waste or residual radioactive waste, dependent upon scanning results. The decontamination fluids and excess samples can be placed in the fluid containment areas and managed with the drilling fluids. The rock cuttings will also be managed in the same manner as the drilling fluids at the completion of site activities.

If during near-field operations, the drilling materials are changed due to site conditions, and the mud or other materials are known to contain chemical additives that are not environmentally friendly, any resulting wastes must be containerized and sampled for known additives prior to off-site disposal. Excess grout and cement will be managed as construction debris or municipal solid waste.

8.0 Reporting Requirements

LM shall comply with the following reporting requirements for all investigation activities covered in this FMP:

- **Fluid Release Reporting:** NDEP shall be notified if fluids containing tritium in concentrations that exceed 400,000 pCi/L, as defined by this FMP, are discharged into an unlined sump or infiltration area in volumes greater than 1 cubic meter (264 gallons). Such notification must be provided by telephone prior to the end of the next business day following verification of the incident. Telephone notification shall be followed by a written report that includes elements described in spill-reporting regulations within 10 calendar days. Additional DOE-mandated reporting requirements will also apply, and personnel from the LM Environmental Compliance group shall be contacted to assist with this process.
- **Hazardous or Mixed Waste Generation:** NDEP will be notified immediately if laboratory results indicate that mixed or hazardous waste has been generated in an unlined or lined sump. Non-emergency actions that constitute deviations to this FMP will be reported to NDEP before implementing the action. Emergency actions that are taken that constitute deviations to this FMP will be reported verbally to NDEP within 24 hours of implementation of the action, and a written report will be provided to NDEP within 10 working days of the action.
- **Well-Specific Fluid Management Strategy Letter:** LM will submit to NDEP a Well-Specific Fluid Management Strategy Letter as defined in Section 3.0 for approval before beginning well-site activities.
- **Well-Site Activity Reporting (Morning Reports):** The synopsis of well-site activities occurring within a 24-hour period (i.e., the morning report) shall be transmitted by fax or e-mail to NDEP each day for all activities covered in this FMP. Fluid releases not reportable under "Fluid Release Reporting" above will be discussed in these morning reports.

All correspondence to NDEP shall be addressed to:

Nevada Division of Environmental Protection
Chief
Bureau of Federal Facilities
2030 E. Flamingo Road, Suite 230
Las Vegas, NV 89119

All field and laboratory data generated in support of the PSA well-construction activities will be archived and made available for inspection by NDEP upon request. The following data will be generated and retained on file. These data shall be made available to the appropriate NDEP staff for inspection upon request.

- Legible copies of daily drilling progress reports and records of daily well-site activities.
- Volumetric measurements of fluids generated during each stage of well construction.
- Records of make-up water delivery and usage during each stage of well construction.
- On-site fluid monitoring data.
- Laboratory analytical data with supplemental quality assurance/quality control and chain of custody records.
- Material Safety Data Sheets and other records of process materials (e.g., cement, grout, casing, screens, packing, drilling fluids), drilling additive usage, and equipment decontamination.

9.0 References

40 CFR 261.24. U.S. Environmental Protection Agency, "Toxicity Characteristic," *Code of Federal Regulations,* July 1, 2010.

FFACO (Federal Facility Agreement and Consent Order), 1996 (as amended March 2010). Agreed to by the State of Nevada; U.S. Department of Energy Office of Environmental Management; U.S. Department of Defense; and U.S. Department of Energy Office of Legacy Management.

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Appendix A

Fluid Management Plan Criteria Limits

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FMP Parameters	RCRA Levels	FMP Criteria[a]	20 × FMP Criteria[b]
Arsenic	5.0 mg/L	0.010 mg/L	0.2 mg/L
Barium	100.0 mg/L	2 mg/L	40 mg/L
Cadmium	1.0 mg/L	0.005 mg/L	0.1 mg/L
Chromium	5.0 mg/L	0.100 mg/L	2 mg/L
Lead	5.0 mg/L	0.015 mg/L	0.3 mg/L
Selenium	1.0 mg/L	0.050 mg/L	1 mg/L
Silver	5.0 mg/L	0.100 mg/L	2 mg/L
Mercury	0.2 mg/L	0.002 mg/L	0.04 mg/L
Gross Alpha	N/A	15 pCi/L	300 pCi/L
Gross Beta	N/A	50 pCi/L	1,000 pCi/L
Tritium	N/A	20,000 pCi/L	400,000 pCi/L

[a] Limit for final disposal of fluids by unrestricted discharge to the ground surface.
[b] Limit for final disposal of fluids by discharge to an access controlled and posted unlined sump or infiltration area.
N/A = Not applicable

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Appendix B

Analytical Laboratory Requirements for Fluid Management Samples

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Parameter	Reporting Detection Limit	RCRA Levels	SDWA Drinking Water Standards (MCLs)[b, c, d]	Analytical Method[e, f]	Maximum Holding Time[d]	Preservative[c]	Container Type[b]
Total:							
Arsenic Barium Cadmium Chromium Lead Selenium Silver	0.01 mg/L 0.1 mg/L 0.005 mg/L 0.01 mg/L 0.003 mg/L 0.005 mg/L 0.01 mg/L	5.0 mg/L 100 mg/L 1.0 mg/L 5.0 mg/L 5.0 mg/L 1.0 mg/L 5.0 mg/L	0.01 mg/L 2.0 mg/L 0.005 mg/L 0.1 mg/L 0.015 mg/L 0.05 mg/L 0.1 mg/L[h]	SW-846 6010/6020	6 months	HNO_3 to pH<2	(1) 1-liter polyethylene or glass
Mercury	0.0002 mg/L	0.2 mg/L	0.002 mg/L	SW-846 7470	28 days	HNO_3 to pH<2	(1) 1-liter polyethylene or glass
Dissolved:							
Arsenic Barium Cadmium Chromium Lead Selenium Silver	0.01 mg/L 0.1 mg/L 0.005 mg/L 0.01 mg/L 0.003 mg/L 0.005 mg/L 0.01 mg/L	5.0 mg/L 100 mg/L 1.0 mg/L 5.0 mg/L 5.0 mg/L 1.0 mg/L 5.0 mg/L	0.01 mg/L 2.0 mg/L 0.005 mg/L 0.1 mg/L 0.015 mg/L 0.05 mg/L 0.1 mg/L[h]	SW-846 6010/6020	6 months	Field/Lab Filtration HNO_3 to pH<2	(1) 1-liter polyethylene or glass
Mercury	0.0002 mg/L	0.2 mg/L	0.002 mg/L	SW-846 7470	28 days	Field/Lab Filtration HNO_3 to pH<2	(1) 1-liter polyethylene or glass
Gross Alpha	10 pCi/L[i]	N/A	15 pCi/L	EPA 900.0 or equivalent	6 months	Field/Lab Filtration HNO_3 to pH<2	(1) 1-liter polyethylene
Gross Beta	<15 pCi/L	N/A	50[d] pCi/L	EPA 900.0 or equivalent	6 months	Field/Lab Filtration HNO_3 to pH<2	(1) 1-liter polyethylene
Tritium	1,000 pCi/L	N/A	20,000 pCi/L	EPA 906.0 or equivalent	6 months	Field or Lab Filtration	(1) 125-mL amber glass

[a] 40 CFR Part 261.24, Table 1
[b] 40 CFR Parts 141.23 and 141.62
[c] 40 CFR Part 141.66 (c), Table A and 141.26 (i)
[d] The MCL for gross beta is calculated and referenced in the *Federal Register*, Vol. 65, No. 236 (EPA 2000)

HNO_3 = nitric acid
L = liter
mg = milligram
pCi = picocurie
SDWA = Safe Drinking Water Act

[e] U.S. Environmental Protection Agency, 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water.*
[f] U.S. Environmental Protection Agency, 2008. SW-846-Online, http://www.epa.gov/osw/hazard/testmethods/sw846/online/, accessed 21 June 2011.
[g] 40 CFR Part 136.3 (e), Table II
[h] The MCL for silver is a secondary drinking water MCL found in 40 CFR Part 143.3

Notes:

1. Filtration and preservation should be performed in the field; If field filtration is not feasible, samples will be sent to the laboratory for subsequent filtering and preservation
2. Maximum contaminant level (MCL) = The highest level of a contaminant that is allowed in drinking water. The MCLs are set as close to MCL goals as feasible using the best available treatment technology and taking cost into consideration.

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Appendix C

Decision Diagrams for Fluid Disposal

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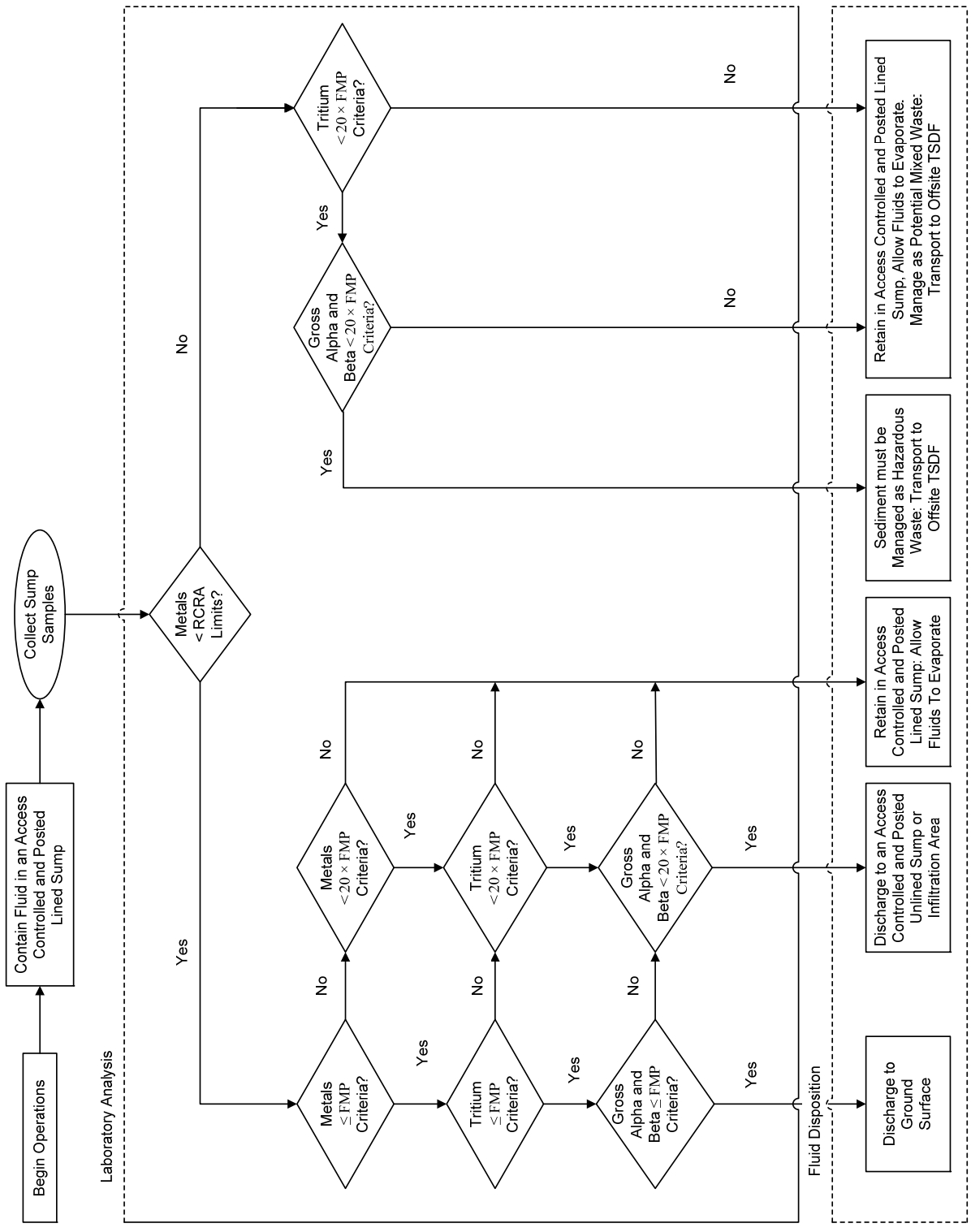
Begin Operations
Contain Fluid in an Access Controlled and Posted Lined Sump
Collect Sump Samples
Laboratory Analysis
Metals < RCRA Limits?
Yes
No
Metals ≤ FMP Criteria?
Yes
No
Tritium ≤ FMP Criteria?
Yes
No
Gross Alpha and Beta ≤ FMP Criteria?
Yes
No
Metals < 20 × FMP Criteria?
Yes
No
Tritium < 20 × FMP Criteria?
Yes
No
Gross Alpha and Beta < 20 × FMP Criteria?
Yes
No
Tritium < 20 × FMP Criteria?
Yes
No
Gross Alpha and Beta < 20 × FMP Criteria?
Yes
No
Fluid Disposition
Discharge to Ground Surface
Discharge to an Access Controlled and Posted Unlined Sump or Infiltration Area
Retain in Access Controlled and Posted Lined Sump: Allow Fluids To Evaporate
Sediment must be Managed as Hazardous Waste: Transport to Offsite TSDF
Retain in Access Controlled and Posted Lined Sump, Allow Fluids to Evaporate. Manage as Potential Mixed Waste: Transport to Offsite TSDF

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Appendix D

NDEP Correspondence with Record of Review and Response to Comments

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ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administrator

June 8, 2011

Mr. Mark Kautsky
Site Manager
U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way
Grand Junction, CO 81503

RE: Draft Fluid Management Plan Project Shoal Area, Corrective Action Unit 447
Federal Facility Agreement and Consent Order

Dear Mr. Kautsky:

The Nevada Division of Environmental Protection, Bureau of Federal Facilities (NDEP), has evaluated the Department of Energy, Office of Legacy Management's (OLM) *Draft Fluid Management Plan Project Shoal Area, Corrective Action Unit 447* (Plan) received on May 26, 2011. The Plan is unacceptable for reasons including, but not necessarily limited to:

1. A Fluid Management Plan (FMP) for the Project Shoal Area (PSA) must contain a Near-Field operation strategy. The FMP is the document that a site-specific fluid management strategy (FMS) refers to when encountering either near or far field conditions. The FMS is used to support the use of a far or near field strategy, not the FMP. Therefore, a near-field fluid management strategy section must be added to this document.

2. All references or descriptions in the FMP related to the following must be removed:
   (a) justification(s) for the FMP covering only far-field scenarios and work
   (b) the FMP only being applicable to augmenting a long-term monitoring network
   (c) FMPs of sites other than the PSA
   (d) assumptions and objectives about future work at the PSA
   (e) decisions that have only been made internally by OLM and not agreed to by NDEP

3. Section 4.1.2.2, Page 9, Second paragraph: The following information must be included in this FMP: If tritium levels of the fluids meet or exceed 20,000 pCi/L and the fluids are contained in an open pit or basin, that area must be posted as hazardous and roped off to prevent intrusion.

4. Section 5.0, Page 11, last paragraph (after the bullets): Why are used far-field operations equipment assumed to be contaminated? If this assumption is automatically made, then

2030 East Flamingo Road Suite 230 • Las Vegas, Nevada 89119 • p: 702.486.2850 • f: 702.486.2863 • ndep.nv.gov

the fluid that is used for decontamination also must be assumed to be contaminated, stored as hazardous waste, and sampled. After validation the fluid can be managed as either low-level or mixed low-level waste, and shipped to a proper waste facility, or managed as non-hazardous waste. This paragraph deals with procedures for near-field wells, but you state that these are far-field operations. Then in the next paragraph you go back to far-field operations. This is confusing, please separate the operational areas.

Please address any questions regarding this matter to Chris Andres at (702) 486-2850 ext. 232.

Sincerely,

T. H. Murphy
Chief
Bureau of Federal Facilities

THM/CDA/MM:*mm*

cc: Jeffrey Fraher, DTRA/CXTS, Kirtland AFB, NM
J. B. Chapman, DRI, Las Vegas, NV
NSTec Technical Information Officer, Las Vegas, NV
E. F. DiSanza, WMP, NNSA/NSO, Las Vegas, NV
FFACO Group, SNJV, Las Vegas, NV
D. Crawford, Stoller, Grand Junction, CO
R. Hutton, Stoller, Grand Junction, CO
R. Findlay, Stoller, Grand Junction, CO

U.S. Department of Energy Office of Legacy Management

Record of Review

Due Date	Review No.	Project	Type of Review
6/24/2011	1	Legacy Managment	Technical

Document Title and\or Number and Revision
Fluid Management Plan Project Shoal Area, Subsurface Corrective Action Unit 447 (S07305)

Author
Mark Kautsky

Author's Organization	Author's Phone
DOE-LM	(970) 248-6018

Reviewer
Tim Murphy

Reviewer's Organization	Reviewer's Phone
Nevada Division of Environmental Protection	(702) 486-2850

Reviewers' Recommendation

- ☐ Release Without Comment
- ☐ Consider Comments
- ☒ Resolve Comments and Reroute for Review

Signature of Reviewer and Date

- ☒ Comments Have Been Addressed

Mark Kautsky 2011.08.29 14:57:29 -06'00'
Signature of Author and Date

- ☒ Comment Resolution Satisfactory
- ☐ Comment Resolution Unsatisfactory

Christ Andrus 9/23/11
Signature of Reviewer and Date

Item No.	Reviewer's Comments and Recommendation	Reqd. (Y/N)	Item No.	Author's Response (if required)
1	A Fluid Management Plan (FMP) for the Project Shoal Area (PSA) must contain a Near-Field operation strategy. The FMP is the document that a site-specific fluid management strategy (FMS) refers to when encountering either near or far field conditions. The FMS is used to support the use of a far or near field strategy, not the FMP. Therefore, a near-field fluid management strategy section must be added to this document.	Y	1	The near-field fluid management strategy was added as requested.
2	All references or descripitions in the FMP related to the following must be removed: (a) justification(s) for the FMP covering only far-field scenarios and work (b) the FMP only being applicable to augmenting a long-term monitoring network (c) FMPs of sites other than the PSA (d) assumptions and objectives about future work at the PSA (e) decisions that have only been made internally by OLM and not agreed to by NDEP	Y	2	The references were removed as requested.
3	Section 4.1.2.2, Page 9, Second paragraph: The following information must be included in this FMP: If tritium levels of the fluids meet or exceed 20,000 pCi/L and the fluids are contained in an open pit or basin, that area	Y	3	The information was added as requested.

U.S. Department of Energy Office of Legacy Management

Record of Review (continuation)

Review No.	Project

Item No.	Reviewer's Comments and Recommendation	Reqd. (Y/N)	Item No.	Author's Response (if required)
	must be posted as hazardous and roped off to prevent intrusion.			
4	Section 5.0, Page 11, last paragraph (after the bullets): Why are used far-field operations equipment assumed to be contaminated? If this assumption is automatically made, then the fluid that is used for decontamination also must be assumed to be contaminated, stored as hazardous waste, and sampled. After validation the fluid can be managed as either low-level or mixed low-level waste, and shipped to a proper waste facility, or managed as non-hazardous waste. This paragraph deals with procedures for near-field wells, but you state that these are far-field operations. Then in the next paragraph you go back to far-field operations. This is confusing, please separate the operational areas.	Y	4	The paragraphs were revised as requested.

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11/2007

Page 2 of 2

U.S. Department of Energy Office of Legacy Management

Record of Review

Due Date	Review No.	Project	Type of Review
7/28/2011	2	Legacy Managment	Technical

Document Title and\or Number and Revision
Fluid Management Plan Project Shoal Area, Subsurface Corrective Action Unit 447 (S07305)

Author
Mark Kautsky

Author's Organization	Author's Phone
DOE-LM	(970) 248-6018

Reviewer
Tim Murphy

Reviewer's Organization	Reviewer's Phone
Nevada Division of Environmental Protection	(702) 486-2850

Reviewers' Recommendation

- ☐ Release Without Comment
- ☐ Consider Comments
- ☒ Resolve Comments and Reroute for Review

Signature of Reviewer and Date

- ☒ Comments Have Been Addressed

Mark Kautsky 2011.08.29 14:58:10 -06'00'

Signature of Author and Date

- ☒ Comment Resolution Satisfactory
- ☐ Comment Resolution Unsatisfactory

Christi Andres 9/22/11

Signature of Reviewer and Date

Item No.	Reviewer's Comments and Recommendation	Reqd. (Y/N)	Item No.	Author's Response (if required)
	Comments 1 through 12 were received by e-mail on July 6, 2011			
1	General: Throughout the document the terms "fenced" and "controlled" are used interchangeably. To clarify the need for a "controlled" and posted "area" for fluids greater than FMP criteria the following sentence should be included in the introduction in sections 4.0 and 6.0: "To avoid human contact with discharge fluids, which are at levels greater than or equal to the FMP Criteria, access to sumps and infiltration areas will be controlled and posted when evaporation/infiltration is in operation."	Y	1	The following sentences were added to each respective section. Section 4: If field monitoring results indicate concentrations of tritium above FMP Criteria (see Appendix A), then access to sumps and infiltration areas will be controlled and posted to avoid human contact with discharge fluids while evaporation/infiltration is in operation. Section 6: To avoid human contact with discharge fluids, access to sumps and infiltration areas may be controlled and posted when evaporation/infiltration is in operation.
2	Section 1.0, Page 1: references to the FFACO should use "FFACO (1996, as amended)". The amended date should no longer be included in the reference.	Y	2	The change was made as requested.

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11/2007

U.S. Department of Energy Office of Legacy Management

Record of Review (continuation)

Review No.	Project

Item No.	Reviewer's Comments and Recommendation	Reqd. (Y/N)	Item No.	Author's Response (if required)
3	Section 5.0, Page 10, First paragraph, Last two sentences: If the appropriate fluid containment is not available activities will be stopped until LM and NDEP have been notified and appropriate fluid containment has been made available. This requirement needs to be clarified in these sentences.	Y	3	The last two sentences were revised as follows: If the appropriate fluid containment is not available (i.e., lined sump or portable tank), activities will be stopped until LM and NDEP have been notified and appropriate fluid containment is made available at the well location. Discharge will be routed to the new fluid containment, the area will be posted and have controlled access, and the transition strategy will be implemented.
4	Section 6.1.2.2, Page 13, Last paragraph, last sentence: replace "...concentrations of 5 mg/L mandates.." with "..concentrations of 5 mg/L or more mandates.."	Y	4	The change was made as requested.
5	Section 6.1.3, Page 14, Second paragraph: The FMP Criteria are the maximum constituent concentrations below which fluids may be discharged to the ground surface. Remove the "5 x FMP"s . (this matches your statement on page 16, first bullet).	Y	5	The change was made as requested.
6	Section 6.1.4, Page 15, first paragraph, forth sentence: What "on-site and off-site" are you referring to? (just delete on and off site) Also in this sentence: change "applicable DOE and U.S. Dept. of Transportation regulations" to "state and federal regulations and applicable DOE orders". Please check pages 15 and 16 for references to NTS and NNSS that don't apply to Shoal (See #9 below).	Y	6	The change was made as requested.
7	Section 6.1.4, Page 15, Third paragraph, Last sentence: This alternate method is more of a quick field check and shouldn't be included in a FMP.	Y	7	The sentence was removed as requested.
8	Section 6.1.5, Page 16, Second bullet: near the end of the sentence add "controlled and posted" before "infiltration area or unlined sump".	Y	8	The change was made as requested.
9	Section 6.1.5, Page 16, After second bullet: Delete all of bullets 3 and 4 and modify the sentence above them to say: "If fluids do not meet the fluid decision criteria for discharge/disposal on site, then the fluids will be allowed to evaporate in lined sumps. The sediment will then be sampled and managed as required by state and federal regulations and applicable DOE orders."	Y	9	The change was made as requested.
10	Section 7.2, Page 18, First sentence: After being "cleaned" with clean water the disposable equipment and materials should be scanned for radioactivity and managed the same as the PPE and other trash is	Y	10	The paragraph was revised as requested.

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11/2007

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U.S. Department of Energy Office of Legacy Management

Record of Review (continuation)

Review No.	Project

Item No.	Reviewer's Comments and Recommendation	Reqd. (Y/N)	Item No.	Author's Response (if required)
	managed after they are scanned (the cleaned equipment many not be clean). Modify the sentence and paragraph to include this.			
11	Appendix A, Table note "a" : The FMP Criteria is the limit for discharge to ground surface for near and far field wells. Delete all text after the word "surface"	Y	11	The ootnote "a" was revised as follows: Limit for final disposal of fluids by unrestricted discharge to the ground surface. The footnote "b" was revised as follow: Limit for final disposal of fluids by discharge to an access controlled and posted unlined sump or infiltration area.
12	General: check to make sure all the decision diagram figures show that the limit for ground surface discharge is FMP criteria (<20,000pCi/L Tritium) and after that the sumps and infiltration areas must be controlled and posted.	Y	12	The diagrams were revised as requested.
	Comments 13 and 14 were received by e-mail on July 28, 2011			
13	Throughout the FMP the terms Fluid Management Plan Criteria (FMP Criteria), applicable fluid management criteria, fluid quality parameters, established action level/action level, fluid management criterion, fluid management decision criteria, and fluid criteria/fluid decision criteria are used interchangeably to mean one of three action levels. For clarity, one term should be chosen and everything else referenced against that term. We suggest using "Fluid Management Criteria (FMP)" to mean those numbers based on the SDWA, MCL, etc. and then using "> FMP Criteria and < 20 X FMP Criteria" or "> 20 X FMP Criteria" depending on the situation being described.	Y	13	Changes were made throughout the document as follows: The terms FMP Criteria, < 20 X FMP Criteria, and/or > 20 X FMP Criteria were inserted into sections that discuss final management and/or disposition of fluids. The terms established action levels/action levels were used in sections that discuss field monitoring of contamination indicators (tritium and/or lead) that support the daily management and operational decisions of fluids, but not final disposition decisions.
14	The very last sentence on Page 12 under Section 6.1.2 contradicts the first sentence in Sections 6.1.3 and 6.2.3. The beginning of the first sentences in 6.1.3 and 6.2.3 should be changed to "Analytical laboratory results are..."	Y	14	The change was made as requested.

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11/2007

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