FMC Idaho LLC, Pocatello, Idaho

FMC Pocatello Post-Closure Plan

Volume 2

Slag Pit Sump Post-Closure Plan

October 2012

TABLE OF CONTENTS

Section Page

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF THIS PLAN 1-1
1.2 DESCRIPTION OF SLAG PIT SUMP 1-1
1.3 POST-CLOSURE PLAN AMENDMENT 1-3
1.4 CONTACT INFORMATION 1-3
1.5 DOCUMENT ORGANIZATION 1-3

2.0 SLAG PIT SUMP POST-CLOSURE ACTIVITIES

2.1 OVERALL POST-CLOSURE MONITORING OBJECTIVES 2-1
2.1.1 Maintaining the Integrity and Effectiveness of the Final Cover 2-1
2.1.2 Maintaining and Monitoring the Leak Detection System 2-1
2.1.3 Maintaining and Monitoring the Groundwater Monitoring System 2-1
2.1.4 Prevention of Run-On and/or Run-Off Erosion or Other Damage to the Final Cover 2-2
2.1.5 Protection and Maintenance of Benchmarks 2-2
2.1.6 Maintaining the Security Systems 2-3
2.2 POST-CLOSURE MONITORING ACTIVITIES 2-3
2.2.1 Monitoring the Integrity and Effectiveness of the Final Cover 2-4
2.2.2 Monitoring the Groundwater Monitoring System 2-6
2.2.3 Monitoring Run-On and/or Run-Off Erosion 2-8
2.2.4 Monitoring Survey Benchmarks 2-9
2.2.5 Monitoring of Security Systems 2-10

3.0 WASTE MANAGEMENT

3.1 ANTICIPATED WASTE GENERATION AT SLAG PIT SUMP 3-1
3.2 WASTE MANAGEMENT 3-2

4.0 RECORDKEEPING AND REPORTING

4.1 INSPECTION AND MAINTENANCE RECORDS 4-1
4.2 ANNUAL SLAG PIT SUMP REPORTS 4-1
4.2.1 Slag Pit Sump Post-Closure Report 4-1
4.2.2 RCRA Interim Status GW Monitoring Assessment Report 4-2
4.3 RECORDKEEPING 4-2
4.4 MONITORING SCHEDULE NOTICES 4-3

5.0 REFERENCES

FIGURES

1-1 Regional Setting
1-2 Slag Pit Sump, Monitoring Wells, Warning Signs and Settlement Monument Locations

TABLES

2.1 Slag Pit Sump Post-Closure Monitoring Activity Summary

APPENDICES

APPENDIX A: SLAG PIT SUMP SAMPLING AND ANALYSIS PLAN

APPENDIX A1: SLAG PIT SUMP QUALITY ASSURANCE PROJECT PLAN

APPENDIX A2: FIELD SAMPLING PLAN FOR SLAG PIT SUMP GROUNDWATER MONITORING

APPENDIX A3: FIELD SAMPLING PLAN FOR SLAG PIT SUMP CAP INTEGRITY MONITORING

SECTION 1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF THIS PLAN

The purpose of the Slag Pit Sump Post-Closure Plan is to describe the post-closure monitoring and maintenance activities that will be performed at the Slag Pit Sump located at the FMC facility in Pocatello, Idaho. Figure 1-1 shows the regional setting of the FMC Plant Site.

The scope of this post-closure plan covers post-closure activities to be performed during the Slag Pit Sump post-closure-care period. Post-closure care and use of the property at the Slag Pit Sumps will continue to be performed in accordance with 40 CFR §265.117 through §265.120. During the post-closure care period, FMC will continue to perform the post-closure monitoring activities in accordance with the applicable performance standards specified in 40 CFR §265.228 and §265.310. Figure 1-2 shows the location of the Slag Pit Sump at the FMC Plant Site.

Post-closure monitoring will continue for 30 years after completion of closure of the Slag Pit Sump, unless shortened or lengthened by the Regional Administrator in accordance with 40 CFR §265.117.

FMC maintains a RCRA Facility-Wide Contingency Plan (FMC, 2010) for the facility in accordance with 40 CFR Part 265 Subpart D. FMC will update the Contingency Plan as necessary to reflect any changes in operations / conditions at the facility including any amendments to this post-closure plan pursuant to 40 CFR §265.118.

1.2 DESCRIPTION OF SLAG PIT SUMP

A detailed description of the Slag Pit Sump closure cover system design can be found in Section 7 of the Slag Pit Sump Closure Plan (Astaris, 2001). A summary of the physical description, wastes managed, and closure is provided below.

The Slag Pit Sump covers an area of approximately 100 square feet in the southeast corner of the slag pit. The sump is unlined and previously received phossy water from sources within the Furnace Building and occasionally from the Phos Dock when the pipeline to the Phase IV Ponds needed maintenance. "Phossy water" is any water in the process that has come in contact with elemental phosphorous. Because of the potential that the combined phossy water stream entering the Slag Pit Sump could at times be a hazardous waste, FMC applied for RCRA interim status in 1991 for this waste management unit.

No wastes were permanently stored or disposed of in the Slag Pit Sump. All liquids and suspended solids were removed by a submersible pump and sent via pipeline to the Phase IV ponds. The liquids and suspended solids were removed during the slag pit dewatering project in

April 1991. After they were removed, the sump was maintained as a backup unit but was never used after 1991 for phossy water management.

The slag pit was an integral part of elemental phosphorus operations at the site. Modifications to slag management operations (slag ladling) in the slag pit, including changes (e.g., configuration, access routes, and/or grade) in the vicinity of the Slag Pit Sump were partially completed in 1999 and completed in 2000. As such, final capping of the Slag Pit Sump needed to be designed and planned consistent with planned slag management operations within the slag pit. Therefore, prior to the modifications for slag management, an interim cover was placed over the Slag Pit Sump to minimize the potential for water infiltration. The interim cover was completed November 1, 1999 consistent with the Interim Slag Pit Sump Plan dated August 1999. In accordance with the RCRA Consent Decree, Attachment A, I, sub item 7, the interim slag pit sump cap was completed prior to the January 10, 2000 deadline (within 180 days of entry of the Consent Decree).

The interim cover area is larger than the original Slag Pit Sump area. The limits of the interim cover extend approximately to the eastern and southern walls of the slag pit. After the interim cover was installed, the area was regraded so that all surface run-off drained away from it to other areas of the slag pit. The final cap was installed over the asphalt concrete layer of the interim cover. The final slag pit sump cap consists, from bottom to top, of a layer of GCL barrier underlying a flexible membrane liner and a geonet (GN) drainage layer. An asphalt concrete/slag/sand cover was placed over the cap for protection against the elements, erosion, and animal or human intrusion. The final cover was constructed with a minimum thickness of 3.5 feet, and was placed on the geofabric filter overlying the drainage layer. The surface of the protective cover consists of an 8-inch asphaltic concrete layer.

The Slag Pit Sump was closed consistent with the *Slag Pit Wastewater Collection Sump Closure Plan* (Astaris, 2001) that EPA approved in February 2005. The cover construction was completed in October 2005, and FMC certified closure completion in December 2005. The closure certification for the Slag Pit Sump was supported by the Closure Report that contains the closure construction as-built drawings. The Closure Report and as-built drawings are on file with FMC and are available to any FMC contractor performing post closure monitoring and maintenance.

FMC filed a survey plat and a *Notice and Covenants Restricting Use of Property* with the Power County recorder's office in December 2005 as a record of the type, location, and quantity of waste placed in the Slag Pit Sump, and the property use restrictions at the closure area. FMC recorded the notice within 60 days of closure certification and sent a letter to the EPA Regional Administrator in December 2005 that provided EPA with the closure certification, and copies of the survey plat and deed notice containing the property use restrictions. The survey plat was prepared and certified by a professional land surveyor registered in the State of Idaho. The deed notice notifies in perpetuity any potential purchaser of the property that the land has been used to

manage hazardous wastes, that land use is restricted under 40 C.F.R. Part 265, Subpart G regulations, and that the survey plat was filed with the Power County recorder's office. The land use restrictions include a prohibition against subsurface intrusion within the limit of the final cover and within 20 feet of the anchor trench. Contemporaneously with sending the closure certification notice letter to EPA in December 2005, FMC provided a copy of that letter to the Shoshone-Bannock Tribes including copies of the closure certification, *Notice and Covenants Restricting Use of Property*, and the survey plat.

1.3 POST-CLOSURE PLAN AMENDMENT

This plan will be modified as necessary to accommodate any events or changes at the facility or changes in governing regulations that could impact the Slag Pit Sump post-closure activities. Possible future modifications that may be needed to this post-closure plan would be accomplished in accordance with the post-closure plan amendment procedures set forth at 40 CFR §265.118.

1.4 CONTACT INFORMATION

During the post-closure period, information about post-closure activities can be obtained by contacting:

Remediation Project Director

FMC Corporation

1735 Market Street

Philadelphia, PA 19103

(215) 299-6700

1.5 DOCUMENT ORGANIZATION

The remainder of this Plan consists of:

Section 2.0: Slag Pit Sump Post-Closure Activities

Section 3.0: Waste Management

Section 4.0: Recordkeeping and Reporting

Section 5.0: References

Appendix A: Slag Pit Sump Sampling and Analysis Plan

Appendix A1: Slag Pit Sump Quality Assurance Project Plan (QAPP)

Appendix A2: Field Sampling Plan (FSP) for Slag Pit Sump Groundwater Monitoring

Appendix A3: Field Sampling Plan (FSP) for Slag Pit Sump Cap Monitoring

SECTION 2.0 SLAG PIT SUMP POST-CLOSURE ACTIVITIES

The purpose of this section is to specify the Slag Pit Sump post-closure monitoring activities under this post-closure plan.

2.1 OVERALL POST-CLOSURE MONITORING OBJECTIVES

The Data Quality Objectives (DQOs) for the Slag Pit Sump post-closure monitoring that address all post-closure monitoring activities are presented in the Slag Pit Sump Quality Assurance Plan (QAPP) as included in Appendix A-1 of this Plan. The following presents a discussion on the overall post-closure monitoring objectives based on the DQOs.

2.1.1 Maintaining the Integrity and Effectiveness of the Final Cover

The post-closure performance standards for maintaining the integrity and effectiveness of the final cover are set forth in 40 CFR §265.228(b)(1) and §265.310(b)(1). These state that during the post-closure care period, the owner or operator must "*Maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct effects of settling, subsidence, erosion, or other events*." The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

Collecting sufficient data and information to determine if the cover system is being maintained such that the cap is capable of performing as designed, i.e., limiting infiltration of precipitation through the slag pit sump cap and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:

- Settlement monitoring;
- Rodent infestation monitoring; and
- Maintenance or repair as needed to comply with the performance standard.

2.1.2 Maintaining and Monitoring the Leak Detection System

The Slag Pit Sump was an unlined waste management unit and there is no leak detection system; therefore, this requirement is not applicable to the Slag Pit Sump post-closure plan.

2.1.3 Maintaining and Monitoring the Groundwater Monitoring System

The post-closure performance standards for maintaining and monitoring the groundwater monitoring system are set forth at 40 CFR §265.228(b)(3) and §265.310(b)(3). These regulations state that during the post-closure care period the owner or operator must "*Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements*." The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

Ensure the groundwater monitoring system is being properly maintained and monitored to collect sufficient data and information to assess if current releases from the slag pit sump are impacting groundwater quality and take corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:

Inspections of the groundwater monitoring wells;

- Sampling and analysis of upgradient and downgradient wells;
- Performance of statistical tests on indicator constituents; and
- Maintenance or repair as needed to comply with the performance standard.

2.1.4 Prevention of Run-On and/or Run-Off Erosion or Other Damage to the Final Cover

The post-closure performance standards for prevention of final cover damage from run-on and/or run-off are set forth at 40 CFR §265.228(b)(4) and §265.310(b)(4). These regulations state that during the post-closure care period the owner or operator must "*Prevent run-on and run-off from eroding or otherwise damaging the final cover*." The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

Ensure the cap surface and stormwater/snowmelt run-off diversion structures (drainage ditches) are being inspected and maintained and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:

- Inspections of the cap surface for signs of erosion, including cracking or deterioration of the asphalt cap, or ponding of stormwater/snowmelt;
- Inspections of stormwater/snowmelt diversion structures for accumulation of debris or sediment; and
- Maintenance or repair as needed to comply with the performance standard.

2.1.5 Protection and Maintenance of Benchmarks

The post-closure performance standards for protection and maintenance of benchmarks are set forth at 40 CFR §265.310(b)(5), which states that during the post-closure care period the owner or operator must "*Protect and maintain surveyed benchmarks used in complying with §265.309*." The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

Ensure the benchmarks used to survey the Slag Pit Sump locations and dimensions and settlement monument movement are being inspected and maintained and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:

- Inspections of the survey benchmark control stations "94-1" and "94-4"; and
- Maintenance or repair as needed to comply with the performance standard.

2.1.6 Maintaining the Security Systems

40 CFR §265.14(a) requires the owner or operator must prevent the unknowing entry, and minimize the possibility of the unauthorized entry, of persons or livestock onto the active portion of the facility. The Slag Pit Sump is wholly enclosed within the boundaries of the FMC plant site which has a combination of fencing around the property boundary, natural barriers and controlled entry. Access to the closed unit is and will be controlled to protect the cover, benchmarks, and monitoring systems from inadvertent access of unauthorized persons. The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

Ensure the slag pit sump warning signs are being inspected and maintained and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:

- Inspections of the slag pit sump signs.
- Maintenance or repair as needed to comply with the performance standard.

2.2 POST-CLOSURE MONITORING ACTIVITIES

The following subsections provide a description of the post-closure monitoring activities for the Slag Pit Sump. DQOs for all post-closure monitoring activities are presented on Tables 1.1, 1.2, and 1.3 of the *Slag Pit Sump QAPP* (attached in Appendix A-1). The post-closure inspection, sampling/measurement, and maintenance activities are summarized on Table 2.1. Annual monitoring at the slag pit sump will typically be performed at approximately 12-month intervals and semiannual monitoring at the slag pit sump will typically be performed at approximately 6-month intervals.

In addition to the post-closure monitoring and maintenance activities described in this section, all FMC and FMC contractor personnel working in the Slag Pit Sump area will be responsible for reporting as soon as practicable to FMC any conditions that indicate an actual or potential failure to meet the requirements specified in this *Post-Closure Plan* or that are otherwise unacceptable. FMC will be responsible for promptly assessing the reported condition(s) based on the requirements of this plan and RCRA regulations, and, if determined to be required, performing any necessary maintenance and/or repair to correct such conditions. FMC will document any such reported conditions covered by the requirements of this plan and RCRA regulations in the Operating Record. For any such condition(s) that FMC determines requires maintenance or repair pursuant to this *Post-Closure Plan*, the maintenance will be performed on a schedule and documented (summarized in the *Slag Pit Sump Annual Post-Closure Report*) consistent with the requirements described herein.

2.2.1 Monitoring the Integrity and Effectiveness of the Final Cover

Post-closure monitoring of the final cover integrity and effectiveness involves the activities discussed below.

2.2.1.1 Settlement Monitoring

The objective of the cap settlement monitoring program is to determine if excessive settlement or movement of the slag pit sump cap materials of construction is taking place. The DQOs for settlement monitoring are presented in Table 1.1 of the *Slag Pit Sump QAPP* (see Appendix A-1 of this *Post-Closure* Plan).

Procedures for the cap settlement monitoring activities are presented in Section 4.3.1 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of this *Post-Closure Plan*). The cap settlement monitoring results will be summarized in the annual *Slag Pit Sump Annual Post-Closure Report*. This monitoring program consists of the following elements:

Inspections: The settlement monument on the Slag Pit Sump cap surface will be visually inspected to determine if the settlement monument is clear, accessible, and undamaged during the displacement measurement surveys described below. Any issues requiring attention or maintenance on the cap settlement monument will be noted on inspection and maintenance forms. Inspection records will be maintained in the Operating Record on-site as described in Section 4.3.

Sampling and/or Measurements: To monitor final cover settlement on the slag pit sump cap, the elevation and coordinates of the settlement monument will be surveyed to determine the vertical and horizontal components of the final cover monument. For accuracy, a surveying instrument will be used to take measurements with the following tolerances:

Elevation readings:	0.01 foot
Horizontal displacement:	0.1 foot

Elevation and displacement measurements will be plotted cumulatively versus time. The time scale will be in logarithm of time or square root of time. The settlement curve will be kept up to date with each reading. The displacement measurements (vertical and horizontal movements) will be made annually during the remaining post-closure period or until the total cumulative movements for the previous five years are less than the following limits:

Vertical settlement:	0.03 foot
Horizontal movement:	0.2 foot

Displacement measurements will be made (1) annually and then every five years during the post-closure period after the above limits are reached; (2) if visible subsidence is noted during

semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events. The criteria for visible subsidence requiring settlement monitoring has been established as an area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater. A triggering seismic event is defined as an event that (1) exceeds a magnitude 5.0 on the Richter Scale with an epicenter within a 20-mile radius as reported by USGS or (2) exceeds a magnitude 6.0 on the Richter Scale with an epicenter within a 50-mile radius as reported by USGS. Settlement monitoring will be based on control stations "94-1" and "94-4," which are local stations in FMC's survey control system. The coordinates for these stations were derived from the U.S. Coast & Geodetic Survey (US C&GS) Control Station MCDOUGAL-2 and BM Y-96. The vertical datum is based on the 1968 adjustment of the National Geodetic Vertical Datum of 1929 (NGVD 29) by the US C&GS.

Maintenance Activities: Any maintenance necessary to clear access to or repair the settlement monument will be performed as soon as practicable so as not to cause any delay for the next scheduled monitoring event.

Any repairs or maintenance of the final cover necessary due to observed visible subsidence will be performed as soon as practicable so as not to cause any localized ponding of precipitation on the cap surface or if the subsidence was identified due to observed localized ponding of precipitation on the cap surface so as to eliminate the potential for future ponding of precipitation on the cap surface. An area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater will require maintenance as soon as practicable. Repairs and/or maintenance to eliminate or prevent potential ponding on the cap surface will commence within seven (7) days unless delayed as specified below. Commencement of repairs and/or maintenance includes actual field work (for simple or minor maintenance) and initiation of engineering, planning and/or procurement of additional materials to perform the maintenance and/or repairs (for more complex or larger scale maintenance). Maintenance or repairs will not be performed if frozen soil / snow cover / muddy conditions exist such that the cap surface cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or are not feasible due to frozen soil / snow cover conditions (typically between November 15 through April 15) at the slag pit sump. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable surface conditions. In the event maintenance or repairs must be delayed beyond commencement within seven (7) days for cause(s) other than frozen soil / snow cover / muddy conditions, FMC will notify EPA within 48 hours of the observation of a condition for which the maintenance/repair will be delayed. The notification will include a description of the reason(s) for the necessary delay and a schedule for commencing the maintenance and/or repairs.

All repairs to the final cover will be conducted in accordance with the final cover construction specifications, and all testing and inspections will be conducted in accordance with the final cover *Construction Quality Assurance* (CQA) *Plan* attached to the Slag Pit Sump Closure Plan. All necessary repairs will be performed by FMC. Documentation of all repairs and maintenance activities will be maintained in the Operating Record on-site as described in Section 4.3.

2.2.1.2 Rodent Monitoring

The objective of the RCRA cap rodent infestation monitoring program is to inspect the soil/slag slope around the perimeter of the slag pit sump cap to identify evidence of rodent burrowing. The DQOs for rodent infestation monitoring are presented in Table 1.1 of the *Slag Pit Sump QAPP* (see Appendix A-1 of this *Post-Closure* Plan).

Procedures for the rodent infestation monitoring activities are presented in Section 4.3.2 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of this *Post-Closure Plan*). The cap rodent infestation monitoring results will be summarized in the annual *Slag Pit Sump Annual Post-Closure Report*. This monitoring program consists of the following elements:

Inspections: The soil/slag slope around the perimeter of the slag pit sump cap will be visually inspected semi-annually for evidence of rodent burrowing that, in the judgment of the inspector, could reasonably be expected to result in excessive soil erosion per run-off erosion monitoring (per section 2.2.3) or create excessive undermining (voids) that could compromise the integrity and functionality of the cap system. Any issues requiring attention or maintenance are to be noted on inspection and maintenance forms. Inspection records will be maintained in the Operating Record on-site as described in Section 4.3.

Sampling and/or Measurements: This is a qualitative, rather than quantitative assessment, i.e., no routine sampling, measurement or analysis is performed as part of this monitoring.

Maintenance Activities: Any required maintenance noted during the inspection of the soil/slag slope around the perimeter of the slag pit sump cap, for example to fill holes or burrows will be performed as soon as practicable. Maintenance to fill holes or burrows will not be performed if frozen soil / snow cover / highly muddy conditions exist such that the cap area cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or are not feasible due to frozen soil / snow cover conditions (typically between November 15 through April 15) where the maintenance is required, but, if delayed by surface conditions filling holes / burrows will commence within seven (7) days of the presence of acceptable surface conditions. Burrowing activity may also warrant the use of pesticides to eradicate the pest. Documentation of all repairs and maintenance activities will be maintained in the Operating Record on-site as described in Section 4.3.

2.2.2 Monitoring the Groundwater Monitoring System

The objective of the Slag Pit Sump groundwater assessment monitoring is to collect groundwater data to monitor the potential impact of each of the Slag Pit Sump on the underlying, uppermost aquifer. The DQOs for groundwater monitoring are presented in Table 1.2 of the *Slag Pit Sump QAPP* (see Appendix A-1 of this *Post-Closure* Plan). The Slag Pit Sump has one upgradient

well and three downgradient wells as part of the RCRA groundwater monitoring system. Figure 1-2 shows the location of the Slag Pit Sump monitoring well network. To meet the groundwater monitoring objective, these wells will be monitored, sampled, and analyzed quarterly.

Groundwater monitoring was conducted prior to final closure of the slag pit sump and has been part of post-closure monitoring at the Slag Pit Sump since certification of final closure.

Procedures for the Slag Pit Sump groundwater monitoring activities are presented in the *FSP for Slag Pit Sump Groundwater Monitoring* (included in Appendix A-2 of the *Post-Closure Plan*). The groundwater monitoring results will be reported in the annual *RCRA Interim Status Groundwater Monitoring Assessment Report*. The groundwater assessment monitoring consists of the following:

Inspections: The RCRA groundwater monitoring wells for the Slag Pit Sump will be visually inspected semiannually to determine if (1) the well covers are in place, undamaged, and locked and (2) barriers are in place to protect the wellhead from incidental damage. Any issues requiring attention or maintenance on the Slag Pit Sump groundwater monitoring wells will be to be noted on inspection and maintenance forms. Inspection records will be maintained in the Operating Record on-site as described in Section 4.3.

Sampling and/or Measurements: Groundwater from the upgradient and downgradient slag pit sump monitoring wells will be sampled and analyzed on a quarterly basis to provide data regarding groundwater quality beneath and in the vicinity of the slag pit sump during the post-closure period. The upgradient and downgradient groundwater monitoring wells will be sampled for the following parameters:

Metals:	arsenic and selenium.
Water quality:	chloride, fluoride, potassium, nitrate, sulfate, and total phosphorus. Elemental phosphorus will be analyzed semi-annually. Ammonia will be analyzed every five years during the second quarter monitoring event, beginning with the second quarter 2012 [2Q12] monitoring event.
Field parameters:	pH, turbidity, temperature, water level (groundwater elevation), and specific conductance.

The groundwater monitoring program will continue throughout the entire post-closure period of 30 years, unless shortened or lengthened by the EPA Regional Administrator in accordance with 40 CFR §265.117.

Maintenance Activities: Any maintenance shown to be necessary based on the inspection of the groundwater monitoring wells will be performed as soon as practicable and within a timeframe that will not delay the next scheduled monitoring event. All necessary repairs will be performed

by FMC. Documentation of all repairs or maintenance activities will be maintained in the Operating Record on-site as described in Section 4.3.

2.2.3 Monitoring Run-On and/or Run-Off Erosion or Other Damage to the Final Cover

The objective of the Slag Pit Sump cap run-on and/or run-off erosion monitoring program is to determine if water erosion from run-on or run-off has impaired the integrity of the final cap. The DQOs for run-on/run-off erosion monitoring are presented in Table 1.3 of the *Slag Pit Sump QAPP* (see Appendix A-1 of this *Post-Closure* Plan). Due to the way that the Slag Pit Sump cap is constructed, there is no chance of run-on (i.e., the cap is higher than surrounding ground surface). Therefore, this monitoring is limited to impacts of run-off.

Procedures for the Slag Pit Sump cap run-off erosion monitoring activities are presented in Section 4.4 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of this *Post-Closure Plan*). The cap erosion monitoring results will be summarized in the annual *Slag Pit Sump Annual Post-Closure Report*. This monitoring program consists of the following elements:

Inspections: The Slag Pit Sump cap will be visually inspected (1) semi-annually and (2) within 48 hours of a 25-year, 24-hour storm event defined as 2.1 inches (or more) of precipitation within a 24 hour period (NOAA, 1973) as reported for the Pocatello airport weather station. The objective of these visual inspections will be to determine if cap surface erosion or ponding has occurred. The criteria for localized erosion or ponding requiring maintenance has been established as an area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater. The surface and edges of the slag pit sump cap will be visually inspected semi-annually for evidence of cracking or deterioration of the asphalt cap that, in the judgment of the inspector, could reasonably be expected to diminish the asphalt layer capability to protect the integrity and functionality of the underlying low permeability geosynthetic layers of the cap system. Diversion and drainage structures will also be inspected for damage and accumulation of debris or sediment. Damage that could impair the functionality of the diversion and drainage structures will be noted and described. Any issues requiring maintenance are to be noted on inspection and maintenance forms. Inspection records will be maintained in the Operating Record on-site as described in Section 4.3.

Sampling and/or Measurements: This is a qualitative, rather than quantitative assessment, i.e., no routine sampling, measurement or analysis is performed as part of this monitoring.

Maintenance Activities: Any maintenance shown to be required based on inspection of the Slag Pit Sump cap surface and diversion structures will be performed as soon as practicable. Maintenance or repairs to the diversion and drainage structures that could impair the functionality of the diversion and drainage structures and maintenance and/or repairs to eliminate or prevent potential ponding on the cap surface will commence within seven (7) days unless delayed as specified below. Commencement of repairs and/or maintenance includes actual field

work (for simple or minor maintenance) and initiation of engineering, planning and/or procurement of additional materials to perform the maintenance and/or repairs (for more complex or larger scale maintenance). Maintenance or repairs will not be performed if frozen soil / snow cover / muddy conditions exist such that the cap surface cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or are not feasible due to frozen soil/snow cover conditions (typically between November 15 through April 15) at the slag pit sump. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable surface conditions. In the event maintenance or repairs must be delayed beyond commencement within seven (7) days for cause(s) other than frozen soil / snow cover / muddy conditions, FMC will notify EPA within 48 hours of the observation of a condition for which the maintenance/repair will be delayed. The notification will include a description of the reason(s) for the necessary delay and a schedule for commencing the maintenance and/or repairs. All necessary repairs will be performed by FMC. Documentation of all repairs or maintenance activities will be maintained in the Operating Record on-site as described in Section 4.3. All repairs to the final cover will be conducted in accordance with the final cover construction specifications, and all testing and inspections will be conducted in accordance with the final cover *CQA Plan* attached to the Slag pit Sump Closure Plans.

2.2.4 Monitoring Survey Benchmarks

The objective of the survey benchmark monitoring program is to ensure that the survey benchmarks used to determine the exact location and dimensions of the Slag Pit Sump and to perform the settlement monitoring are properly protected and maintained. The DQOs for survey benchmark monitoring are presented in Table 1.3 of the *Slag Pit Sump QAPP* (see Appendix A-1 of this *Post-Closure* Plan). Survey benchmarks for the Slag Pit Sump include control stations "94-1" and "94-4."

The procedures for the survey benchmark monitoring are presented in Section 4.6 of the *FSP for Slag pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of this *Post-Closure Plan*). The survey benchmark monitoring results will be summarized in the annual *Slag pit Sump Annual Post-Closure Report*. This monitoring program consists of the following elements:

<u>Inspections</u>: Each of the survey benchmarks associated with the Slag Pit Sump will be visually inspected annually to determine if the benchmarks are clear, accessible, and undamaged. Any issues requiring attention or maintenance on the survey benchmarks are to be noted on inspection and maintenance forms. Inspection records will be maintained in the Operating Record on-site as described in Section 7.3.

<u>Sampling and/or Measurements</u>: This is a qualitative, rather than quantitative assessment, i.e., no routine sampling, measurement or analysis is performed as part of this monitoring.

<u>Maintenance Activities</u>: Any maintenance shown to be required based on inspection of the survey benchmarks will be performed as soon as practicable and within a timeframe that will not delay the next scheduled monitoring event. All necessary repairs will be performed by FMC. Documentation of all repairs or maintenance activities will be maintained in the Operating Record on-site as described in Section 4.3.

2.2.5 Monitoring of Security Systems

The objective of the security system monitoring is to ensure that security systems are in place, functional, and maintained. Security systems for the Slag Pit Sump include warning signs. The DQOs for security system monitoring are presented in Table 1.3 of the *Slag Pit Sump QAPP* (see Appendix A-1 of this *Post-Closure* Plan). One warning signs will be posted inside the slag pit, adjacent to the slag pit sump, and one warning sign will be posted outside and above the slag pit. The warning signs will state in English "Danger--Unauthorized Personnel Keep Out" per 40 CFR §265.14(c) and will be legible, with a standard size of 10 by 14 inches.

The procedures for the slag pit sump security monitoring are presented in Section 4.5 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of this *Post-Closure Plan*). The security system monitoring results will be summarized in the annual *Slag Pit Sump Annual Post-Closure Report*. These procedures consist of the following:

Inspections: Security system inspections will be conducted semi-annually at the Slag Pit Sump. These inspections will be conducted to 1) verify that the warning signs are in place and in good repair, and 2) determine whether there is any evidence of unauthorized entry or attempted entry into the slag pit sump area. Any issues requiring attention or maintenance on the security systems are to be noted on inspection and maintenance forms. Inspection records will be maintained in the Operating Record on-site as described in Section 4.3.

Sampling and/or Measurements: This is a qualitative, rather than quantitative assessment, i.e., no routine sampling, measurement or analysis is performed as part of this monitoring.

Maintenance Activities: Any maintenance shown to be required based on inspection of the security systems will be performed as soon as practicable. Repairs and/or maintenance of the fencing, gates and/or warning signs will commence within seven (7) days unless delayed as specified below. Commencement of repairs and/or maintenance means performing actual field work, in the case of simple or minor maintenance, or, in the case of more complex or larger scale maintenance, initiation of engineering, planning and/or procurement of additional materials to perform the maintenance and/or repairs. Maintenance or repairs will not be performed if frozen soil / snow cover / muddy conditions exist such that the cap area cannot be accessed or if that work is not feasible due to frozen soil conditions/snow cover (typically between November 15 through April 15) at the area where maintenance/repairs are required. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable surface conditions. In the event commencement of maintenance or repairs must be delayed beyond seven (7) days for cause(s) other than unacceptable surface conditions as described above, FMC will notify EPA within the initial 48 hours of the seven (7) day period. The notification will include a description of the reason(s) for the necessary delay and a schedule for commencing the maintenance and/or repairs. All necessary repairs will be performed by FMC. Documentation of all repairs or maintenance activities will be maintained in the Operating Record on-site as describe in Section 4.3.

SECTION 3.0 WASTE MANAGEMENT

3.1 ANTICIPATED WASTE GENERATION AT SLAG PIT SUMP

Based upon experience to date at the slag pit sump, post-closure activities at the closed Slag Pit Sump, anticipated solid waste streams resulting from post-closure activities include:

- Debris removed from stormwater ditch maintenance;
- Groundwater monitoring well purge water; and
- Spent PPE.

These anticipated solid waste streams are discussed below.

Debris Removed from Stormwater Ditch Maintenance – Stormwater ditch debris is generated when stormwater diversion ditches are cleaned. Based upon process knowledge, including the historical observation of this debris, this stream is not anticipated to be a RCRA hazardous waste per 40 CFR Part 261. A new waste determination may be warranted if field observations indicate unusual conditions, such as unidentified materials (e.g., materials other than native soil, sand/gravel, slag and/or tumbleweeds).

Groundwater Monitoring Well Purge Water – During sampling of RCRA monitoring wells, the wells are purged prior to sampling. Based upon process knowledge, including over 20 years of groundwater well analyses for wells at the FMC facility, this stream is not anticipated to be a RCRA hazardous waste per 40 CFR Part 261. A new waste determination may be warranted if field observations indicate unusual conditions, such as unusual color or odors.

Spent PPE – During monitoring, sampling, or maintenance activities, spent PPE may be generated. Based upon process knowledge, including the historical observation of past-generated PPE and the fact that listed or characteristic wastes are not encountered, spent PPE is not anticipated to be a RCRA hazardous waste per 40 CFR Part 261.

3.2 WASTE MANAGEMENT

FMC is subject to all applicable RCRA requirements including 40 CFR §262.11 requirements for waste determination. All waste determination records will be documented as part of the Operating Record per the requirements of 40 CFR § 262.40(c). In accordance with 40 CFR 265.73(b)(3), records and results of waste analysis, waste determinations, and any trial tests performed will be recorded and maintained in the facility's Operating Record. Wastes will be managed in accordance with the applicable RCRA regulatory requirements.

SECTION 4.0 RECORDKEEPING AND REPORTING

A copy of this *Post-Closure Plan* will be maintained at the FMC facility and will be made available to EPA upon request. In addition to the annual Slag Pit Sump Reports described in Section 4.2, FMC will report to EPA and other entities within the applicable timeframes, as required by this post-closure plan and/or applicable law, any environmental releases, spills, groundwater monitoring data, emergency incidents, or other situations potentially threatening to human health or the environment.

4.1 INSPECTION AND MAINTENANCE RECORDS

All inspection, maintenance and other records generated as result of activities performed under this plan shall be maintained on-site. These records will be maintained per the requirements of 40 CFR §§ 265.73, 265.74 and 265.77.

4.2 ANNUAL SLAG PIT SUMP REPORTS

4.2.1 SLAG PIT SUMP POST-CLOSURE REPORT

A *Slag Pit Sump Annual Post-Closure Report* will be prepared annually. These reports will cover each calendar year and will be submitted to the EPA Region 10 by May 1st of the following year. Two (2) hard copies and one (1) electronic copy of the annual post-closure report will be submitted to the RCRA Project Manager, Office of Air, Waste and Toxics, EPA Region 10, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101. The report will include a summary of the following:

- Inspection and maintenance forms
- Settlement monitoring
- Survey benchmark monitoring
- Rodent infestation monitoring
- Stormwater diversion and drainage system monitoring
- Security system inspection results
- Maintenance and repair activities

- A summary of any problems encountered and actions taken to address them

4.2.2 RCRA Interim Status GW Monitoring Assessment Report

An annual *RCRA Interim Status Groundwater Assessment Report* will be prepared to present an evaluation of the RCRA groundwater quality monitoring data collected at the facility during each calendar year. This report will be prepared in accordance with the interim status requirements of RCRA pursuant to 40 CFR Part 265 Subpart F and will be submitted to EPA Region 10 by March 1st of the following year. In addition to the copy required to be submitted to the EPA Regional Administrator, two (2) hard copies and one (1) electronic copy of the annual groundwater assessment report will be submitted to the RCRA Project Manager, Office of Air, Waste and Toxics, EPA Region 10, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101. The annual *RCRA Interim Status Groundwater Assessment Report* will include:

- Evaluation of groundwater flow direction and water elevation
- Evaluation of the groundwater data including identification of any significant difference from background and results of statistical tests
- Status update for the waste management units (WMUs)
- Groundwater monitoring data and data validation and usability reports for the current year (via electronic media)

4.3 RECORDKEEPING

This post-closure plan and all associated monitoring data, inspection records, and certifications are part of the facility operating record. The operating records are located in the FMC files on-site. Except for inspection records, which must be kept for 3 years, or longer as may be required, the information contained in the operating record will be maintained at the facility until the post-closure care period has been completed.

4.4 MONITORING SCHEDULE NOTICES

FMC will provide 10 days prior notice to EPA for the quarterly RCRA groundwater monitoring events. For the balance of the monitoring activities, upon notice from EPA to observe post-closure monitoring, FMC will work with EPA to schedule specific monitoring activities as requested by EPA.

SECTION 5.0 REFERENCES

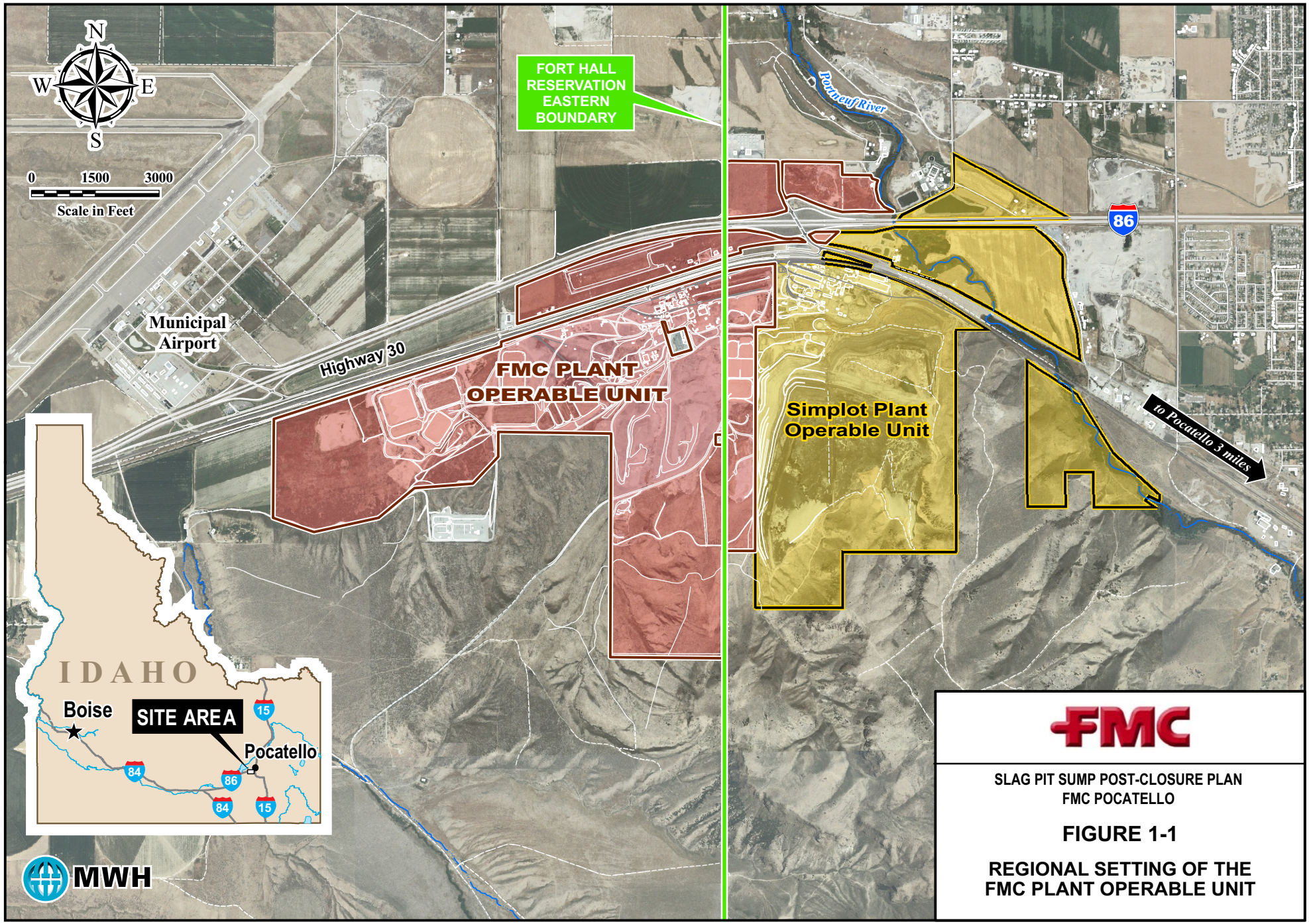
Astaris, 2001. Slag Pit Wastewater Collection Sump Closure Plan, Astaris Idaho LLC, Revised September 2001.

FMC Idaho, LLC (FMC), June 2009. Groundwater Current Conditions Report for the FMC Plant Operable Unit, June 2009 Final.

FMC, 2010. "RCRA Facility-Wide Contingency Plan," FMC Idaho, LLC, Pocatello, Idaho, June 16, 2010.

National Oceanic and Atmospheric Administration (NOAA), 1973. NOAA Atlas 2 Precipitation-Frequency Atlas of the Western United States, Volume V – Idaho.

FILE *Fig 1-01_Regional Setting_waerial_postclosure.mxd* *16Sep2010*

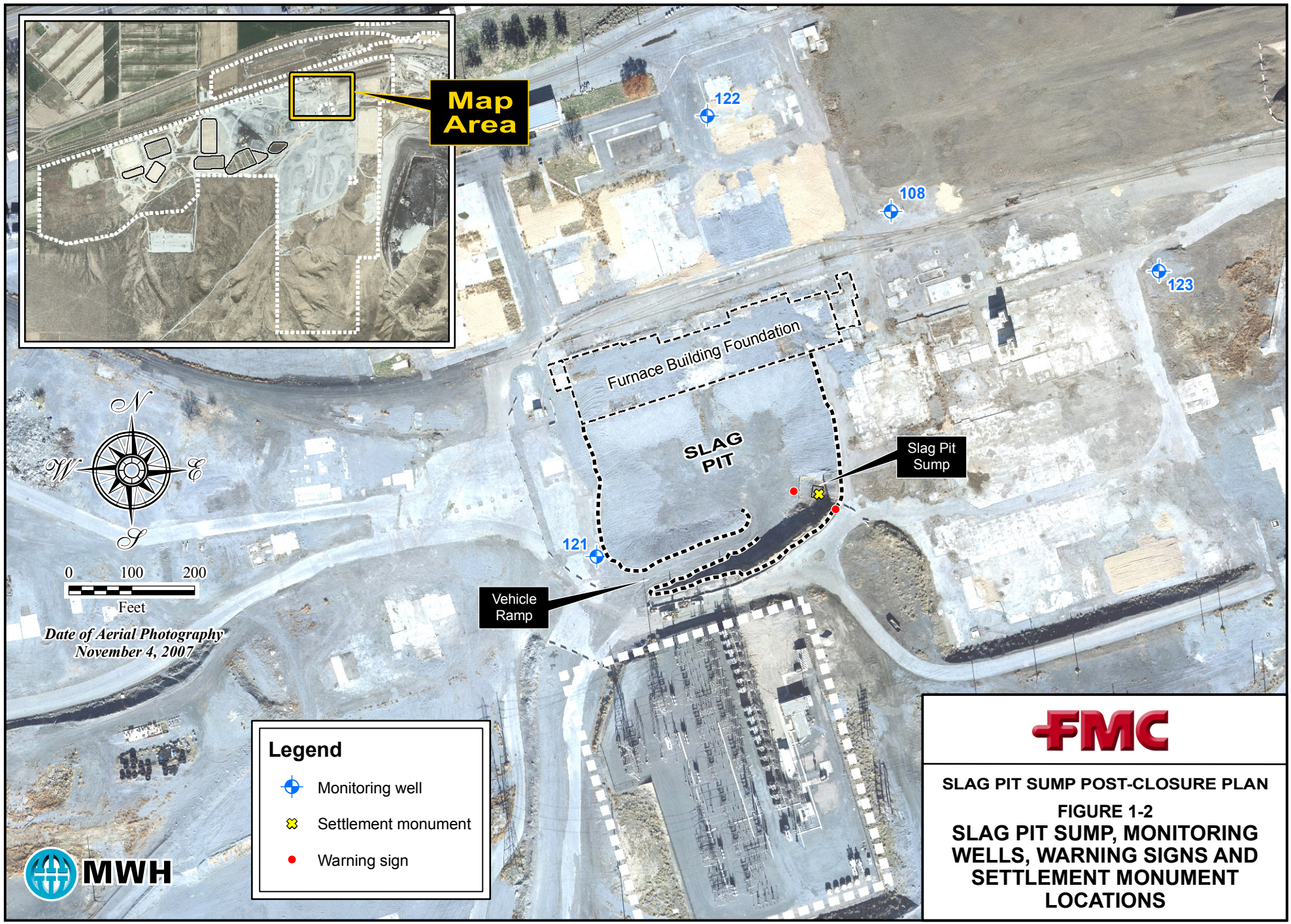


SLAG PIT SUMP POST-CLOSURE PLAN
FMC POCATELLO

FIGURE 1-1

REGIONAL SETTING OF THE FMC PLANT OPERABLE UNIT

FILE *Fig 1-02_Slag Pit_MonWells_Warning_Settlement.mxd 18Oct2011*



FMC

SLAG PIT SUMP POST-CLOSURE PLAN

FIGURE 1-2

SLAG PIT SUMP, MONITORING WELLS, WARNING SIGNS AND SETTLEMENT MONUMENT LOCATIONS

TABLE 2.1

SLAG PIT SUMP POST-CLOSURE MONITORING ACTIVITY SUMMARY

Post-closure Monitoring/Inspection Activity	Record/Report	Activity Frequency	Reporting Frequency	Action Trigger(s)	Action(s)	Post-Closure Plan (PCP) Reference
Routine Inspections						
Settlement monuments	Inspection & maintenance forms	Annually[1]	Annually	Damage to settlement monuments.	Maintenance action as soon as practicable[2].	PCP: Section 2.2.1.1
Rodent Infestation	Inspection & maintenance forms	Semiannually	Annually	Excessive rodent activity on external slope`.	Repair damage as soon as practicable[3].	PCP: Section 2.2.1.2
Groundwater monitoring wells	Inspection & maintenance forms	Semiannually	Annually	Damage to well head or cover.	Maintenance action as soon as practicable[2].	PCP: Section 2.2.2
Stormwater run-off cap erosion	Inspection & maintenance forms	Semiannually	Annually	Excessive cap erosion or cracking or deterioration of the asphalt cap; debris/sediment buildup.	Maintenance action as soon as practicable[3].	PCP: Section 2.2.3
Surveyor benchmarks	Inspection & maintenance forms	Annually	Annually	Damage to surveyor benchmarks.	Maintenance action as soon as practicable[2].	PCP: Section 2.2.4
Security system	Inspection & maintenance forms	Semiannually	Annually	Damaged or missing security signs.	Maintenance action as soon as practicable[3].	PCP: Section 2.2.5
25-year, 24-hour Storm						
Stormwater run-off cap erosion	Inspection & maintenance forms	w/in 48-hours	Annually	Excessive cap erosion or cracking or deterioration of the asphalt cap; debris/sediment buildup.	Maintenance action as soon as practicable[3].	PCP: Section 2.2.3
Seismic Event						
Settlement	Survey report	w/in 48-hours	Annually	Exceeds acceptable rates.	Engineering evaluation/repair.	PCP: Section 2.2.1.1
Sampling and Measurements						
Settlement	Survey report	Annually[1]	Annually	Exceeds acceptable rates.	Engineering evaluation/repair.	PCP: Section 2.2.1.1
Groundwater well sampling	Annual GW Assessment Report	Quarterly	Annually	Annual compilation of GW data.	Perform trend analysis.	PCP: Section 2.2.2

Notes: [1] Settlement monitoring will be performed annually during the post-closure period or until the total cumulative movements for the previous five years are less than the limits specified in Section 2.2.1.1 after which settlement monitoring will performed every 5 years. Settlement monitoring will also be performed if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring (per Section 2.2.3) or other monitoring and/or maintenance and after local seismic events (per Section 2.2.1.1).

[2] Any maintenance required based on the inspection shall be performed as soon as practicable and within a timeframe that will not delay the next scheduled monitoring event.

[3] Repairs / maintenance will commence within 7 days except if frozen soil / snow cover / muddy conditions exist such that the cap surface cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or are not feasible due to frozen soil/snow cover conditions (typically between November 15 through April 15) at the slag pit sump. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable surface conditions. In the event maintenance or repairs must be delayed beyond commencement within seven (7) days for cause(s) other than frozen soil / snow cover / muddy conditions, FMC will notify EPA within 48 hours of the observation of a condition for which the maintenance/repair will be delayed.

APPENDIX A

SLAG PIT SUMP SAMPLING AND ANALYSIS PLAN

APPENDIX A1: Slag Pit Sump Quality Assurance Project Plan (QAPP)

APPENDIX A2: Field Sampling Plan For Slag Pit Sump Groundwater Monitoring

APPENDIX A3: Field Sampling Plan for Slag Pit Sump Cap Monitoring

APPENDIX A-1

Slag Pit Sump Quality Assurance Project Plan (QAPP)

TABLE OF CONTENTS

Section		Page
1	PROJECT MANAGEMENT	1
	1.1 Project Organization	2
	1.2 Background	3
	1.3 Project Description	4
	1.4 Data Quality Objectives	5
	1.5 Description of Post-Closure Monitoring Activities	9
	1.6 Special Training Requirements/Certification	12
	1.7 Documentation and Records	12
2	DATA GENERATION AND ACQUISITION	13
	2.1 Sampling Process Design	13
	2.2 Sampling Methods	16
	2.3 Sample Handling and Custody	16
	2.4 Analytical Methods	17
	2.5 Quality Control	17
	2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements	20
	2.7 Instrument/Equipment Calibration and Frequency	20
	2.8 Inspection/Acceptance Requirement for Supplies and Consumables	20
	2.9 Data Acquisition Requirements (Non-direct Measurements)	21
	2.10 Data Management	21
3	ASSESSMENT/OVERSIGHT	23
	3.1 Assessments and Response Actions	23
	3.2 Reports to Management	23
4	DATA VALIDATION AND USABILITY	24
	4.1 Data Review, Validation, and Verification Requirements	24
	4.2 Validation and Verification Methods	24
	4.3 Reconciliation with User Requirements	25
5	REFERENCES	26

TABLE OF CONTENTS

Tables

Table		Page
1.1	Cap Integrity Monitoring DQOs	follows 6
1.2	GW Monitoring DQOs	follows 7
1.3	Erosion, Benchmark and Security Monitoring DQOs	follows 8
2.0	Slag Pit Sump Groundwater Monitoring Wells	follows 10
3.1	Groundwater Well Laboratory Analyses	follows 10
3.2	Groundwater Well Field Measurements	follows 10
4.0	GW Monitoring Equipment Inspection and Maintenance Activities	20
5.0	Field Equipment Calibration	follows 20
6.0	Database Field Acronyms and Descriptions	follows 21

Figures

Figure		
1	Project Organization	2

1.0 PROJECT MANAGEMENT

This plan describes the quality assurance and quality control (QA/QC) requirements for sampling and analyses activities performed at the FMC Idaho, LLC (FMC) facility to meet the Resource Conservation and Recovery Act (RCRA) requirements for interim status specified in 40 CFR 265. This facility ceased producing elemental phosphorus from phosphate ore in December 2001 and is no longer in operation. This plan was prepared in accordance with the following the guidance:

- *QA Project Plans in EPA SW-846* (EPA, 1997);
- *Guidance for the Data Quality Objectives (DQO) Process* (EPA, 2000a),
- *Data Quality Objectives for Hazardous Waste Site Investigations EPA QA/G4HW* (EPA, 2000b);
- *EPA Requirements for Quality Assurance Project Plans* (EPA, 2001);
- *Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation* (EPA, January 2004);
- *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance* (EPA, March 2009); and,
- Pursuant to applicable 40 CFR 264 Subpart F criteria and objectives.

This *Quality Assurance Project Plan* (QAPP) will be revised when appropriate, per 40 CFR §265.228. The requirements of this QAPP will be implemented using field sampling plans (FSPs as included in Appendices A2 and A3 of the *Post-Closure Plan*) that provide detailed field procedures for sampling and analyses.

This QAPP and the associated FSPs constitute a RCRA sampling and analysis plan (SAP) used for environmental data collection associated with the Slag Pit Sump at the FMC Plant Site. Environmental data collection includes:

- Settlement monitoring of the Slag Pit Sump cap;
- Rodent impact monitoring on the slope around the Slag Pit Sump cap;
- Groundwater monitoring of the upgradient and downgradient uppermost aquifer;
- Stormwater/snowmelt management monitoring on and around the Slag Pit Sump cap; and
- Survey benchmark monitoring.

This document is organized as follows:

- Section 1 - Project Management addresses project management, including the project history, roles and responsibilities of the participants, overall project monitoring objectives and associated data quality objectives.
- Section 2 - Data Generation and Acquisition addresses all aspects of project design and implementation, which ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling and quality control (QC) activities are employed and properly documented.
- Section 3 - Assessments and Oversight addresses the requirements for assessing the effectiveness of the QC measures described in this QAPP.
- Section 4 - Data Validation and Usability provides requirements for data validation and assurance of data usability.

1.1 PROJECT ORGANIZATION

The project organization is shown in Figure 1.

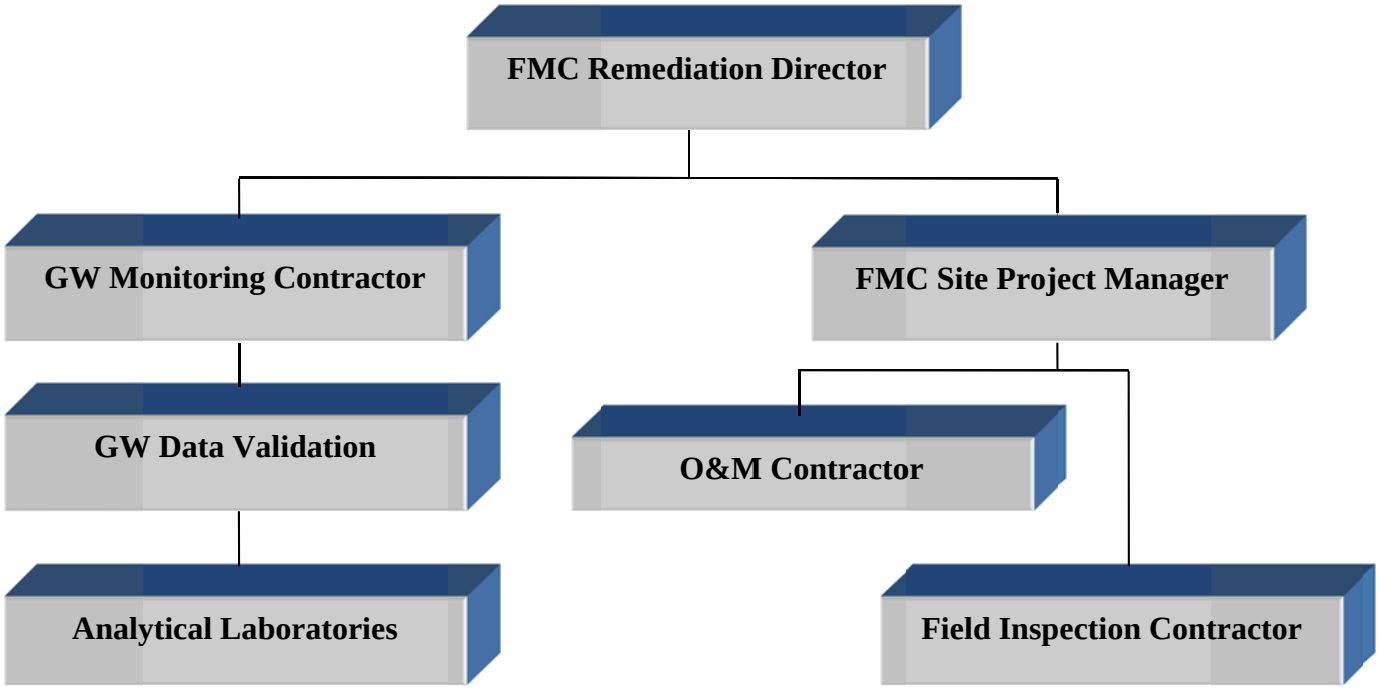


Figure 1. Slag Pit Sump Post-Closure Project Organization

The responsibilities of key project positions are as follows:

- FMC Remediation Project Director - overall project responsibility.
- FMC Site Project Manager - responsible for managing specific field activities (e.g. groundwater monitoring/cap monitoring) including direct management of field supervisors and contractors. Also responsible for assembly, organization and maintenance of all information collected during monitoring activities.
- FMC Groundwater Monitoring, Field Inspection and O&M Contractors - responsible for the representativeness of groundwater samples collected and reporting of field data relevant to monitoring and data management. The groundwater monitoring contractor is also responsible for maintenance of the groundwater monitoring database. The field inspection contractor is responsible for performing visual inspections, monitoring system data collection and reporting to FMC and specific maintenance items. The O&M contractor is responsible for maintenance as indicated based on field inspections and as directed by FMC.
- FMC Analytical Laboratory Contractor QA Officer - responsible for the accuracy and precision of data resulting from analysis of monitoring samples.
- FMC Data Validation Contractor - responsible for validation of data.

All personnel are responsible for identifying problems that may arise in the collection and reporting of project data and overseeing the implementation of the necessary corrective actions. The FMC Site Project Manager will track, review, and verify the effectiveness of corrective actions.

1.2 BACKGROUND

The FMC Pocatello Plant site is located in southeastern Idaho, approximately 2.5 miles northwest of Pocatello, Idaho. The FMC Pocatello Plant was a RCRA treatment, storage, and disposal facility (EPA Identification Number IDD 070929518). The FMC Pocatello Plant was in continuous operation from 1949 through 2001. The facility ceased producing elemental phosphorus from phosphate ore in December 2001. Process decommissioning and plant site dismantling activities were completed in 2006. RCRA groundwater monitoring has been conducted at the facility since 1990, when the plant became subject to RCRA Subtitle C regulatory requirements (as result of the narrowing of the Bevill exemption) and associated groundwater monitoring standards.

The FMC Plant Site is also a part of the Eastern Michaud Flats (EMF) Superfund Site. The EMF Site was listed on the National Priorities List (NPL) on August 30, 1990. The FMC Plant Site is part of the FMC Plant Operable Unit (OU), an OU within the EMF Site. The EMF site also includes an adjacent production facility (an operating phosphate fertilizer processing plant)

owned and operated by the J.R. Simplot Company. The FMC Plant OU consists of all the property that FMC owns within the EMF Site, including the FMC Plant Site and all property that FMC owns north of that Highway 30 (with exception of the Tesco property). FMC, Simplot and EPA entered into a CERCLA Administrative Order on Consent (AOC) in May 1991 under which the companies agreed to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the site.

FMC ceased production of elemental phosphorus from phosphate ore at its Pocatello facility in December 2001. This led EPA and FMC to enter into an AOC in October 2003 (SRI/SFS AOC) for a Supplemental Remedial Investigation and Feasibility Study (SRI/SFS) at the FMC Plant Operable Unit (OU). This was driven primarily by EPA's finding that additional investigations and evaluations were needed at the plant areas that had been actively operated at the time of the RI/FS but where operations had terminated with the plant shutdown. After the SRI/SFS is completed, it is anticipated that EPA will issue an Amended ROD specifying the FMC Plant OU remedial action requirements. The Slag Pit Sump, being subject to RCRA, is not part of the RI/FS or the SRI/SFS.

As confirmed by the 2003 SOW, the SRI/SFS, like the original RI/FS, will take into account the anticipated future uses of the site and will apply EPA's One Cleanup Program policy so that the CERCLA process also meets parallel RCRA corrective action requirements. The SRI/SFS AOC and SOW acknowledge that the FMC Plant Site includes 1) hazardous waste management units that have been closed in accordance with RCRA and RCRA consent decree requirements, and 2) former Calciner Ponds where FMC has conducted remedial action pursuant to a consent order with IDEQ.

The scope of this QAPP covers the post-closure activities associated with the closed Slag Pit Sump.

1.3 PROJECT DESCRIPTION

This section identifies and provides a schedule and specifies the nature of monitoring at the Slag Pit Sump that is subject to RCRA post-closure monitoring. The Slag Pit Sump and associated monitoring locations are identified in figures in the FSPs.

1.3.1 PROJECT SCHEDULE

Post-closure monitoring will continue for 30 years after completion of closure of the slag pit sump unless shortened or lengthened by the Regional Administrator in accordance with 40 C.F.R. §265.117. FMC will petition EPA to reduce the post-closure monitoring period in accordance with 40 C.F.R. §265.118(g) in the event the Company concludes that a monitoring period of shorter duration is warranted. RCRA interim status groundwater monitoring pursuant to 40 CFR. Part 265, Subpart F, has been ongoing at the facility on a quarterly basis since 1991.

The results of the groundwater assessment program will be reported in the *RCRA Interim Status Annual Groundwater Assessment Report*. Slag Pit Sump cap monitoring is monitored at specified frequencies and will be reported in the *Slag pit Sump Annual Post-Closure Report*.

1.4 DATA QUALITY OBJECTIVES

Data quality refers to the level of reliability associated with a particular data set or data point. The data quality associated with Performance Objective compliance monitoring data is a function of the sampling plan rationale, the sample collection procedures, and the analytical methods and instrumentation used in making the measurements. The overall QA objective is to develop and implement procedures for field sampling, COC, laboratory analysis, and data reporting that will provide data that meet project DQOs and are legally defensible. Data quality objectives are qualitative and quantitative statements that specify the field and laboratory data quality necessary to support specific decisions or regulatory actions. The DQOs describe which data are needed, why the data are needed, and how the data are to be used to meet the needs of the Performance Objective compliance monitoring. DQOs also establish numeric limits for the data to allow the data user (or reviewers) to determine whether the data collected are of sufficient quality for their intended use.

The DQOs for the Slag Pit Sump post-closure monitoring are discussed below. The DQOs for all the monitoring activities have been developed in accordance with the Guidance for the Data Quality Objectives Process, EPA QA/G-4 (U.S. EPA, 2000a) and additional guidance as provided in Data Quality Objectives for Hazardous Waste Site Investigations, EPA QA/G- 4HW (U. S. EPA, 2000b). The remainder of this section defines how the data will be assessed to meet the DQOs and the criteria that will be used to define acceptable limits of uncertainty.

1. State the problem. *Concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem. Identify the planning team members, including the decision-makers. For each data gap category, the problem statement is presented. Planning team members and decision-makers are the same for each data collection activity.*

2. Identify the decision. *Identify what questions the study will attempt to resolve and what actions may result from each decision. Develop a decision statement.*

3. Identify the decision inputs. *Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement.*

4. Define the study boundaries. *Specify the time periods and spatial boundaries to which decisions will apply. Determine when and where data should be collected. Define the target population of interest.*

5. Develop the decision rules. *Define the statistical parameter of interest, specify the action level, and integrate the previous DQO outputs into a single statement that*

describes the logical basis for choosing among alternative actions. Define an "if... then..." statement.

6. Specify tolerance limits on decision errors. *Define the decision-makers' tolerable decision error rates based on a consideration of the consequences of making an incorrect decision.*

7. Optimize the sampling design. *Evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.*

1.4.1 OVERALL POST-CLOSURE MONITORING OBJECTIVES

The Data Quality Objectives (DQOs) for the slag pit sump post-closure monitoring address all post-closure monitoring activities. The following presents a discussion on the overall post-closure monitoring objectives upon which the amended DQOs are based.

1.4.1.1 Maintaining the Integrity and Effectiveness of the Final Cover

The post-closure performance standards for maintaining the integrity and effectiveness of the final cover are set forth in 40 CFR §265.228(b)(1) and §265.310(b)(1). These state that during the post-closure care period, the owner or operator must "*Maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct effects of settling, subsidence, erosion, or other events.*" The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Collecting sufficient data and information to determine if the slag pit sump cover system is being maintained such that the cap is capable of performing as designed, i.e., limiting infiltration of precipitation and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:
    - Settlement monitoring;
    - Rodent infestation monitoring; and
    - Maintenance or repair as needed to comply with the performance standard based on the monitoring.

The DQOs associated with the maintaining the integrity and effectiveness of the final cover on the slag pit sump are presented in Table 1.1.

1.4.1.2 Maintaining and Monitoring the Leak Detection System

The Slag Pit Sump was an unlined waste management unit and there is no leak detection system; therefore, this requirement is not applicable to the Slag Pit Sump post-closure monitoring.

1.4.1.3 Maintaining and Monitoring the Groundwater Monitoring System

The post-closure performance standards for maintaining and monitoring the groundwater monitoring system are provided in 40 CFR §265.228(b)(3) and §265.310(b)(3) which state that during the post-closure care period, the owner or operator must "*Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements*." The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Ensure the groundwater monitoring system is properly maintained and monitored to collect sufficient data and information to determine if there are current releases from the slag pit sump that are impacting groundwater quality, and to take corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:
    - Inspections of the groundwater monitoring wells;
    - Sampling and analysis of upgradient and downgradient wells;
    - Performance of statistical tests on indicator constituents; and
    - Maintenance or repair as needed to comply with the performance standard based on the inspections.

The DQOs associated with maintaining and monitoring the groundwater monitoring system for the slag pit sump are presented in Table 1.2.

1.4.1.4 Prevention of Run-On and/or Run-Off Erosion or Other Damage to the Final Cover

The post-closure performance standards for prevention of final cover damage from run-on and/or run-off are provided in 40 CFR §265.228(b)(4) and §265.310(b)(4) which state that during the post-closure care period, the owner or operator must "*Prevent run-on and run-off from eroding or otherwise damaging the final cover*." The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Inspecting and maintaining the cap surface and stormwater/snowmelt diversion structures (drainage ditches) to minimize cap surface erosion or other damage, and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:
    - Inspections of the cap surface for signs of erosion, including cracking or deterioration of the asphalt cap, or ponding of stormwater/snowmelt;
    - Inspections of stormwater/snowmelt diversionary structures for accumulation of debris or sediment; and
    - Maintenance or repair as needed to comply with the performance standard based on the inspections.

The DQOs associated with prevention of run-off and/or run-off erosion or other damage to the slag pit sump cap are presented in Table 1.3.

1.4.1.5 Protection and Maintenance of Benchmarks

The post-closure performance standards for protection and maintenance of benchmarks are provided in 40 CFR §265.310(b)(5) which state that during the post-closure care period, the owner or operator must "*Protect and maintain surveyed benchmarks used in complying with §265.309.*" The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Inspecting and maintaining the benchmarks used to survey the slag pit sump location and dimensions and settlement monument movement, and taking corrective action when deficiencies are noted. This specific actions to meet these objectives consist of the following:
    - Inspections of the survey benchmark control stations "94-1" and "94-4"; and
    - Maintenance or repair as needed to comply with the performance standard based on the inspections.

The DQOs associated with protection and maintenance of benchmarks used for surveying at the slag pit sump are presented in Table 1.3.

1.4.1.6 Maintaining the Security Systems

40 CFR §265.14(a) requires the owner or operator must prevent the unknowing entry, and minimize the possibility of the unauthorized entry, of persons or livestock onto the active portion of the facility. The Slag Pit Sump is wholly enclosed within the boundaries of the FMC plant site which has a combination of fencing around the property boundary, natural barriers and controlled entry. Access to the closed unit is and will be controlled to protect the cover, benchmarks, and monitoring systems from inadvertent access of unauthorized persons. The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Inspecting and maintaining the slag pit sump warning signs and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:
    - Inspections of the slag pit sump signs.
    - Maintenance or repair as needed to comply with the performance standard based on the inspections.

1.5 DESCRIPTION OF POST-CLOSURE MONITORING ACTIVITIES

The following subsections provide a description of the post-closure monitoring activities for the Slag Pit Sump. The Slag Pit Sump and associated monitoring locations are identified in figures and in the FSPs as included in Appendix A-2 for groundwater monitoring and Appendix A-3 for Slag Pit Sump cap monitoring.

1.5.1 CAP INTEGRITY MONITORING

40 CFR §265.228(b)(1) and §265.310(b)(1) require that the integrity and effectiveness of the final cover be maintained, including making repairs to the cover as necessary to correct effects of settling, subsidence, erosion, or other events. Several post-closure monitoring activities are conducted to meet these requirements as discussed below:

Settlement Monitoring – The objective of the cap settlement monitoring is to determine if excessive settlement or movement of slag pit sump cap materials of construction is taking place. To meet the settlement monitoring objective, displacement measurements will be made (1) annually until the defined vertical and horizontal displacement limits are reached and then at least once every five years during the post-closure period; (2) if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events. The displacement limits and criteria for visible subsidence and local seismic events are specified in Section 2.2.1.1 of the *Post-Closure Plan*. No routine sampling and analysis is performed as part of this monitoring. The procedures for the settlement monitoring field activities are presented in Section 4.3.1 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of the *Post-Closure Plan*). The settlement monitoring results will be summarized in the *Slag Pit Sump Annual Post-Closure Report*. Any damage to settlement monuments requiring maintenance will be noted on the Inspection Record Form.

Rodent Infestation Monitoring – The objective of the Slag Pit Sump rodent infestation monitoring is to inspect the soil/slag slope around the perimeter of the slag pit sump cap to identify evidence of rodent burrowing. To meet the rodent infestation monitoring objective, the slopes around the Slag Pit Sump cap are visually inspected semi-annually to determine if evidence of rodent burrowing has occurred. This is a qualitative, rather than quantitative assessment and no routine sampling and analysis is performed as part of this monitoring. The procedures for the rodent monitoring field activities are presented in Section 4.3.2 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of the *Post-Closure Plan*). The rodent inspections will be reported in the *Slag Pit Sump Annual Post-Closure Report*. Any areas of the slope around the slag pit sump cap that require maintenance (i.e., repair burrowing activities) will be noted on the Inspection Record Form.

1.5.2 GROUNDWATER MONITORING

40 CFR §265.228(b)(3) and §265.310(b)(3) require that the groundwater monitoring system be maintained and monitored to comply with 40 CFR Subpart F, as applicable. The objective of the groundwater monitoring is to collect groundwater data to monitor the potential impact of the slag pit sump on the underlying, uppermost aquifer. The Slag Pit Sump and associated groundwater monitoring well network is shown in Table 2.0. To meet the groundwater monitoring objective, quarterly samples from groundwater wells associated with the slag pit sump are collected, submitted to an analytical laboratory, and analyzed for the parameters specified in Table 3.1. Field parameters for the quarterly groundwater wells are specified in Table 3.2. These parameters are based on facility operations, previous site investigations, historical RCRA groundwater assessment monitoring program results, and the requirements for groundwater monitoring specified in 40 CFR 265, Subpart F. In June 1995, the RCRA groundwater assessment monitoring program was reduced from a list of 37 inorganic parameters and four radiological parameters to 10 inorganic parameters (EPA, 1995). However, FMC is proposing to eliminate cadmium from all RCRA groundwater monitoring wells and ammonia will be sampled and analyzed every five years during the second quarter monitoring event at all RCRA groundwater monitoring wells, beginning with the second quarter 2012 [2Q12] monitoring event. Table 3.1 reflects these changes. Results from analysis of samples collected from specified downgradient monitoring wells at the slag pit sump will be compared to results from analysis of samples collected from the specified upgradient well(s) to determine if there is statistically significant evidence of a current release. The sampling and analysis procedures for the groundwater assessment monitoring field activities are presented in the *FSP for Slag Pit Sump Groundwater Monitoring* (included in Appendix A-2 of the *Post-Closure Plan*). The quarterly RCRA groundwater assessment results will be reported in the *RCRA Interim Status Annual Groundwater Assessment Report*. Also, as described in Section 2.2.3 of the *Post-Closure Plan*, the physical condition of each groundwater monitoring well (e.g., locking cover, barriers) will be inspected semiannually and deficiencies requiring maintenance will be noted on the Inspection Record Form.

1.5.3 RUN-ON AND RUN-OFF EROSION OR OTHER DAMAGE TO THE FINAL COVER MONITORING

Stormwater/snowmelt runoff has the potential for damaging the cap surface. The objective of the cap run-on and/or run-off erosion monitoring is to determine if water erosion from run-on or run-off has impaired the integrity of the slag pit sump cap. The surface and edges of the slag pit sump cap will be visually inspected semi-annually for evidence of cracking or deterioration of the asphalt cap that, in the judgment of the inspector, could reasonably be expected to diminish the asphalt layer capability to protect the integrity and functionality of the underlying low permeability geosynthetic layers of the cap system. In addition, stormwater/snowmelt diversionary/accumulation systems will be inspected to note and remove debris, sediment, or other

obstructions. To meet the stormwater/snowmelt monitoring objective, the Slag Pit Sump cap is visually inspected (1) semiannually and (2) within 48 hours of a 25-year, 24-hour storm event defined as 2.1 inches (or more) of precipitation within a 24 hour period (NOAA, 1973) as reported for the Pocatello airport weather station. This is a qualitative, rather than quantitative assessment and no routine sampling and analysis is performed as part of this monitoring. The procedures for the stormwater/snowmelt monitoring field activities are presented in Section 4.4 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of the *Post-Closure Plan*). The stormwater/snowmelt inspections will be summarized in the *Slag pit Sump Annual Post-Closure Report*. Any areas of the slag pit sump cap that require maintenance (i.e., repair erosion channels or seeding) will be noted on the Inspection Record Form.

1.5.4 Survey Benchmark Monitoring

Survey benchmarks are used to determine the exact location and dimensions of the slag pit sump and as reference points while performing the cap settlement monitoring. The objective of the survey benchmark monitoring is to ensure that the survey benchmarks used to determine the exact location and dimensions of the slag pit sump and to perform the settlement monitoring are properly protected and maintained. This is a qualitative, rather than quantitative assessment and no routine sampling and analysis is performed as part of this monitoring. The procedures for the survey benchmark inspection field activities are presented in Section 4.6 of the *FSP for Slag pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of the *Post-Closure Plan*). The survey benchmark inspections will be summarized in the *Slag Pit Sump Annual Post-Closure Report*. Any survey benchmarks that require maintenance (i.e., damaged, missing, or covered) will be noted on the Inspection Record Form.

1.5.5 Security System Monitoring

40 CFR §265.14(a) requires the owner or operator must prevent the unknowing entry, and minimize the possibility of the unauthorized entry, of persons or livestock onto the active portion of the facility. The Slag Pit Sump is wholly enclosed within the boundaries of the FMC plant site which has a combination of fencing around the property boundary, natural barriers and controlled entry. Access to the closed unit is and will be controlled to protect the cover, benchmarks, and monitoring systems from inadvertent access of unauthorized persons. The objective of the security system monitoring is to ensure that security systems are in place, functional, and maintained. The security system for the Slag pit Sump includes warning signs. This is a qualitative, rather than quantitative assessment and no routine sampling and analysis is performed as part of this monitoring. The procedures for the security inspection field activities are presented in Section 4.6 of the *FSP for Slag Pit Sump Cap Integrity Monitoring* (included in Appendix A-3 of the *Post-Closure Plan*). The security inspections will be summarized in the *Slag*

Pit Sump Annual Post-Closure Report. Any security system items that require maintenance will be noted on the Inspection Record Form.

1.6 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

All personnel directly involved in sample collection, handling, analysis, and data evaluation will be provided with a copy of this QAPP and the applicable FSPs. Personnel will be trained in the requirements specified herein, or provided ample time to read and become familiar with the requirements prior to beginning data collection activities. Any persons entering the slag pit sump area will be given training on the *RCRA Facility-Wide Contingency Plan – FMC Idaho, LLC*. Persons directly involved in sampling on the FMC Plant Site will also be required to have hazardous waste operations and emergency response training (HAZWOPER) per the requirement of 29 CFR § 1910.120.

1.7 DOCUMENTATION AND RECORDS

Records of the analyses and evaluations required by this plan will be maintained by FMC at the site throughout the post-closure care period. Laboratory documentation and records requirements are specified in the laboratory QAPP. Required field documentation is specified in the companion FSPs included in Appendix A-2 and A-3.

2.0 DATA GENERATION AND ACQUISITION

This section provides requirements for sampling program design, sample collection, handling, analysis, and data management. These requirements ensure that appropriate methods for sampling, analysis, data handling, and quality control are employed and documented.

2.1 SAMPLING PROCESS DESIGN

2.1.1 SETTLEMENT MONITORING

The elevation and coordinates of each monument will be surveyed to determine the vertical and horizontal components of the final cover monuments. Measurements are taken on the monuments annually. For accuracy, a surveying instrument will be used to take measurements with the following tolerances:

- Elevation readings: 0.01 foot
- Horizontal displacement: 0.1 foot

Elevation and displacement measurements will be plotted cumulatively versus time. The time scale will be in logarithm of time or square root of time. The settlement curve will be kept up to date with each reading. The displacement measurements (vertical and horizontal movements) will be made (1) annually; (2) if visible subsidence is noted during semiannual inspections or routine maintenance; and (3) after local seismic events. A triggering seismic event is defined as an event the (1) exceeds a magnitude 5.0 on the Richter Scale with an epicenter within a 20-mile radius as reported by USGS or (2) exceeds a magnitude 6.0 on the Richter Scale with an epicenter within a 50-mile radius as reported by USGS during the remaining post-closure period or until the total cumulative movements for the previous five years are less than the following limits:

- Vertical settlement: 0.03 foot
- Horizontal movement: 0.2 foot

Displacement measurements will be made (1) at least once every five years during the post-closure period after the above limits are reached; (2) if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events. The criteria for visible subsidence requiring settlement monitoring has been established as an area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater. A triggering seismic event is defined as an event the (1)

exceeds a magnitude 5.0 on the Richter Scale with an epicenter within a 20-mile radius as reported by USGS or (2) exceeds a magnitude 6.0 on the Richter Scale with an epicenter within a 50-mile radius as reported by USGS. Settlement monitoring will be based on control stations "94-1" and "94-4," which are local stations in FMC's survey control system. The coordinates for these stations were derived from the *U.S. Coast & Geodetic Survey (US C&GS) Control Station MCDOUGAL-2 and BM Y-96*. The vertical datum is based on the 1968 adjustment of the *National Geodetic Vertical Datum of 1929 (NGVD 29) by the US C&GS*.

2.1.2 Rodent/Insect Infestation Monitoring

The soil / slag slope around the slag pit sump cap will be visually inspected for evidence of rodent burrowing or loss of vegetation as result of rodent/insect feeding. The rodent/insect infestation monitoring is performed semi-annually by walking around the perimeter of the cap. The monitoring is a visual observation of evidence of rodent burrowing. This is a qualitative, rather than quantitative assessment.

2.1.3 Groundwater Monitoring

The groundwater monitoring system wells sampling frequency and parameters of concern have developed over the history of the monitoring program and are documented in *RCRA Interim Status Groundwater Monitoring Assessment Reports*. The Slag Pit Sump monitoring wells, as identified in Table 2.0 are sampled on a quarterly basis and analyzed for the parameters of concern as detailed on Tables 3.1 and 3.2. The indicator constituent (As, K, Se) concentrations for each monitoring (calendar) year will be evaluated using a three step statistical test as follows:

As recommended by the EPA (James Brown, Office of Solid Waste, May 5, 1993), and consistent with the EPA's guidance documents for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (EPA, 1989, 1992, 2009), the 2009 indicator constituent concentrations were analyzed as they were in previous years using a defined set of statistical procedures: the non-parametric Mann-Whitney U-test (rank-sum test) to compare the central tendency (median) of two data sets, and a comparison of mean concentrations. Details of the Mann-Whitney method are provided in the "RCRA Interim Status Groundwater Monitoring Assessment Report" (FMC, August 1993). Statistical testing procedures are as follows:

Test 1) For each WMU, the arsenic, potassium, and selenium concentrations in upgradient wells will be compared to those in the downgradient wells using the Mann-Whitney U-test. The test will be performed using a significance level $\alpha = 0.05$ (i.e., if the test yields a p-value less than 0.05, the null hypothesis will be rejected and the median concentrations of upgradient and downgradient wells will be considered to be significantly different). The α-value of 0.05 sets the Type I error rate at 5%; that is, the

risk that the medians will be considered significantly different through statistical testing, even though they are not is 5%. This is typically an acceptable rate as described in guidance and other sources (Gilbert, 1987 and EPA, 1989 and 2009). In many cases, constituent concentrations are expected to be higher in the downgradient wells because of the presence of former unlined ponds underlying or adjacent to certain WMUs. As discussed in FMC's RCRA annual assessment reports (FMC, August 1993; February 1994 through February 2010) and the Groundwater Current Conditions Report for the FMC Plant Operable Unit (FMC, June 2009), results showing statistically higher downgradient concentrations using this analysis do not necessarily indicate current impacts from the WMUs, and in certain cases may instead be attributable to prior practices at the former ponds. Consequently, an additional test (Test 2) is also conducted for downgradient wells for each WMU.

Test 2) For each downgradient well, the current monitoring year mean concentrations of arsenic, potassium, and selenium will be compared to prior year mean concentrations. If the current monitoring year mean concentrations are less than or equal to prior years mean concentrations, the concentrations of the measured constituent are not increasing at that well,and therefore result in a conclusion that no leakage of contaminants from the WMU is occurring. If the results of Test 1 indicated that concentrations in downgradient wells are significantly higher than those of upgradient wells, and the results of Test 2 are inconclusive or indicated that the current monitoring year mean is higher than the prior years mean for any individual downgradient well, then Test 3 will be conducted.

Test 3) The Mann-Whitney U-test will be performed for downgradient wells at each WMU to compare concentrations observed in the current monitoring year with concentrations observed in prior years. This test is intended to determine if data for a constituent shows a statistically significant increase through time by comparing the median concentrations of the current year and prior years data sets. As with Test 1, Test 3 will be performed using a significance level $\alpha = 0.05$.

It should be noted that, for purposes of the three statistical tests described above, data reported as less than the analytical detection limit will be removed from the database prior to performing statistical testing on the data set.

The pH meter, water level meter, and water temperature measurements are ± 0.2 pH units, ± 0.01 ft, and ± 0.15 ° C respectively of actual value. The specific conductance measurements will be within 0.5% or 1 µmhos/cm and turbidity measurements will be within + 2% of actual value.

2.1.4 Run-On and Run-Off Erosion Monitoring

The cap stormwater/snowmelt monitoring is performed (1) semiannually and (2) within 48 hours of a 25-year, 24-hour storm event defined as 2.1 inches (or more) of precipitation within a 24

hour period (NOAA, 1973) as reported for the Pocatello airport weather station to determine if cap surface erosion or ponding has occurred by walking around the perimeter of the slag pit sump, and then walking a traverses over the cap surface. This monitoring is a visual identification of areas where erosion, including cracking or deterioration of the asphalt cap, and/or ponding of water on the cap surface is present. Diversionary / drainage structures are also inspected for accumulation of debris or sediment. This is a qualitative, rather than quantitative assessment.

2.1.5 SURVEY BENCHMARK MONITORING

The survey benchmark monitoring is performed annually by visually inspecting all survey benchmark control stations used to determine the exact location and dimensions of the slag pit sump and as reference points while performing the slag pit sump cap settlement monitoring. This is a qualitative, rather than quantitative assessment.

2.1.6 SECURITY MONITORING

The Slag Pit Sump security monitoring is performed semiannually by visually inspecting the warning signs associated with the slag pit sump security system. This is a qualitative, rather than quantitative assessment.

2.2 SAMPLING METHODS

The groundwater monitoring wells associated with the slag pit sump will be sampled in accordance with the detailed procedures presented in the *FSP for Slag Pit Sump Groundwater Monitoring* as included in Appendix A-2 of the *Post-Closure Plan*. All other sampling/measurements associated with cap monitoring will be performed in accordance with the detailed procedures in the *FSP for Slag Pit Sump Cap Monitoring* as included in Appendix A-3 of the *Post-Closure Plan*.

2.3 SAMPLE HANDLING AND CUSTODY

Sample handling and custody only applies to samples being submitted to an off-site analytical laboratory, e.g., the groundwater monitoring samples and waste determination samples. All other sampling and data collection covered by the QAPP is performed using field instrumentation or direct observation. The groundwater samples will be handled and custody will be maintained in accordance with the detailed procedures presented in Section 6 of the FSP *for Slag Pit Sump Groundwater Monitoring*. Waste determination samples will be handled and custody will be maintained in accordance with standard practices necessary to comply with 40 CFR § 262.11.

2.4 ANALYTICAL METHODS

Sample analytical methods only apply to samples being submitted to an off-site analytical laboratory, e.g., the groundwater monitoring samples and waste determination samples. All other sampling and data collection covered by the QAPP is performed using field instrumentation or direct observation. Waste determination samples will be analyzed in accordance with established analytical methods necessary to comply with 40 CFR § 262.11.

2.4.1 ANALYSIS OF GROUNDWATER SAMPLES

The analytical methods that will be used on groundwater monitoring samples are summarized in Table 3.1. The table specifies method number, method type, and method detection limit ranges. Method detection limits presented on this table for each analysis represent the best reporting limits that can be attained by the specified methodology. Data from multiple dilutions will be used, as necessary, to quantify target components within the calibrated range. Actual detection limits obtained during analysis will be reported by the laboratory for each parameter in each sample.

The laboratory performing the analyses will have an established quality assurance/quality control (QA/QC) plan and all analyses will be performed in accordance standard operating procedures consistent with the QA/QC plan. Where analytical or QA/QC procedures presented in the QAPP are different from those presented in the laboratory QA/QC plan, procedures presented in this QAPP will govern.

2.5 QUALITY CONTROL

For groundwater samples, both field and laboratory QC checks will be employed to evaluate field contamination, the variability of field techniques and the performance of laboratory analytical procedures. QC checks will take the form of samples introduced into the analytical stream to enable evaluation of sampling and analytical accuracy and precision.

Such QC samples will be regularly prepared in the field and laboratory so that all phases of the sampling process are monitored. The following subsections describe the QC samples that will be collected.

Sections 2.6 and 2.7 describe the instrument/equipment testing, inspection, calibration and maintenance requirements.

2.5.1 FIELD QUALITY CONTROL SAMPLES

Field Duplicates - Field duplicate samples will be collected for use as a measure of the precision of the sample collection and analysis process. The duplicate will be submitted with minimal

indication of the site it was taken from. Duplicates will be prepared following standard sampling and preparation techniques as described in the FSP and submitted to the laboratory at a minimum frequency of one per sample delivery group or every 20 samples.

Rinsate Blanks - Rinsate blanks are collected by pouring reagent grade purified water over or through submersible pump setups to evaluate the effectiveness of field decontamination of sampling equipment. The blank is analyzed for the same analytical parameters as the groundwater samples. Rinsate blanks will be collected after decontamination and at a minimum frequency of one per sample delivery group or every 20 samples.

Distilled or De-ionized Water Blank – Distilled or de-ionized water blanks are aliquots of water collected directly from the field supply container and analyzed to determine distilled / de-ionized water quality. The blanks are collected at a frequency of one per semi-annual sampling event and are analyzed for the same parameters as the groundwater samples. The distilled or de-ionized blanks are collected in conjunction with the CERCLA and Calciner Pond Remedial Action groundwater monitoring programs (i.e., one distilled or de-ionized water blank per sampling event concurrently satisfies requirement for all three monitoring programs).

2.5.2 Matrix Spike / Matrix Spike Duplicate Quality Control Samples

Matrix spike / matrix spike duplicate (MS/MSD) quality control samples will also be collected at a frequency of one per sample delivery group or one per twenty samples collected. The well(s) designated for a MS/MSD quality control sample will be randomly selected during each monitoring event from the RCRA program monitoring wells.

2.5.3 Laboratory QA/QC Samples

Laboratory QC samples consist of laboratory method blanks, laboratory control samples, matrix spike, and laboratory duplicates or matrix spike duplicates. Requirements for laboratory QC samples are specified in the Laboratory's Quality Assurance Project Plan.

For method-specific QC criteria and samples (e.g. calibration blanks or initial calibrations), the criteria specified in the methods will be used. The methods will be performed as written. Any deviations, if allowed, must be approved by the FMC Environmental Manager in writing prior to implementation by the laboratory. Procedures will be in place for demonstrating that the laboratory is in control during each analytical measurement.

Laboratory Control Samples - The laboratory will be considered in control when data generated by analysis of control samples fall within laboratory prescribed limits. Data generated by analysis of control samples that falls outside the established control limits are judged to be generated during an "out-of-control" situation. These data are considered suspect and will be

repeated or reported with qualifiers. Laboratory control samples will be analyzed for each analytical method when appropriate for the method. A laboratory control sample consists of either a control matrix spiked with the analytes of interest for this program or a certified reference material that contains the analytes of interest. Laboratory control sample(s) will be analyzed with each batch of samples processed to verify that the precision and bias of the analytical process are within control limits. The results of the laboratory control sample(s) will be compared to control limits established by the laboratory for both precision and bias to determine usability of the data.

Method Blank - A method blank will be analyzed with each batch of samples processed to assess contamination levels in the laboratory. The laboratory will have guidelines in place for accepting or rejecting data based on the level of contamination in the blank. For a method blank to be acceptable for use with the accompanying samples, the concentration in the blank of any analyte of concern will not be higher than the highest of either:

- The MDL, or
- Five percent of the regulatory limit for that analyte, or
- Five percent of the measured concentration in the sample.

Matrix Spike/Matrix Spike Duplicates for Matrix Duplicate Samples - Procedures will be in place for documenting the effect of the matrix on method performance. When appropriate for the method, there will be at least one matrix spike (MS) and either one matrix duplicate (MD) or one matrix spike duplicate (MSD) per analytical batch. These procedures will include preparation and analysis of matrix spikes and the method of standard additions for metal and inorganic methods. When the concentration of the analyte in the sample is greater than 0.1% (1,000 ppm), no spike is necessary. Procedures will be in place for determining the precision of the method for a specific matrix. These procedures will include analysis of matrix duplicates and/or matrix spike duplicates.

If the concentration of a specific analyte in the sample is being checked against a regulatory concentration limit or action level, the spike will be at or below the limit, or 10 times the background concentration (if historical data are available), whichever concentration is higher.

If the concentration of a specific analyte in a sample is not being checked against a limit specific for that analyte, then the analyst may spike the sample at the same concentration as the reference sample, at 20 times the estimated quantitation limit (EQL) in the matrix of interest, or at a concentration near the middle of the calibration range.

2.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

All equipment used in the conduct of this work will receive routine maintenance checks in order to minimize equipment breakdowns. Laboratory equipment is tested, inspected, and maintained in accordance with an established QA/QC plan.

All equipment used in the conduct of the groundwater monitoring will receive routine maintenance checks in order to minimize equipment breakdowns. Maintenance checks will generally coincide with calibration checks. Any equipment found to be operating improperly will be taken out of use, and a notation stating the time and date of this action will be made in a groundwater monitoring log book. The equipment will be repaired, replaced or recalibrated, as necessary, and the time and date of its return to service will also be recorded. Groundwater monitoring equipment will be inspected and maintained as shown on Table 4.0.

Table 4.0

GROUNDWATER MONITORING EQUIPMENT INSPECTION AND MAINTENANCE ACTIVITIES

Inspection Item	Inspection Frequency	Maintenance Action
Field equipment	Quarterly	Repair or replace defective/damaged equipment
Laboratory equipment	Quarterly	Recalibrate; repair or replace defective equipment in accordance with Laboratory QA/QC Plan

2.7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

The requirements in this section pertain to the calibration of field equipment. Laboratory equipment will be calibrated in accordance with an established QA/QC plan and all calibrations will be performed in accordance standard operating procedures consistent with the QA/QC plan. Additional requirements related to laboratory instrument calibrations and frequency requirements are specified in the laboratory QA/QC plan. All calibrations of field equipment will be recorded in the groundwater monitoring log book. Table 5.0 provides a summary of groundwater monitoring field equipment calibration requirements.

2.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

Groundwater sample containers will be new or pre-cleaned and supplied by the laboratory performing sample analysis. All other supplies will be decontaminated prior to use in accordance with the equipment decontamination procedure presented in the applicable FSP. No consumable supplies are required to execute the temperature and pressure monitoring program.

2.9 DATA ACQUISITION REQUIREMENTS (NON-DIRECT MEASUREMENTS)

To meet groundwater and cap monitoring objectives at the FMC Facility, no data from non-direct measurements are required.

2.10 DATA MANAGEMENT

Data from both the field and the laboratory will be managed during this project. Field data will consist of field notebooks and chain of custody forms. Notebooks and chain of custody forms will be retained by the groundwater sampling contractor until the end of each quarterly sampling event, then forwarded to the FMC Environmental Manager for retention.

The laboratory documentation required for each sample delivery group depends on the anticipated level of review. Section 2.10.1 presents the documentation requirements of data validation and Section 2.10.2 presents the documentation requirements for data review. The Groundwater Sampling Contractor will maintain the analytical database.

Field documentation is presented in Section 2.10.3.

2.10.1 LABORATORY DOCUMENTATION FOR DATA VALIDATION

The following documentation will be provided by the laboratory for each sample delivery group scheduled for validation:

1. Case Narrative
2. Chain of Custody Documentation
3. Summary of Results
4. QA/QC Result Summaries
5. Raw Data

The format and detailed content of the laboratory documents will support validation of the data in accordance with EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 1994). An electronic data deliverable will be provided by the laboratory in a file format specified by FMC that is compatible with dBase III software. The deliverable will contain the fields specified in Table 6.0. Data packages for full validation will be forwarded by the laboratory to the data validation contractor. At the same time, a copy of items 1 through 4 will be forwarded to the FMC Environmental Manager for retention.

2.10.2 LABORATORY DOCUMENTATION FOR DATA REVIEW

Each sample delivery group of laboratory data not planned for validation will include items 1 through 4 described above in the same level of detail as required if the data were to be validated.

Item 5, Raw Data, is not required. An electronic data deliverable will be provided by the laboratory in a file format specified by FMC. The deliverable will contain the fields specified in Table 6.0. Items 1 though 4 will be forwarded to the FMC Environmental Manager for retention.

2.10.3 Field Measurement Documentation

All information pertinent to the field activities will be entered directly onto the field inspection form(s). Information entered onto the field inspection form will include:

- Date, sampling event start time, weather conditions, personnel on site, and instrument calibration information.
- Descriptions of all field activities and procedures including any deviations from the FSP's.

In addition to written records, photographs also may be taken as necessary to supplement written descriptions of field activities entered on the field inspection form(s). Photographs will be included in project reports, where appropriate, and will be stored with the permanent project files.

3.0 ASSESSMENT/OVERSIGHT

Periodic surveillance of monitoring activities will be conducted. The surveillance will be conducted by the FMC Site Project Manager or his/her designee. The field surveillance will focus on adherence to standard procedures and will include field observation of sampling procedures and selected documentation. Laboratory audits will be conducted in accordance with the laboratory quality assurance plan. Field surveillance reports and laboratory audit reports will be forwarded to the FMC Remediation Director. Audit findings which require corrective action and follow-up will be documented and tracked and will have resolution verified by the FMC Site Project Manager.

3.1 ASSESSMENTS AND RESPONSE ACTIONS

If it appears that field or laboratory data are in error, the error(s) or potential error(s) will be documented and appropriate corrective action(s) will be taken. Corrective actions may include one or more of the following:

- Measurements may be repeated to check the error
- Calibrations may be checked and/or repeated
- Instrument/equipment may be replaced or repaired
- New samples may be collected, and/or samples may be reanalyzed.

All field and laboratory personnel will be responsible for identification of problems and implementation of corrective actions. During field and laboratory activities, problem descriptions and corrective actions taken will be thoroughly detailed and entered onto field inspection forms or laboratory notebooks.

If the FMC Site Project Manager, Analytical Laboratory Contractor QA officer, or other project personnel become aware of any problems in sample collection or analysis that cannot be corrected in the field or laboratory, they will initiate formal corrective action. . The FMC Site Project Manager will also be notified of problems identified and corrective actions taken during field activities. Appropriate corrective actions will be determined on a case-by-case basis.

3.2 REPORTS TO MANAGEMENT

The surveillance and audit findings will be included in the corresponding groundwater quarterly groundwater monitoring results and data validation reports. Each report, as appropriate, will include a section which provides an overall assessment of the performance of the field and laboratory programs based on the audits.

4.0 DATA VALIDATION AND USABILITY

The following subsection presents requirements for activities that occur after the data collection phase of the project is complete.

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

For laboratory generated analytical data, ten percent of the analytical results or one sample delivery group, whichever is greater, will be validated. The other ninety percent will receive a QC and Blank Check to ensure the sampling and analytical program are operating within control limits. The QC and Blank Check will include examination of field duplicate sample results and laboratory QA/QC sample results. All electronic copy entries will be verified against hard-copy results reported by the laboratory and field sampling personnel, unless the electronic copy is produced using the same laboratory information management system.

The FMC Site Project Manager or designee will assess the usability of the data generated pursuant to the Slag Pit Sump Post-Closure Plan as follows:

- Review the validated laboratory analytical data and quantitative field data (e.g., depth to water and field parameter measurements during groundwater monitoring) in terms of the DQOs as described in Tables 1.1 and 1.2 and consistency with prior results and any trends.
- Review the non-quantitative field data qualitatively in terms of the DQOs as described in Tables 1.1, 1.2, and 1.3.

4.2 VALIDATION AND VERIFICATION METHODS

The required data review may be conducted informally during report preparation; it should include a comparison of the current and previous quarter results. The QC and Blank Check will be conducted by compiling the results of field duplicate samples and laboratory QA/QC samples and assessing whether the sampling and analytical processes are operating within control limits. Generally, these processes are considered within control limits if the relative percent difference between field duplicate pairs is less than 30 percent and if the laboratory QA/QC sample results meet the criteria specified in the applicable method. Data validation will be conducted in accordance with the EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA, 1994), Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final (EPA, July 2002), and Guidance on Environmental Data Verification and Data Validation (EPA, November 2002).

4.3 RECONCILIATION WITH USER REQUIREMENTS

To meet the project objectives specified in Section 1.3.2, the data analyses specified in DQO Step 5 of this QAPP will be performed. If sufficient data of known quality have been generated to complete these analyses, then the project objectives have been met. If insufficient data of known quality have been generated (i.e., significant rejected results) to complete these analyses, then the project objectives have not been met and corrective action will be required to complete the analyses. Appropriate corrective actions will be determined on a case-by-case basis but may include re-measurement or re-sampling / laboratory analysis.

5.0 REFERENCES

Astaris, 2001. "Slag Pit Wastewater Collection Sump Closure Plan," Astaris Idaho, LLC, Pocatello, Idaho, Revised September 2001.

Bechtel Environmental Inc. (BEI), 1996a. "RCRA Interim Status Groundwater Monitoring Plan," Revised June 1996.

BEI 1996b. "Remedial Investigation Report for the Eastern Michaud Flats Site," performed for FMC Corporation and J. R. Simplot Company by Bechtel Environmental, Inc., August 23, 1996.

EPA, 1983. "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-020, revision March 1983.

EPA, 1994. "EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", February 1994.

EPA, 1995. "Proposed RCRA Ground-Water Monitoring Reductions for the FMC Pocatello Facility, EPA ID# IDD 07092 9518", June 1995.

EPA, 1997. "Test Methods for Evaluating Solid Waste," EPA SW-846, 3rd edition, May 1997.

EPA, 2000. "Guidance for the Data Quality Process, EPA QA/G-4, EPA/600/R-96/055, August 2000.

EPA, 2001. "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, EPA/240/B-01/003, March 2001.

EPA, 2001. "Requirements for Quality Assurance Project Plans for Environmental Data Operations," EPA QA/R-5, March 2001.

EPA, July 2002. "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final", EPA 540-R-01-008, July 2002.

EPA, November 2002. "Guidance on Environmental Data Verification and Data Validation" EPA QA/G-8, November 2002.

EPA, January 2004. "Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation," OSWER Directive No. 9355.4-28, January 2004.

EPA, March 2009. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance" EPA 530-R-09-007, Office of Resource Conservation and Recovery, Program Implementation and Information Division, March 2009.

FMC Corporation (FMC), August 1993, RCRA Interim Status Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 1994, RCRA Interim Status 1993 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 1995, RCRA Interim Status 1994 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 1996, RCRA Interim Status 1995 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 1997, RCRA Interim Status 1996 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 1998, RCRA Interim Status 1997 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 1999, RCRA Interim Status 1998 Groundwater Monitoring Assessment.

FMC, 1999. "RCRA Interim Status Groundwater Monitoring Plan" for FMC Corporation, Bechtel Environmental, Inc., August 1999.

FMC Corporation (FMC), February 2000, RCRA Interim Status 1999 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 2001, RCRA Interim Status 2000 Groundwater Monitoring Assessment.

FMC Corporation (FMC), February 2002, RCRA Interim Status 2001 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2003, RCRA Interim Status 2002 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2004, RCRA Interim Status 2003 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2005, RCRA Interim Status 2004 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2006, RCRA Interim Status 2005 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2007, RCRA Interim Status 2006 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2008, RCRA Interim Status 2007 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2009, RCRA Interim Status 2008 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), June 2009, Groundwater Current Conditions Report for the FMC Plant Operable Unit, June 2009 Final.

FMC Idaho, LLC (FMC), February 2010, RCRA Interim Status 2009 Groundwater Monitoring Assessment.

FMC Idaho, LLC (FMC), February 2011, RCRA Interim Status 2010 Groundwater Monitoring Assessment.

Table 1.1
SLAG PIT SUMP POST CLOSURE PLAN DATA QUALITY OBJECTIVES (DQOs)
Cap Integrity Monitoring

DQO Step	Settlement Monitoring	Rodent Monitoring
State the Problem		
Problem Statement	In order to monitor cap settlement and movement, settlement monuments will be monitored and maintained.	In order to maintain cap performance, impacts of rodents will be monitored on the soil / slag slopes around the outside edge of the cap surface, i.e., burrowing.
Relevant Deadlines	Displacement measurements will be made (1) annually until the defined vertical and horizontal displacement limits are reached and then at least once every five years during the post-closure period; (2) if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events, as specified in the Post-Closure Plan.	The soil / slag slopes around the outside edge of the cap surface will be monitored for evidence of rodent activity (including dirt mounds, etc.) semi-annually, ground surface conditions permitting.
Identify the Decision		
Principal Study Question	Is settlement/movement of the cap surface is less than or equal to the expected design settlement rates?	Is rodent activity is controlled such that the cap integrity/performance is not jeopardized.
Alternative Actions	Evaluation of settlement/movement on the slag pit sump cap surface will be used to demonstrate that the capping materials are settling at or near expected design rates.	Monitoring of the soil / slag slopes around the outside edge of the cap surface for evidence of excessive rodent activity will be used to identify and correct excessive rodent activity.
Identify the Decision Inputs		
Physical Inputs	Vertical and horizontal displacement measurement at each settlement monument.	Visual check for any signs of excessive rodent activity.
Chemical Inputs	None.	None.
Action Levels	If the total cumulative movement on the slag pit sump cap is less than the following limits for five consecutive years, then settlement monitoring frequency will be reduced to once every 5 years for the duration of the post-closure monitoring period: - Vertical = 0.03 ft - Horizontal = 0.2 ft	Any unusual or excessive burrowing or soil mounding.
Define the Study Boundaries		
Temporal Boundary	Settlement monitoring on the cap surface will be conducted annually.	The soil / slag slopes around the outside edge of the cap surface will be monitored for evidence of rodent activity semi-annually, ground surface conditions permitting, throughout the post-closure period.
Horizontal Boundary	The geographical boundaries of the cap surface.	The geographical boundaries of the soil / slag slopes around the outside edge of the cap surface.
Vertical Boundary	The cap surface.	The soil / slag slopes around the outside edge of the cap surface.
Develop the Decision Rule		
Parameter of Interest	Vertical and horizontal displacement at the settlement monuments.	Not applicable.
Decision Rule	Decision Rule a: If the total cumulative movement on the slag pit sump cap is less than the action levels for five consecutive years, then settlement monitoring frequency will be reduced to once every 5 years for the duration of the post-closure monitoring period. Proceed to Decision Rule b. Decision Rule b: If the settlement monument is damaged, buried, or inaccessible, take corrective maintenance action as soon as practicable.	Decision Rule: If there is any evidence of excessive or unusual rodent activity that could negatively impact cap function, take corrective action as soon as practicable.
Specify Tolerance Limits on Decision Errors		
Tolerance Limits	Elevation readings = ±0.01 foot Horizontal displacement = ±0.1 foot	Not applicable.
Optimize the Design for Obtaining Data		
Sample Design	The data collection design is described in the Field Sampling Plan for Cap Monitoring in Appendix A-3 of the *Slag Pit Sump Post-Closure Plan.*	The data collection design is described in the Field Sampling Plan for Cap Monitoring in Appendix A-3 of the *Slag Pit Sump Post-Closure Plan.*

Table 1.2
SLAG PIT SUMP POST CLOSURE PLAN DATA QUALITY OBJECTIVES (DQOs)
Groundwater Monitoring

DQO Step	Groundwater Monitoring
State the Problem	
Problem Statement	An objective process is needed to evaluate groundwater flow patterns and potential changes and/or trends in groundwater constituents in order to evaluate whether the slag pit sump is impacting groundwater quality.
Relevant Deadlines	Groundwater will be monitored (depth to groundwater and sampled and analyzed quarterly) as specified in the Field Sampling Plan.
Identify the Decision	
Principal Study Question	Determine whether the concentration or value of selected parameters in the groundwater monitoring data from the slag pit sump wells indicate a current release of a waste constituent into the groundwater requiring further evaluation and potential notification to EPA Region 10 or continue quarterly sampling as planned for the slag pit sump.
Alternative Actions	Evaluation of groundwater monitoring data will be used to demonstrate there is no current release of waste constituents from the slag pit sump into groundwater.
Identify the Decision Inputs	
Physical Inputs	Groundwater elevation data and analytical results from groundwater samples collected from the wells specified in Table 2.0.
Chemical Inputs	The informational inputs required to address the Decision Statements are reported in Tables 4.0 and 5.0. They include: Constituents/Parameters of Concern (COCs), Analytical Methods, Detection Limits, and Data Quality Indicators.
Action Levels	The action levels for the indicator parameters are dependent comparison of upgradient and downgradient concentrations and results of the test for trend evaluations.
Define the Study Boundaries	
Temporal Boundary	RCRA regulations require groundwater monitoring to be performed on a quarterly basis. The quarterly sample events are reported in an annual groundwater assessment report. The groundwater monitoring program will continue throughout the post-closure period.
Horizontal Boundary	The geographical boundaries of the slag pit sump and the locations of the upgradient and downgradient monitoring wells.
Vertical Boundary	The upper groundwater zone (uppermost aquifer).
Develop the Decision Rule	
Parameter of Interest	Groundwater elevations and constituent concentration in groundwater.
Decision Rule	Decision Rule a: If the concentration of a groundwater indicator parameter indicates a statistically significant increase from the previous years' monitoring data for the slag pit sump, then further evaluation is necessary to determine if a current release is occurring. Proceed to Decision Rule b.
	Decision Rule b: The concentration of arsenic (As), potassium (K), or selenium (Se) as indicator constituents will be evaluated to determine if a current release is occurring from the slag pit sump using the following statistical tests:
	Test 1: Concentrations of indicator constituents (As, K and Se) in the downgradient wells are statistically higher than the corresponding concentrations in the upgradient wells as computed using the Mann-Whitney U-test, and
	Test 2: Mean concentration of the indicator constituents (As, K and Se) for the current year is higher than the previous years' corresponding mean concentrations or is inconclusive as computed using software integrated into Microsoft Excel, and
	Test 3: Concentrations of indicator constituents (As, K and Se) in all the downgradient wells are statistically increasing with time as computed using the Mann-Whitney U-test; then, evaluation of a current release from the slag pit sump will be considered and the EPA will be notified, otherwise continue quarterly groundwater monitoring as planned for the slag pit sump.
Specify Tolerance Limits on Decision Errors	
Tolerance Limits	Laboratory analytical methods and results will be within the accuracy specified for each parameter method as specified in the QAPP. The pH meter, water level meter, and water temperature measurements are ± 0.2 pH units, ± 0.01 ft, and ± 0.15 ° C respectively of actual value. The specific conductance measurements shall be within 0.5% or 1 umhos/cm and turbidity measurements will be within + 2% of actual value. In the statistical analyses the Mann-Whitney U-test is used at the level of significance of α=0.05 or 95% confidence (i.e., if the test yielded a ρ-value of less than 0.05, the null hypothesis is rejected and the two medians are considered statistically different).
Optimize the Design for Obtaining Data	
Sample Design	The data collection design is described in the Groundwater Field Sampling Plan in Appendix A-2 of the *Slag Pit Sump Post-Closure Plan.*

Table 1.3
SLAG PIT SUMP POST CLOSURE PLAN DATA QUALITY OBJECTIVES (DQOs)
Erosion Monitoring, Benchmark Monitoring and Security Monitoring

DQO Step	Run-On and Run-Off Erosion Monitoring	Survey Benchmarks Monitoring	Security System Monitoring
State the Problem			
Problem Statement	In order to maintain cap performance, impacts of stormwater/snowmelt including the condition of the asphalt layer will be monitored on the cap surface. Stormwater collection and/or diversion systems will be inspected and maintained.	In order to maintain survey benchmarks used to determine the exact location and dimensions of the slag pit sump and to perform the settlement monitoring, survey benchmarks will be monitored and maintained.	In order to maintain the effectiveness of the slag pit sump security system, security system monitoring will be performed.
Relevant Deadlines	Cap surface and all stormwater/snowmelt control diversions will be monitored for erosion, sediment/debris accumulation, and/or water accumulation semiannually and within 48 hours after a triggering precipitation event, as defined in the *Slag Pit Sump Post-Closure Plan*.	Survey benchmarks will be inspected annually.	Slag pit sump security system will be inspected semiannually.
Identify the Decision			
Principal Study Question	Is stormwater/snowmelt runoff being properly managed and diverted in a way that minimizes erosion, deterioration of the asphalt layer and/or water accumulation on the cap surface?	Are the survey benchmarks in place, accessible, and in useable condition?	Are all security signs in good condition, in place and legible, and is there any sign of unauthorized entry or tampering with security system?
Alternative Actions	Evaluation of stormwater/runoff from the cap surface will be used to demonstrate there has been no erosion or deterioration of the asphalt layer of the cap surface that would threaten cap integrity.	Inspection of survey benchmarks will be used to determine if maintenance action is required.	Inspection of security system will be used to determine if maintenance action is required and if security system appears to be adequate.
Identify the Decision Inputs			
Physical Inputs	Visual check for any signs of erosion, asphalt cracking or deterioration, water accumulation, or sediment/debris accumulation.	Visual check to ensure benchmarks are in place, accessible and undamaged.	Visual check to ensure security signs in good condition, in place and legible, and is there are no signs of unauthorized entry or tampering with security system.
Chemical Inputs	None	None	None
Action Levels	Any observed erosion, asphalt cracking or deterioration, water accumulation, or sediment/debris accumulation.	Any observed damage of the survey benchmarks.	Any observed damage of the signs.
Define the Study Boundaries			
Temporal Boundary	Cap surface and all stormwater/snowmelt control diversions will be monitored semiannually and within 48 hours after a triggering precipitation event, as defined in the *Slag Pit Sump Post-Closure Plan*.	Survey benchmarks will be inspected annually, in conjunction with the settlement monitoring.	Security system will be inspected semiannually.
Horizontal Boundary	The geographical boundaries of the cap surface and all auxiliary stormwater diversion/accumulation areas.	At the location of each survey benchmark.	At the location of slag pit sump security signs.
Vertical Boundary	The cap surface and all auxiliary stormwater diversion/accumulation areas.	At the location of each survey benchmark.	At the location of slag pit sump security signs.
Develop the Decision Rule			
Parameter of Interest	Not applicable.	Not applicable.	Not applicable.
Decision Rule	Decision Rule: If there is any evidence of erosion**,** asphalt cracking or deterioration, or water accumulation on the cap surface; and/or if any stormwater/snowmelt diversion or accumulation structures are damaged or contain accumulations of debris/sediment, take corrective action as soon as practicable.	Decision Rule: If there is any evidence of survey benchmark damage, tampering, or burial, take corrective action to repair/replace benchmark as soon as practicable.	Decision Rule: If there is any evidence of sign damage, tampering or unauthorized access, take corrective action to repair/replace/improve as soon as practicable.
Specify Tolerance Limits on Decision Errors			
Tolerance Limits	Not applicable.	Not applicable.	Not applicable.
Optimize the Design for Obtaining Data			
Sample Design	The data collection design is described in the Cap Monitoring Field Sampling Plan in Appendix A-3 of the *Slag Pit Sump Post-Closure Plan.*	The data collection design is described in the Cap Monitoring Field Sampling Plan in Appendix A-3 of the *Slag Pit Sump Post-Closure Plan.*	The data collection design is described in the Cap Monitoring Field Sampling Plan in Appendix A-3 of the *Slag Pit Sump Post-Closure Plan.*

TABLE 2.0
SLAG PIT SUMP GROUNDWATER MONITORING NETWORK[1]

		RCRA POND MONITORING WELL NETWORK	
WMU NAME	**WMU NO.**	**UPGRADIENT**	**DOWNGRADIENT**
Slag Pit Sump	5	121	108, 122, 123

[1]This table presents the current Slag Pit Sump groundwater monitoring network as of October 2012.

TABLE 3.1
SUMMARY OF REQUIRED LABORATORY ANALYSES FOR SLAG PIT SUMP GROUNDWATER MONITORING

Parameter	Method Number	Method Type	Reporting Limit (mg/l)	Accuracy*	Precision**
Potassium	6010B (a)	Inductively Coupled Plasma Atomic Emission Spectrometry (ICP)	2.5	75% - 125%	± 30%
Chloride	300.0 (b) or 325.3 (c)	Ion Chromatography or Titrimetric	1	75% - 125%	± 30%
Fluoride	300.0 (b) or 340.2 (c)	Ion Chromatography or Potentiometric, Ion Selective Electrode	0.1	75% - 125%	± 30%
Arsenic	6010B (a)	ICP	0.002 (As), 0.0005 (Se)	75% - 125%	± 30%
Selenium	6010B (a)	ICP	0.002 (As), 0.0005 (Se)	75% - 125%	± 30%
Nitrate	300.0 (b) or 353.2 (d)	Ion Chromatography or Colorimetric	0.1	75% - 125%	± 35%
Total Phosphorus	6010B (a), 365.1 (b), 365.4 (c), or 4500-P (d)	ICP, or Colorimetric (ascorbic acid)	0.02	75% - 125%	± 30%
Sulfate	300.0 (b) or 375.4 (d)	Ion Chromatography or Turbidimetric	1	75% - 125%	± 30%
Elemental Phosphorus (e)	7580 (b)	Gas Chromatography	0.00005	70% - 130%	± 35%
Total Ammonia (f) (NH_3 + NH_4 as N)	350.1 (b) or 350.3 (c)	Colorimetric or Potentiometric, Ion Selective Electrode	0.2	75% - 125%	± 30%

(a) Analysis may also be performed using method 6020, both 6010 and 6020 from Test Methods for Evaluating Solid Waste, EPA SW–846, Third Edition, Update IIIB or as updated.

(b) Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600/R-93/100) or as updated.

(c) Methods for Chemical Analysis of Water and Wastes, EPA600/4–79–020, Revision, March 1983 or as updated.

(d) Standard Methods for the Examination of Water and Wastewater, 20th Ed. American Public Health Association, American Water Works Association, Water Environment Federation, Approved by Standard Methods Committee, 1997 or as updated.

(e) Elemental phosphorus is analyzed semiannually.

(f) The Slag Pit Sump wells will be sampled and analyzed for ammonia every five years during the second quarter monitoring event, beginning with the second quarter 2012 [2Q12] monitoring event.

* percent recovery

** relative percent difference

TABLE 3.2
SUMMARY OF REQUIRED FIELD ANALYSES FOR SLAG PIT SUMP GROUNDWATER MONITORING

Field Parameter	Instrument / Method	Calibration	Estimated Accuracy*
Water Level Survey	Electrical Water Probe Steel Tape	Reference to Steel Tape Reference to New Tape	0.01 ft 0.01 ft
Specific Conductance	Conductivity meter	Daily, single standard (typically 1413 µmhos/cm)	± 0.5% or 1 µmhos/cm
Dissolved Oxygen	Dissolved oxygen meter	Daily, based on local barometric pressure and water-saturated air	± 2% or 0.2 mg/L
ORP	ORP meter	Daily, using ORP buffer solution; solution temperature must also be recorded	± 20 mV
Temperature	Temperature meter	Factory calibration only	0.15 °C
Nephelometric turbidity (NTU)	Turbidity meter	Daily, check against 2 known standards	± 2%
pH	pH meter	Daily, 2- or 3-point with standard buffers (4, 7, 10)	± 0.2 pH unit

*Based on manufacturer specifications for YSI 556 MPS system and HACH 2100P turbidity meter currently used for FMC groundwater monitoring. Alternate instrumentation should have comparable estimated accuracies.

TABLE 5.0
SUMMARY OF FIELD EQUIPMENT CALIBRATION REQUIREMENTS

Field Parameter	Instrument / Method	Calibration	Calibration Frequency	Estimated Accuracy*
Water Level Survey	Electrical Water Probe Steel Tape	Reference to Steel Tape Reference to New Tape	Periodically Periodically	0.1 ft 0.01 ft
Specific Conductance	Conductivity meter	Daily, single standard (typically 1413 µmhos/cm)	Daily	± 0.5% or 1 µmhos/cm
Dissolved Oxygen	Dissolved oxygen meter	Daily, based on local barometric pressure and water-saturated air	Daily	± 2% or 0.2 mg/L
ORP	ORP meter	Daily, using ORP buffer solution; solution temperature must also be recorded	Daily	± 20 mV
Temperature	Temperature meter	Factory calibration only	Factory only	0.15 °C
Nephelometric turbidity (NTU)	Turbidity meter	Daily, check against 2 known standards	Daily	± 2%
pH	pH meter	Daily, 2- or 3-point with standard buffers (4, 7, 10)	Daily	± 0.2 pH unit

*Based on manufacturer specifications for YSI 556 MPS system and HACH 2100P turbidity meter currently used for FMC groundwater monitoring. Alternate instrumentation should have comparable estimated accuracies.

TABLE 6.0
DATABASE FIELD ACRONYMS AND DESCRIPTIONS

DATABASE FIELD NAME	Type	Size	FULL NAME	DESCRIPTION
STA_ID	Text	12	Station ID:	well number, etc. (i.e., F308300 or S308108)
AGENCY	Text	8	Agency	investigating party (EPA)
SAMP_DATE	Date/Time	8	Sample Date	date sample was taken
SAMP_ID	Text	8	Sample ID	unique identification number given to each sample
WTR_DEP	Number (Double)	8	Water Depth	depth to where water is found from casing reference notch (in ft.)
WTR_ELEV	Number (Double)	8	Water Elevation	elevation above mean sea level of groundwater (in ft.)
CHEM_NAME	Text	36	Chemical Name	name of chemical
CAS_NO	Text	12	Chemical Abstract Service Number	number that is given to identify a unique chemical by the Chemical Abstract Service
CONC_DET	Number (Double)	8	Concentration Detection	chemical concentration that was detected
QUAL	Text	4	Qualifier	laboratory qualifier given to each sample
UNITS	Text	12	Units	units of measurement
QUAL_VAL	Text	4	Validation Qualifier	qualifier assigned as a result of data validation
QUAL_CODE	Text	6	Code Qualifier	code used by validation to indicate why a qualifier was assigned
VAL_LVL	Text	4	Validation Level	level or extent of validation done
CHEM_NO	Number (Double)	8	Chemical Number	chemical number given by FMC for database sorting

TABLE 6.0
DATABASE FIELD ACRONYMS AND DESCRIPTIONS

DATABASE FIELD NAME	Type	Size	FULL NAME	DESCRIPTION
SAMP_TYPE	Text	4	Sample Type	e.g., groundwater (GW), surface water (SW) or potential source (PS) sample
LAB_NAME	Text	12	Laboratory Name	name of laboratory that performed the analyses
LAB_ID	Text	12	Laboratory Identification	identification number given to a sample by laboratory
QUAL_ANAL	Text	4	Analysis Qualifier	lab-assigned qualifier (see Qualifier Description)
QUAL_SAM	Text	8	Qualifying Sample	sample qualifier indicating that sample is not representative (see Qualifier Description)
AN_DATE	Date/Time	8	Analytical Date	date sample was analyzed for constituents
AN_METHOD	Text	20	Analytical Method	method used for analyzing chemicals
PKG_NAME	Text	9	Package Name	laboratory sample delivery group (SDG)
ACTUAL_VAL	Number (Double)	8	Actual Value	actual value shown for accuracy, used only for radiological
ACCURACY	Number (Double)	8	Accuracy	± accuracy (for rad samples)
RPT_LIM	Number (Double)	8	Reporting Limit	laboratory required reporting limit
FILE_NAME	Text	8	File Name	chronological name of an event

APPENDIX A-2

Field Sampling Plan

for

Slag Pit Sump Groundwater Monitoring

TABLE OF CONTENTS

Section		Page
1.0	INTRODUCTION	1
	1.1 Background	1
	1.2 Previous Results	1
2.0	SAMPLING OBJECTIVES	3
3.0	SAMPLING LOCATIONS AND FREQUENCY	4
	3.1 Groundwater Monitoring Well Samples	4
	3.2 Field and Laboratory Quality Control Samples	4
4.0	SAMPLE DESIGNATION	6
5.0	SAMPLING EQUIPMENT AND PROCEDURES	7
	5.1 Field Logbooks	7
	5.2 Groundwater Monitoring Well Sample Collection	9
	5.3 Field Duplicate QC Sample Collection	12
	5.4 Matrix Spike / Matrix Spike Duplicate QC Sample Collection	12
	5.5 Field Blank QC Sample Collection	12
	5.6 Field Parameter Measurements	12
	5.7 Equipment Decontamination Procedure	14
6.0	SAMPLE HANDLING AND ANALYSIS	15
	6.1 Sample Handling	15
	6.2 Sample Shipment	15
	6.3 Sample Analysis	16
7.0	DISPOSAL OF WASTE	18
	7.1 Used PPE and Disposable Sampling Equipment	18
	7.2 Disposal of Decontamination Fluids and Purged Groundwater	18

TABLE OF CONTENTS

Tables

Table		Page
1.0	Slag Pit Sump Groundwater Monitoring Wells	2
2.0	Field Parameter Measurement, Calibration and Accuracy Requirements	13
3.0	Sample Handling and Preservation Procedures	15
4.0	Summary of Required Laboratory Analysis for Groundwater Monitoring	17

Figures

Figure		
1	Slag Pit Sump Location at FMC	19

1.0 INTRODUCTION

1.1 BACKGROUND

This Field Sampling Plan (FSP) provides sampling and analysis procedures for implementation of the RCRA interim status groundwater monitoring program associated with the Slag Pit Sump located at the former FMC Corporation Elemental Phosphorus Plant in Pocatello, Idaho, including the RCRA post-closure care period. The facility ceased producing elemental phosphorus from phosphate ore in December 2001. Process decommissioning and plant site dismantling activities were completed in 2006.

The FSP contains procedures for sample collection, labeling, storage, shipment, chain-of-custody protocols, and quality assurance/quality control (QA/QC). The plan also specifies the analytical parameters and test methods. Implementation of these procedures will ensure that equipment and piping that has come into contact with hazardous waste has been properly decontaminated.

1.2 PREVIOUS RESULTS

In accordance with the interim status requirements of RCRA pursuant to 40 CFR Part 265 Subpart F, groundwater monitoring wells associated with the Slag Pit Sump are sampled and analyzed on a quarterly basis as part of an assessment monitoring program. The results of this program are presented in annual RCRA Interim Status Groundwater Monitoring Assessment reports.

The groundwater monitoring sample results are subjected to several statistical tests to determine if hazardous waste constituents from a waste management unit have entered the groundwater. One test compares the concentrations in downgradient wells with the concentrations in upgradient wells. A second test compares the mean concentrations with mean concentrations in previous years, and a third test compares concentrations in downgradient wells with downgradient well concentrations from previous years. Based on these tests, decisions are made concerning whether or not current releases from the slag pit sump are impacting groundwater.

Table 1.0 identifies the upgradient and downgradient monitoring wells associated with the Slag Pit Sump.

TABLE 1.0
SLAG PIT SUMP GROUNDWATER MONITORING WELLS

		Monitoring Well I.D. Numbers	
WMU No.	**Unit Name**	**Upgradient**	**Downgradient**
5	Slag Pit Sump	121	108, 122 and 123

2.0 Sampling Objectives

The objectives of sampling the monitoring wells associated with the Slag Pit Sump are to:

- Collect samples representative of groundwater flowing beneath the Slag Pit Sump.
- Collect data that meets data quality objectives.
- Evaluate potential changes and/or trends in groundwater conditions beneath the Slag Pit Sump.
- Based on groundwater evaluations, determine the status of the Slag Pit Sumps with respect to current groundwater impacts.

To meet these objectives, data will be obtained to support several statistical tests designed to indicate whether or not the Slag Pit Sumps is currently impacting groundwater.

3.0 Sampling Locations and Frequency

The location of upgradient and downgradient monitoring wells for the slag pit sump is provided in Figure 1. Attachment 1 of this FSP provides the well completion diagrams.

3.1 GROUNDWATER MONITORING WELL SAMPLES

One groundwater monitoring well sample will be collected quarterly from each of the wells for the slag pit sump listed in Table 1.0 in accordance with the procedures specified in Section 5. Each sample will then be submitted to the laboratory in accordance with the procedures specified in Section 6.

3.2 FIELD AND LABORATORY QUALITY CONTROL SAMPLES

Field and laboratory quality control (QC) samples will be prepared for each quarterly groundwater sampling event. The QC samples ensure the reliability and validity of the field collection methods and laboratory analyses conducted for each sampling event.

3.2.1 FIELD QUALITY CONTROL SAMPLES

Field QC samples are collected and analyzed to verify that sample collection and handling has not affected the quality of the groundwater samples. All field QC samples should be prepared as regular investigation samples with regard to sample volume, containers, and preservation. The following field QC samples are collected:

3.2.1.1 Field Duplicate Groundwater Monitoring Well Samples

Field duplicate groundwater samples will be collected at a frequency of one per sample delivery group or one per twenty samples collected. The well designated for a field duplicate sample will be randomly selected during each monitoring event from the RCRA program monitoring wells.

3.2.1.2 Matrix Spike / Matrix Spike Duplicate Quality Control Samples

Matrix spike / matrix spike duplicate (MS/MSD) quality control samples will also be collected at a frequency of one per sample delivery group or one per twenty samples collected. The well designated for a MS/MSD quality control sample will be randomly selected during each monitoring event from the RCRA program monitoring wells.

3.2.1.3 Field Blank Quality Control Samples

During each RCRA monitoring event, field blank samples will be collected as follows:

- *Rinsate blank* - Rinsate blanks are collected by pumping purified (distilled or deionized) water through the submersible pump setup to evaluate the effectiveness of field decontamination of sampling equipment. The blank is analyzed for the same analytical parameters as the groundwater samples. Rinsate blanks will be collected after decontamination and at a minimum frequency of one per sample delivery group or one per twenty samples collected.

- *Distilled or De-ionized water blank* – Distilled or de-ionized water blanks are aliquots of water collected directly from the field supply container and analyzed to determine distilled or de-ionized water quality. The blanks are collected at a frequency of one per sampling event in conjunction with the RCRA and Calciner Pond Remedial Action groundwater monitoring programs (i.e., one distilled or de-ionized water blank per sampling event concurrently satisfies requirement for all three monitoring programs).

EPA Region 10 may collect split samples in accordance with an EPA prepared split sampling plan.

3.2.2 LABORATORY QUALITY CONTROL SAMPLES

Laboratory QC samples consist of laboratory method blanks, laboratory control samples, matrix spike, and laboratory duplicates or matrix spike duplicates. Requirements for laboratory QC samples are specified in the *Slag Pit Sump Quality Assurance Project Plan* (QAPP).

4.0 Sample Designation

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. The samples will have preassigned, identifiable, and unique numbers. At a minimum, the sample labels will contain the following information:

- Facility name.
- Sample number.
- Date of collection.
- Time of collection.
- Analytical parameter.
- Method of preservation.

Each sample will be assigned a unique sample number. The same unique number will be used to identify all containers associated with that sample. The sample coding convention used for the RCRA monitoring program (which is also consistent with FMC'S CERCLA and Calciner Pond Remedial Action groundwater programs sample coding) is described in Section 5.1.1 below.

5.0 Sampling Equipment and Procedures

This section describes the procedures to be used to collect groundwater samples. All samples will be collected in accordance with the procedures presented in this section and handled in accordance with the procedures presented in Section 6.

5.1 FIELD LOGBOOKS

Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be complete and accurate enough to permit reconstruction of field activities. At a minimum, the following sampling information will be recorded:

- Sample location, station location, and description.
- Sample number.
- Sampler's name(s).
- Date and time of sample collection.
- Type of sample (e.g., regular, QA sample designation).
- Type of sampling equipment used.
- Onsite measurement data (e.g. temperature, pH, conductivity).
- Field observations and details important to analysis or integrity of samples (e.g., heavy rains, odors, colors).
- Type of preservation used.

In addition, the following will be kept in a Field Data Report:

- Chain-of-custody forms.
- Shipping arrangements (i.e., Federal Express air bill number).
- Recipient laboratory(ies).

5.1.1 SAMPLE CODING IN FIELD LOGBOOKS

The station location will be described in the logbook as follows, in a manner consistent with the conventions used during the remedial investigation.

A one-digit number will be used to indicate the year in which the sample was collected, for example "3" indicates a sample was collected in 2003. This digit will be followed by two others indicating the month in which the sample was collected, for example "11" indicates a sample was collected in November. Finally, additional digits or letters will identify the well from which the sample was collected. The location description, 311136, indicates a sample collected from Well 136 in November 2003.

Samples collected for field QC will be identified by a three-digit or descriptive letter combination. Numbers for well locations and field QC will be grouped as follows:

- RCRA Groundwater Monitoring Wells: 100 series numbers.
- Field Duplicate: 600 series starting with 600 for each sampling event and continuing consecutively during the event for duplicates collected.
- Rinsate: 700 series numbers starting with 700 for each sampling event and continuing consecutively during the event for rinsates collected.
- Distilled/deionized water blank: FDI.

Samples collected for laboratory QC will be identified on bottles and field paperwork using an A, B, or C designation as a suffix to the sample identifier code. These QC codes will be designated as follows:

- A - Original unspiked sample
- B - Matrix spike
- C - Matrix spike duplicate

The date of collection will be indicated in mm/dd/yy format, and the time will be indicated in accordance with the military convention. The analytical parameter and method of preservation will be indicated in unambiguous shorthand, such as K for potassium and HCl for hydrochloric acid.

Logbooks will be bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions

or inappropriate terminology. In addition to the sampling information, the following specifics will also be recorded in the field logbook:

- Team members.
- Time of site arrival/entry on site and time of site departure.
- Other personnel on site.
- Any deviations from sampling plans, site safety plans, and QAPP procedures.
- Any changes in personnel and responsibilities as well as reasons for the changes.
- Equipment calibration and equipment model and serial number.

5.2 GROUNDWATER MONITORING WELL SAMPLE COLLECTION

5.2.1 WATER LEVEL MEASUREMENTS

FMC performs quarterly groundwater level (elevation) measurements at numerous monitoring wells that provide uniform coverage across the entire FMC Plant OU such that the water level measurements are coordinated among FMC's RCRA, Calciner Pond Remedial Action and interim CERCLA groundwater monitoring programs. Routine quarterly water level measurements will be taken at the following list of wells:

- Wells 101 through 191 inclusive (i.e., includes all shallow and deep wells within the FMC "100-series" wells);
- TW-5S, TW-5I, TW-5D, TW-9S, TW-11S and TW-12S; and,
- 501, 502, 503, 505, 514, 515, 516, 517, 518, 523, 524 and 525.
- In addition, the surface water elevation will be measured in the Batiste Spring channel immediately below the overflow weir from the springhouse cistern and in the Swanson Road Spring (aka the Spring at Batiste Road) basin.

Water levels will be established, generally in a single day, prior to purging and sampling the wells. Wells will be purged and sampled on subsequent days within the sampling event. An electronic sounder, accurate to the nearest (±) 0.01 feet, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column. The graduated markings on the probe wire are used to measure the depth to water from the surveyed point on the rim of the well casing. Typically, the measuring device emits a constant tone when the probe is submerged in standing water, and most electronic water

level sounders have a visual indicator consisting of a small light bulb or diode that turns on when the probe encounters water. Water level sounding equipment will be decontaminated by rinsing with de-ionized or distilled water before and after use in each well.

The long-history of groundwater monitoring indicates that there is no significant sediment entering the groundwater monitoring wells. Consequently, it is unnecessary to measure total well depth on a routine basis. However, FMC's groundwater sampling contractor will measure total well depth at any wells that, based on the sampling contractors experience and historic monitoring of the wells, are suspected to have significant (e.g., above the screened interval) sediment accumulation. In the event significant sediment accumulation is found based on measured total depth compared to the well construction details for the well, the groundwater sampling contractor will notify FMC. FMC will determine whether the well will be sampled prior to or after actions to remove the excessive sediment (e.g., well redevelopment).

5.2.2 WELL PURGING

All wells will be purged prior to sampling. Three to five casing volumes of water will be purged using an electric submersible pump. Clean flexible plastic or Teflon tubes connected to pumps will be used for groundwater extraction. All tubes will be decontaminated before and after use in each well. Pumps will typically be placed approximately 10 feet below the water level in the well to permit reasonable drawdown but to prevent cascading conditions. Pumps may need to be placed lower in the water column at certain wells to avoid lowering the water level to the pump inlet horizon due to the poor yield characteristics of these monitoring wells. If necessary, purge water will be collected into a measured container to record the purge volume.

Casing volumes will be calculated based on total well depth and static water level; casing diameter will be based on the well construction details. Monitoring well construction details are summarized in Tables 2A through 2H in Attachment 1 along with water elevations measured during May 2008.

One casing volume will be calculated as:

$$V = \pi R^2 h / 19.25$$

where:

V is the volume of one well casing of water (in gallons, 1 gallon = 0.134 ft^3);

R is one-half the inner diameter of the well casing (in inches); and

h is the total depth of water in the well (in feet).

Prior to the start of sampling and after each well casing volume is purged, water temperature, pH, specific conductance, dissolved oxygen (DO) and oxidation-reduction potential (ORP) will be measured using in-line flow-through meters installed in a manifold off the pump system. A separate grab sample will be obtained to measure turbidity the same time interval as other field parameters. The flow-through cell and associated tubing will be emptied prior to sampling a subsequent well. During operation, the flow-through cell and tubing are flushed with purge water at approximately one gpm for five to ten minutes before field parameters are recorded. This flushing action and the non-absorptive nature of this sampling equipment makes it unnecessary to otherwise decontaminate the tubing and in-line meters between uses using the equipment decontamination methods presented in Section 5.6 of this FSP. The final measurements will be recorded after these parameters have stabilized, indicating representative formation water is entering the well.

Three consecutive measurements which display consistent values of all parameters will be taken prior to sampling. Samples will be collected after three well casing volumes if parameters have stabilized. Typically, the temperature should not vary by more than (±)1°C, pH by more than 0.1 pH units, DO by no more than 0.3 mg/L and specific conductance by more than 10 percent from reading to reading. No water that has been tested with a field meter probe will be collected for chemical analysis. If these parameters have not stabilized after five casing volumes have been purged, purging will cease, a notation will be recorded in the field logbook, and samples will be collected. In accordance with Section 5.1, depth-to-water measurements, field measurements of parameters, and purge volumes will be recorded in the field logbook. The in-line flow meter used to estimate the volume of removed purged water will be field-checked for volumetric accuracy once during a sampling event by recording the time needed to obtain a known volume of purge water in a bucket.

If a monitoring well dewaters during purging and three casing volumes are not purged, that well will be allowed to recharge up to 80 percent of static water column, and dewatered once more. After water levels have recharged to 80 percent of the static water column, groundwater samples will be collected.

All field meters will be calibrated according to manufacturers' guidelines and specifications prior to beginning field work every day.

5.2.3 WELL SAMPLING

Groundwater samples will be collected from the monitoring wells specified in Table 1.0. Prior to sampling, the water level in the well will be measured as described in Section 5.2.1 and wells will be purged as described in Section 5.2.2. All wells will be sampled within 24 hours after purging. Clean nitrile gloves will be worn while collecting samples. Groundwater samples will be collected directly from the pump tubing into the appropriate sample container, preserved as

described in Section 6, and chilled and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the discharge tubing to the sample container.

Section 6 gives detailed procedures for sample packaging, labeling, and shipping. All groundwater sampling equipment will be decontaminated before and after each sample is collected using procedures outlined in Section 5.6.

5.2.4 INSPECTION OF MONITORING WELL COVERS

The condition of the groundwater monitoring well covers will be observed semiannually to ensure the well covers are intact and locked. In addition, the wellhead barriers will be visually observed semiannually to ensure barriers are in place to protect the wellhead from incidental damage. Any unacceptable conditions requiring maintenance will be recorded on an inspection form. Any maintenance shown to be necessary based on the inspection of the groundwater monitoring wells will be performed as soon as practicable and within a timeframe that will not delay the next scheduled monitoring event.

5.3 FIELD DUPLICATE QC SAMPLE COLLECTION

When collecting duplicate groundwater samples, bottles with two different sample designations will be alternated in the filling sequence. Duplicate samples will be submitted blind to the analytical laboratory.

5.4 MATRIX SPIKE / MATRIX SPIKE DUPLICATE QC SAMPLE COLLECTION

When collecting MS/MSD QC samples, a single sample designation, followed with “A,” “B” and “C” suffixes for the primary, MS and MSD sample volumes respectively, will be assigned to a triple-volume sample.

5.5 FIELD BLANK QC SAMPLE COLLECTION

Rinsate blanks will be collected by pumping purified (distilled or deionized) water through the submersible pump setup after decontamination. Distilled or de-ionized water blanks will be collected directly from the field supply container.

5.6 FIELD PARAMETER MEASUREMENTS

Electrical conductivity, water temperature, turbidity and pH measurements will be made in the field during purging and immediately before collection of the water sample. Field parameter measurements are collected using an in-line flow through system as described in Section 5.2.2. A field pH meter with a combination electrode or equivalent will be used for pH measurement. A field conductivity meter will be used for specific conductance measurements. A nephelometer-type turbidimeter will be used for turbidity measurements. Temperature measurements will be

performed using standard thermometers or equivalent temperature meters. A combined field meter or individual meters will be used for dissolved oxygen and ORP measurements. Combination instruments capable of measuring multiple parameters may also be used.

All instruments will be calibrated in accordance with manufacturers' recommendations. Conductivity standards and pH buffers used in the calibration will be recorded on daily calibration forms associated with each monitoring event. The field parameter measurement, calibration and accuracy requirements are summarized below on Table 2.0.

TABLE 2.0
FIELD PARAMETER MEASUREMENT, CALIBRATION AND ACCURACY REQUIREMENTS

Field Parameter	Instrument / Method	Calibration	Estimated Accuracy*
Water Level Survey	Electrical Water Probe Steel Tape	Reference to Steel Tape Reference to New Tape	0.01 ft 0.01 ft
Specific Conductance	Conductivity meter	Daily, single standard (typically 1413 µmhos/cm)	± 0.5% or 1 µmhos/cm
Dissolved Oxygen	Dissolved oxygen meter	Daily, based on local barometric pressure and water-saturated air	± 2% or 0.2 mg/L
ORP	ORP meter	Daily, using ORP buffer solution; solution temperature must also be recorded	± 20 mV
Temperature	Temperature meter	Factory calibration only	0.15 °C
Nephelometric turbidity (NTU)	Turbidity meter	Daily, check against 2 known standards	± 2%
pH	pH meter	Daily, 2- or 3-point with standard buffers (4, 7, 10)	± 0.2 pH unit

*Based on manufacturer specifications for YSI 556 MPS system and HACH 2100P turbidity meter currently used for FMC groundwater monitoring. Alternate instrumentation should have comparable estimated accuracies.

5.7 EQUIPMENT DECONTAMINATION PROCEDURE

Decontamination of sampling equipment will be consistently conducted in a manner to minimize potential cross-contamination and to ensure the quality of samples collected. The resulting decontamination fluids and residual material will be handled in the manner described in Section 7 to minimize potential recontamination of sampling equipment.

All equipment that comes into contact with potentially contaminated water will be decontaminated with the exception of the flow-through cell used to measure field parameters which is flushed with purge water prior to field parameter measurements as described in Section 5.2.2. Sampling equipment will be washed with a non-phosphate detergent scrub, followed by fresh water and de-ionized water rinses prior to each use. Equipment will be decontaminated in plastic containers, on pallets or plastic sheeting, and clean equipment will be used immediately. Clean equipment that is stored more than a few hours will be decontaminated again prior to use.

Sampling equipment will either be cleaned at the sampling location using non-phosphate detergent followed by fresh water and deionized water rinse, or will be steam-cleaned along with other equipment at a decontamination station.

Sampling equipment will be decontaminated as follows:

1. The exterior surfaces and accessible interior portions of submersible and hand pumps will be steam-cleaned or cleaned with sequential rinses of non-phosphate detergent solution, tap water, and de-ionized water prior to each use. Inaccessible interior portions of the pumps will be cleaned prior to each use by purging the same rinse water sequence through the pump and discharge lines. An effort will be made to sample the wells in the order of least to most contaminated to further minimize the risk of sample cross-contamination.

2. Bailers and tubing used for collection of the groundwater samples will be precleaned and disposed after one use or cleaned at the start of the job and between wells by steam cleaning or with a non-phosphate detergent wash followed by a tap water, and finally, a de-ionized water rinse.

3. Steel tapes, water probes, water level indicators, and transducers will be rinsed in de-ionized water or cleaned in a detergent solution and rinsed once in fresh water after each use.

4. Rinsate blanks will be collected from the submersible pump setup at the frequency specified in Section 3.2.1.3.

6.0 Sample Handling and Analysis

This section describes sample handling procedures including sample containers, sample preservation, shipping requirements and holding times, and sample analysis. These procedures are designed to ensure that samples are preserved and transported to the laboratory in a manner that is consistent and maintains sample integrity. Table 3.0 summarizes analytical parameters, sample containers, sample volume, preservatives, and holding times.

TABLE 3.0
SAMPLE HANDLING AND PRESERVATION PROCEDURES

Parameter	Recommended Container	Preservative	Maximum Holding Time
Water Quality (Cl^-, F^-, NO_3^-, SO_4^{2-})	1-liter polyethylene bottle	Cool to 4°C	6 months
Metals (As, K, Se)	2 1-liter polyethylene bottles	HNO_3 to pH<2, Cool to 4°C	6 months
Total Phosphorus	1-liter polyethylene bottle	Cool to 4°C	30 days
Elemental Phosphorus (Semiannually only)	½-liter amber glass bottle; zero head space	Cool to 4°C	5 days for extraction
Total Ammonia (Every 5 years, beginning 2Q2012)	0.5-liter polyethylene bottle	H_2SO_4 to pH<2; Cool to 4°C	28 days

6.1 SAMPLE HANDLING

Pre-cleaned sample containers will be used for sample collection. Preservatives, if required, will be added to the containers prior to shipment of the sample containers to the laboratory.

6.2 SAMPLE SHIPMENT

All sample containers will be placed in a strong, rigid-walled shipping container such as a heavy plastic cooler. The following outlines the packaging procedures that will be followed.

1. When ice is used, secure the drain plug of the cooler with tape to prevent melting ice from leaking out of the cooler.
2. Line the cooler with bubble wrap, as needed, to prevent breakage during shipment.
3. Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of their sample bottles with indelible ink.

4. Custody-seal all container tops.
5. Affix sample labels onto the containers and write sample number on container with indelible ink.
6. Wrap all glass sample containers in bubble wrap to prevent breakage.

All samples will be placed in coolers with the appropriate chain-of-custody form. All forms will be enclosed in a large plastic bag and affixed to the underside of the cooler lid. Empty space in the cooler will be filled with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment. Ice used to cool samples will be placed on top and around the samples to chill them to the correct temperature. Both samples and ice will be double-bagged in large plastic bags. Each ice chest will be securely taped shut with strapping tape; and custody seals will be affixed to the front and back of each cooler.

6.3 SAMPLE ANALYSIS

Required sample analyses and methods are summarized in Table 4.0.

TABLE 4.0
SUMMARY OF REQUIRED LABORATORY ANALYSES FOR SLAG PIT SUMP GROUNDWATER MONITORING

Parameter	Method Number	Method Type	Reporting Limit (mg/l)
Potassium	6010B (a)	Inductively Coupled Plasma Atomic Emission Spectrometry (ICP)	2.5
Chloride	300.0 (b) or 325.3 (c)	Ion Chromatography or Titrimetric	1
Fluoride	300.0 (b) or 340.2 (c)	Ion Chromatography or Potentiometric, Ion Selective Electrode	0.1
Arsenic	6010B (a)	ICP	0.002 (As), 0.0005 (Se)
Selenium	6010B (a)	ICP	0.002 (As), 0.0005 (Se)
Nitrate	300.0 (b) or 353.2 (d)	Ion Chromatography or Colorimetric	0.1
Total Phosphorus	6010B (a) 365.1 (b), 365.4 (c), or 4500-P (d)	ICP or Colorimetric (ascorbic acid)	0.02
Sulfate	300.0 (b) or 375.4 (d)	Ion Chromatography or Turbidimetric	1
Elemental Phosphorus (e)	7580 (b)	Gas Chromatography	0.00005
Total Ammonia (f) (NH_3 + NH_4 as N)	350.1 (b) or 350.3 (c)	Colorimetric or Potentiometric, Ion Selective Electrode	0.2

(a) Analysis may also be performed using method 6020, both 6010 and 6020 from Test Methods for Evaluating Solid Waste, EPA SW–846, Third Edition, Update IIIB or as updated.

(b) Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600/R-93/100) or as updated.

(c) Methods for Chemical Analysis of Water and Wastes, EPA600/4–79–020, Revision, March 1983 or as updated.

(d) Standard Methods for the Examination of Water and Wastewater, 20th Ed. American Public Health Association, American Water Works Association, Water Environment Federation, Approved by Standard Methods Committee, 1997 or as updated.

(e) Elemental phosphorus is analyzed semiannually at the Slag Pit Sump well network only.

(f) The Slag Pit Sump wells will be sampled and analyzed for ammonia every five years during the second quarter monitoring event, beginning with the second quarter 2012 [2Q12] monitoring event.

7.0 Disposal of Waste

In the process of collecting groundwater samples, different types of potentially contaminated wastes will be generated. The expected wastes are:

- Used personal protective equipment (PPE).
- Disposable sampling equipment.
- Decontamination fluids.
- Purged groundwater.

This section describes the procedures that will be followed to handle these wastes. The procedures have enough flexibility to allow the sampling team to use its professional judgment on the proper method for the disposal of each type of waste generated at each sampling location. Notwithstanding the terms and conditions of the Slag Pit Sump Post-Closure Plan or this Appendix A2, FMC remains subject to all applicable RCRA requirements including 40 CFR §262.11 requirements for waste determination.

7.1 USED PPE AND DISPOSABLE SAMPLING EQUIPMENT

Waste determination will be made on used PPE and disposable sampling equipment per the requirements of 40 CFR §262.11. Used PPE and disposable equipment will be bagged and accumulated in a dumpster onsite for disposal. Any PPE and disposable equipment that could be considered reusable will be rendered inoperable before disposal. If deemed to be non-hazardous, used PPE and disposable sampling equipment will be disposed in the onsite landfill or an appropriate off-site landfill. If deemed to be hazardous, used PPE and disposable sampling equipment will be disposed off-site in accordance with the generator standards of 40 CFR Part 262.

7.2 DISPOSAL OF DECONTAMINATION FLUIDS AND PURGED GROUNDWATER

Waste determination will be made on decontamination fluids and purged groundwater per the requirements of 40 CFR §262.11. Due to the low levels of contaminants in groundwater (i.e., analytical results of previous groundwater samples have not exceeded the Toxicity Criteria presented in 40 C.F.R. Part 261 Subpart C), the decontamination fluids and groundwater are presumed to be non-hazardous. If deemed to be non-hazardous, decontamination fluids and purged groundwater will be disposed onsite. If deemed to be hazardous, decontamination fluids and purged groundwater will be disposed off-site in accordance with the generator standards of 40 CFR Part 262.

ATTACHMENT 1

WELL COMPLETION DIAGRAMS

MONITORING WELL

PROJECT	WELL NO.
EMF POCATELLO, ID	108

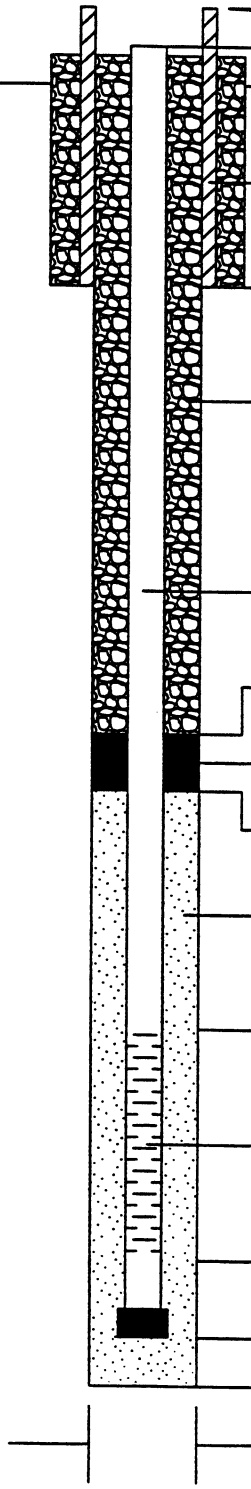
JOB NO.	SITE	COORDINATES and / or STATIONING
20906	Northeast of Slag Pit Sump	N 452,316.5 : E 556,573.7

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
10-12-90	10-12-90	Curtis Obi	Top of PVC casing (water level)

(GENERALIZED GEOLOGIC LOG)

See Boring Logs.

NOT TO SCALE



	DEPTH (FT)	ELEV. (FTMSL)
TOP OF SURFACE CASING	-2.3	4482.55
TOP OF RISER CASING	-2.1	4482.4
GROUND SURFACE	0.0	4480.3
BOTTOM OF SURFACE CASING	2.7	4477.6
TOP OF SEAL	87.0	4393.3
TOP OF FILTER PACK	91.0	4389.3
TOP OF SCREEN	97.6	4382.7
BOTTOM OF SCREEN	107.6	4372.7
BOTTOM OF SUMP	110.1	4370.2
BOTTOM OF HOLE	150.0	4330.3

SURFACE CASING
DIAMETER: 8"
TYPE: Steel with locking lid

BACKFILL MATERIAL TYPE
Cement - Bentonite Grout

RISER CASING
DIAMETER: 4"
TYPE: Schedule 40 PVC

ANNULAR SEAL TYPE
Bentonite Slurry

FILTER PACK TYPE
Silica sand 10-20 & 20-40

SCREEN
DIAMETER: 4"
TYPE: Sch. 40 PVC/Machine Cut
OPENING WIDTH: 0.020"
TYPE:

HOLE DIAMETER: 10-inches

Update: Apr 22, 1998
Report Form: EMF-WELLOG2

NOT TO SCALE

MONITORING WELL

PROJECT	WELL NO.
EMF POCATELLO, ID	121

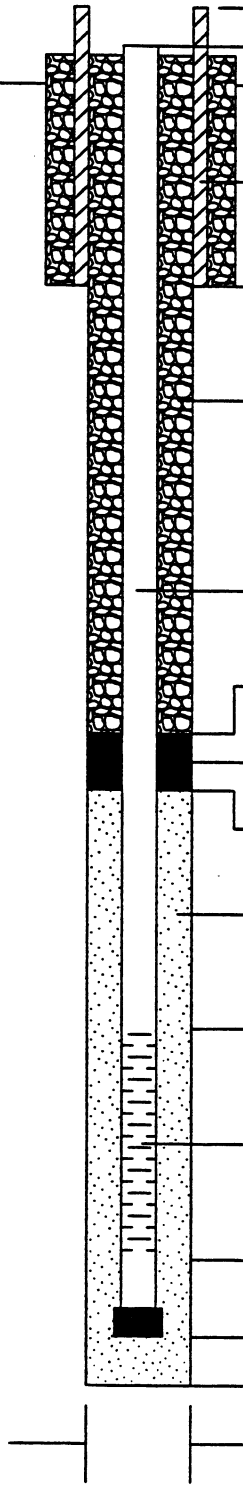
JOB NO.	SITE	COORDINATES and / or STATIONING
20906	Southwest of Slag Pit Sump	N 451,766.8 : E 556,105.7

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
10-10-90	10-10-90	Curtis Obi	Top of PVC casing (water level)

(GENERALIZED GEOLOGIC LOG)

See Boring Logs.

NOT TO SCALE



	DEPTH (FT)	ELEV. (FTMSL)
TOP OF SURFACE CASING	-2.3	4485.76
TOP OF RISER CASING	-2.1	4485.58
GROUND SURFACE	0.0	4483.5
BOTTOM OF SURFACE CASING	2.7	4480.8
TOP OF SEAL	92.0	4391.5
TOP OF FILTER PACK	96.0	4387.5
TOP OF SCREEN	106.0	4377.5
BOTTOM OF SCREEN	116.0	4367.5
BOTTOM OF SUMP	118.5	4365.0
BOTTOM OF HOLE	120.0	4363.5

SURFACE CASING
DIAMETER: 8"
TYPE: Steel with locking lid

BACKFILL MATERIAL TYPE
Cement - Bentonite Grout

RISER CASING
DIAMETER: 4"
TYPE: Schedule 40 PVC

ANNULAR SEAL TYPE
Bentonite Slurry

FILTER PACK TYPE
Silica sand 10-20 & 20-40

SCREEN
DIAMETER: 4"
TYPE: Sch. 40 PVC/Machine Cut
OPENING WIDTH: 0.020"
TYPE:

HOLE DIAMETER: 10-inches

Update: Apr 22, 1998
Report Form: EMF-WELLOG2

NOT TO SCALE

MONITORING WELL

PROJECT	WELL NO.
EMF POCATELLO, ID	122

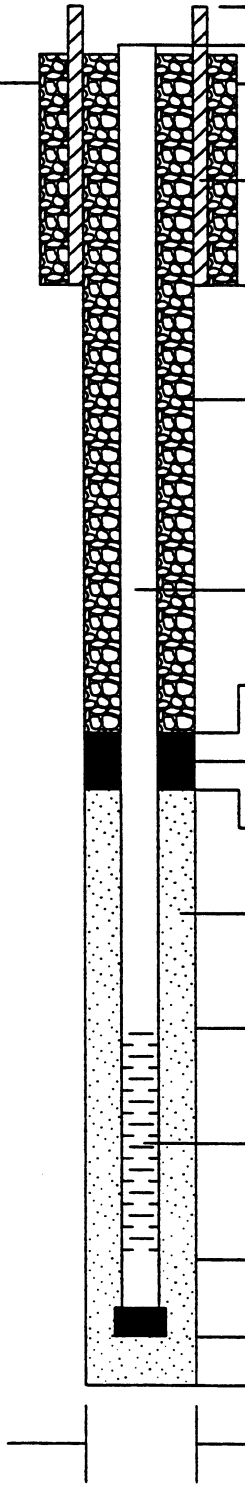
JOB NO.	SITE	COORDINATES and / or STATIONING
20906	North of Slag Pit Sump	N 452,470.2 : E 556,282.4

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
10-11-90	10-11-90	Curtis Obi	Top of PVC casing (water level)

(GENERALIZED GEOLOGIC LOG)

See Boring Logs.

NOT TO SCALE



	DEPTH (FT)	ELEV. (FTMSL)
TOP OF SURFACE CASING	-2.2	4476.1
TOP OF RISER CASING	-2.0	4475.92
GROUND SURFACE	0.0	4473.9
BOTTOM OF SURFACE CASING	2.8	4471.1
TOP OF SEAL	86.0	4387.9
TOP OF FILTER PACK	90.0	4383.9
TOP OF SCREEN	101.5	4372.4
BOTTOM OF SCREEN	111.5	4362.4
BOTTOM OF SUMP	113.0	4360.9
BOTTOM OF HOLE	121.5	4352.4

SURFACE CASING
DIAMETER: 8"
TYPE: Steel with locking lid

BACKFILL MATERIAL TYPE
Cement - Bentonite Grout

RISER CASING
DIAMETER: 4"
TYPE: Schedule 40 PVC

ANNULAR SEAL TYPE
Bentonite Slurry

FILTER PACK TYPE
Silica sand 10-20 & 20-40

SCREEN
DIAMETER: 4"
TYPE: Sch. 40 PVC/Machine Cut
OPENING WIDTH: 0.020"
TYPE:

HOLE DIAMETER: 10-inches

Update: Apr 22, 1998
Report Form: EMF-WELLOG2

NOT TO SCALE

MONITORING WELL

PROJECT	WELL NO.
EMF POCATELLO, ID	123

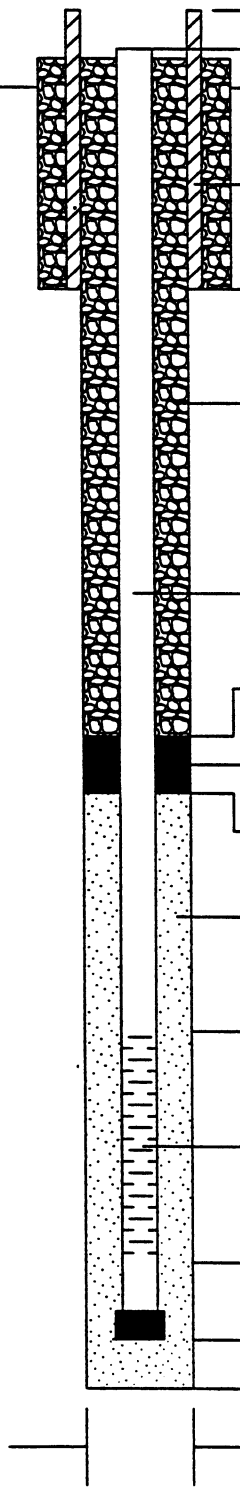
JOB NO.	SITE	COORDINATES and / or STATIONING
20906	Northeast of Slag Pit Sump	N 452,221.3 : E 557,000.1

BEGUN	COMPLETED	PREPARED BY	REFERENCE POINT FOR MEASUREMENTS
10-13-90	10-13-90	Curtis Obi	Top of PVC casing (water level)

(GENERALIZED GEOLOGIC LOG)

See Boring Logs.

NOT TO SCALE



	DEPTH (FT)	ELEV. (FTMSL)
TOP OF SURFACE CASING	-2.3	4484.29
TOP OF RISER CASING	-2.1	4484.12
GROUND SURFACE	0.0	4482.0
BOTTOM OF SURFACE CASING	2.7	4479.3
TOP OF SEAL	95.0	4387.0
TOP OF FILTER PACK	99.0	4383.0
TOP OF SCREEN	106.5	4375.5
BOTTOM OF SCREEN	116.0	4366.0
BOTTOM OF SUMP	118.5	4363.5
BOTTOM OF HOLE	121.2	4360.8

SURFACE CASING
DIAMETER: 8"
TYPE: Steel with locking lid

BACKFILL MATERIAL TYPE
Cement - Bentonite Grout

RISER CASING
DIAMETER: 4"
TYPE: Schedule 40 PVC

ANNULAR SEAL TYPE
Bentonite Slurry

FILTER PACK TYPE
Silica sand 10-20 & 20-40

SCREEN
DIAMETER: 4"
TYPE: Sch. 40 PVC/Machine Cut
OPENING WIDTH: 0.020"
TYPE:

HOLE DIAMETER: 10-inches

Update: Apr 22, 1998
Report Form: EMF-WELLOG2

NOT TO SCALE

APPENDIX A-3

Field Sampling Plan

for

Slag Pit Sump Cap Integrity Monitoring

TABLE OF CONTENTS

Section		Page
1.0	**INTRODUCTION**	
1.1	BACKGROUND	1-1
1.2	PREVIOUS RESULTS	1-2
	1.2.1 Cap Integrity Monitoring	1-2
	1.2.2 Slag Pit Sump Cap Run-Off Erosion Monitoring	1-3
	1.2.3 Survey Benchmark Monitoring	1-3
	1.2.4 Security Monitoring	1-3
2.0	**MONITORING OBJECTIVES**	
2.1	MAINTAINING THE INTEGRITY AND EFFECTIVENESS OF COVER	2-1
2.2	MAINTAINING AND MONITORING THE LEAK DETECTION SYSTEM	2-1
2.3	PREVENTION OF RUN-OFF EROSION OR OTHER DAMAGE	2-1
2.4	PROTECTION AND MAINTENANCE OF BENCHMARKS	2-2
2.5	MAINTENANCE OF SECURITY SYSTEMS	2-2
3.0	**MONITORING LOCATIONS AND FREQUENCY**	
3.1	CAP INTEGRITY MONITORING	3-1
3.2	STORMWATER/SNOWMELT RUNOFF MONITORING	3-1
3.3	SURVEY BENCHMARK MONITORING	3-2
3.4	SECURITY MONITORING	3-2
4.0	**MONITORING PROCEDURES**	
4.1	FIELD DOCUMENTATION	4-1
	4.1.1 Field Inspection and Maintenance Forms	4-1
	4.1.2 Photographs	4-2
4.2	SAMPLE LABELING, C-O-C, HANDLING AND SHIPPING	4-2
4.3	CAP INTEGRITY AND EFFECTIVENESS MONITORING PROCEDURES	4-3
	4.3.1 Cap Settlement Monitoring Procedures	4-3
	4.3.2 Rodent Infestation Monitoring Procedures	4-4
4.4	CAP STORMWATER/SNOWMELT RUNOFF MONITORING PROCEDURES	4-5
4.5	SURVEY BENCHMARK AND SECURITY MONITORING PROCEDURES	4-7
4.6	EQUIPMENT DECONTAMINATION PROCEDURE	4-8
5.0	**DISPOSAL OF WASTE**	

1.0 INTRODUCTION

This field sampling plan (FSP) implements the quality control requirements for the Slag Pit Sump post-closure monitoring as specified in the *Slag Pit Sump Quality Assurance Project Plan* (QAPP). This FSP and the associated QAPP constitute the Slag Pit Sump sampling and analysis plan (SAP) for the following post-closure activities:

- Settlement monitoring of the Slag Pit Sump cap;
- Rodent impact monitoring on the soil / slag slopes around the Slag Pit Sump cap;
- Stormwater/snowmelt run-off erosion monitoring;
- Survey benchmark monitoring; and,
- Security system monitoring.

Note that a separate FSP has been prepared for groundwater monitoring as presented in Appendix A-2 of the *Slag Pit Sump Post-Closure Plan.*

1.1 BACKGROUND

The Slag Pit Sump covers an area of approximately 100 square feet in the southeast corner of the slag pit. No wastes were permanently stored or disposed of in the Slag Pit Sump. All liquids and suspended solids were removed by a submersible pump and sent via pipeline to the Phase IV ponds. The liquids and suspended solids were removed during the slag pit dewatering project in April 1991. After they were removed, the sump was maintained as a backup unit but was never used after 1991 for phossy water management.

The slag pit was an integral part of elemental phosphorus operations at the site. Modifications to slag management operations (slag ladling) in the slag pit, including changes (e.g., configuration, access routes, and/or grade) in the vicinity of the Slag Pit Sump were partially completed in 1999 and completed in 2000. As such, final capping of the Slag Pit Sump needed to be designed and planned consistent with planned slag management operations within the slag pit. Therefore, prior to the modifications for slag management, an interim cover was placed over the Slag Pit Sump to minimize the potential for water infiltration. The interim cover was completed November 1, 1999 consistent with the Interim Slag Pit Sump Plan dated August 1999. In accordance with the RCRA Consent Decree, Attachment A, I, sub item 7, the interim slag pit sump cap was completed prior to the January 10, 2000 deadline (within 180 days of entry of the Consent Decree).

The interim cover area is larger than the original Slag Pit Sump area. The limits of the interim cover extend approximately to the eastern and southern walls of the slag pit. After the interim cover was installed, the area was regraded so that all surface run-off drained away from it to other areas of the slag pit. The final cap was installed over the asphalt concrete layer of the interim cover. The final slag pit sump cap consists, from bottom to top, of a layer of GCL barrier

underlying a flexible membrane liner and a geonet (GN) drainage layer. An asphalt concrete/slag/sand cover was placed over the cap for protection against the elements, erosion, and animal or human intrusion. The final cover was constructed with a minimum thickness of 3.5 feet, and was placed on the geofabric filter overlying the drainage layer. The surface of the protective cover consists of an 8-inch asphaltic concrete layer.

The Slag Pit Sump was closed consistent with the *Slag Pit Wastewater Collection Sump Closure Plan* (Astaris, 2001) that EPA approved in February 2005. The cover construction was completed in October 2005, and FMC certified closure completion in December 2005. The closure certification for the Slag Pit Sump was supported by the Closure Report that contains the closure construction as-built drawings. The Closure Report and as-built drawings are on file with FMC and are available to any FMC contractor performing post closure monitoring and maintenance.

1.2 PREVIOUS RESULTS

The purpose of this subsection is to present information on historical post-closure monitoring experience that supports the development of this *FSP* and includes the following monitoring procedures:

- Settlement monitoring of the Slag Pit Sump cap;
- Rodent impact monitoring on the soil / slag slopes around the Slag Pit Sump cap;
- Stormwater/snowmelt run-off erosion monitoring;
- Survey benchmark monitoring; and,
- Security system monitoring.

A separate *FSP* (included in Appendix A-2 of the *Post-Closure Plan*) covers the slag pit sump groundwater monitoring.

1.2.1 CAP INTEGRITY MONITORING

Several post-closure monitoring activities have been historically conducted to perform cap integrity post-closure monitoring as discussed below:

Settlement monitoring – The objective of the cap settlement monitoring is to determine if excessive settlement or movement of slag pit sump cap materials of construction is taking place. To meet the settlement monitoring objective, annual vertical and horizontal displacement measurements have been historically made of the settlement monument constructed within the Slag pit Sump cap. The previous results of post-closure settlement monitoring appear to be meeting the DQOs and regulatory requirements. Therefore, no change in monitoring schedule or procedures has been made. However, in comments submitted by EPA on June 18, 2010 on a *Draft Pond 16S Post-Closure Plan* modification, EPA stated that: "The PC Plan must specify the magnitude/distance of the seismic event." The procedures for the settlement monitoring field activities, as modified to specify the magnitude/distance of the seismic event are presented in Section 4.3.1 of the *FSP*.

Rodent Infestation Monitoring – The objective of the Slag Pit Sump cap rodent infestation monitoring is to inspect the soil / slag slope around the perimeter of the Slag Pit Sump cap to identify evidence of rodent burrowing. To meet the rodent infestation monitoring objective, the slope around the perimeter of the Slag Pit Sump cap historically has been visually inspected at least semiannually to determine if evidence of rodent burrowing has occurred. Inspections have been performed during the late spring (typically in June) and again in the fall (typically in September when burrowing rodent activity have declined). The previous results of post-closure rodent infestation monitoring appear to be meeting the DQOs and regulatory requirements. Therefore, no change in procedures has been made. The procedures for the rodent monitoring field activities are presented in Section 4.3.2 of this *FSP*.

1.2.2 SLAG PIT SUMP CAP RUN-OFF EROSION MONITORING

The objective of the Slag Pit Sump cap run-on and/or run-off erosion monitoring is to determine if water erosion from run-on or run-off has impaired the designed functionality of the final cap. In addition, stormwater/snowmelt diversionary/accumulation systems are inspected to note and remove debris, sediment, or other obstructions. To meet the stormwater/snowmelt monitoring objective, the Slag Pit Sump cap historically have been visually inspected semiannually and within 48 hours of a 25-year, 24-hour storm event, to determine if cap surface erosion or ponding has occurred. Diversionary/accumulation structures are also inspected for accumulation of debris or sediment and erosion damage. The previous results of post-closure stormwater/snowmelt runoff monitoring appear to be meeting the DQOs and regulatory requirements. However, in comments submitted by EPA on June 18, 2010 on a *Draft Pond 16S Post-Closure Plan* modification, EPA requested that the amount of precipitation that would trigger an additional inspection be specified. Therefore, no change in monitoring schedule or procedures has been made except to specify the precipitation events that would trigger additional monitoring. The procedures for the stormwater/snowmelt monitoring field activities are presented in Section 4.4 of this *FSP*.

1.2.3 SURVEY BENCHMARK MONITORING

The objective of the survey benchmark monitoring is to ensure that the survey benchmarks used to determine the exact location and dimensions of Slag Pit Sump and to perform the settlement monitoring are properly protected and maintained. To meet the survey benchmark monitoring objective, survey benchmark associated with the Slag pit Sump historically have been monitored annually in conjunction with the settlement monument monitoring. The previous results of post-closure survey benchmark monitoring appear to be meeting the DQOs and regulatory requirements. Therefore, no change in monitoring schedule or procedures has been made. The procedures for the survey benchmark monitoring field activities are presented in Section 4.5 of this *FSP*.

1.2.4 SECURITY MONITORING

The objective of the security system monitoring is to ensure that security system is in place, functional, and maintained. The security system for the Slag Pit Sump consists of warning signs. Monitoring of the security system has been conducted at least semiannually to ensure the security system is in place. The previous results of post-closure security monitoring appear to be

meeting the DQOs and regulatory requirements. Therefore, no change in monitoring schedule or procedures is recommended. The procedures for the security monitoring field activities are presented in Section 4.5 of this *FSP*.

2.0 MONITORING OBJECTIVES

The following presents a discussion on the overall post-closure monitoring objectives upon which the DQOs are based.

2.1 MAINTAINING THE INTEGRITY AND EFFECTIVENESS OF THE FINAL COVER

The post-closure performance standards for maintaining the integrity and effectiveness of the final cover are set forth in 40 CFR §265.228(b)(1) and §265.310(b)(1). These state that during the post-closure care period, the owner or operator must "*Maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct effects of settling, subsidence, erosion, or other events.*" The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Collecting sufficient data and information to determine if the Slag Pit Sump cover system is being maintained such that the cap is capable of performing as designed, i.e., limiting infiltration of precipitation and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:
    - Settlement monitoring;
    - Rodent infestation monitoring; and
    - Maintenance or repair as needed to comply with the performance standard based on the monitoring.

The DQOs associated with the maintaining the integrity and effectiveness of the final cover on the Slag Pit Sump are presented in Table 1.1 of the *Slag Pit Sump QAPP* (see Appendix A-1 of the *Slag Pit Sump Post-Closure Plan*).

2.2 MAINTAINING AND MONITORING THE LEAK DETECTION SYSTEM

The Slag Pit Sump was an unlined waste management unit and there is no leak detection system; therefore, this requirement is not applicable to the Slag Pit Sump post-closure plan.

2.3 PREVENTION OF RUN-OFF EROSION OR OTHER DAMAGE TO THE FINAL COVER

The post-closure performance standards for prevention of final cover damage from run-on and/or run-off are provided in 40 CFR §265.228(b)(4) and §265.310(b)(4) which state that during the post-closure care period, the owner or operator must "*Prevent run-on and run-off from eroding or otherwise damaging the final cover.*" The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Inspecting and maintaining the cap surface and stormwater/snowmelt diversion structures (drainage ditches) to minimize cap surface erosion or other damage, and taking corrective

action when deficiencies are noted. The specific actions to meet these objectives consist of the following:

- Inspections of the cap surface for signs of erosion, including cracking or deterioration of the asphalt cap, or ponding of stormwater/snowmelt;
- Inspections of stormwater/snowmelt diversionary structures for accumulation of debris or sediment and/or damage; and
- Maintenance or repair as needed to comply with the performance standard based on the inspections.

The DQOs associated with the run-off erosion of the final cover on the Slag Pit Sump are presented in Table 1.3 of the *Slag Pit Sump QAPP* (see Appendix A-1 of the *Slag Pit Sump Post-Closure Plan*).

2.4 PROTECTION AND MAINTENANCE OF BENCHMARKS

The post-closure performance standards for protection and maintenance of benchmarks are provided in 40 CFR §265.310(b)(5) which state that during the post-closure care period, the owner or operator must "*Protect and maintain surveyed benchmarks used in complying with §265.309.*" The following describes the post-closure actions that FMC will take to ensure that this performance standard is being met.

- Inspecting and maintaining the benchmarks used to survey the Slag Pit Sump location and dimensions and settlement monument movement, and taking corrective action when deficiencies are noted. The specific actions to meet these objectives consist of the following:
  - Inspections of the survey benchmark control stations "94-1" and "94-4"; and
  - Maintenance or repair as needed to comply with the performance standard based on the inspections.

The DQOs associated with protection and maintenance of benchmarks used for surveying at the Slag pit Sump are presented in Table 1.3 of the *Slag pit Sump QAPP* (see Appendix A-1 of the *Slag Pit Sump Post-Closure Plan*).

2.5 MAINTENANCE OF SECURITY SYSTEMS

40 CFR §265.14(a) requires the owner or operator must prevent the unknowing entry, and minimize the possibility of the unauthorized entry, of persons or livestock onto the active portion of the facility. The Slag Pit Sump is wholly enclosed within the boundaries of the FMC plant site which has a combination of fencing around the property boundary, natural barriers and controlled entry. Access to the closed unit is and will be controlled to protect the cover, benchmarks, and monitoring systems from inadvertent access of unauthorized persons. The overall post-closure monitoring objective to demonstrate this performance standard is being met is as follows:

- Inspecting and maintaining the Slag Pit Sump security system, including signs. Also, to take corrective action when deficiencies are noted. This overall monitoring objective is to be demonstrated through the following monitoring activities:
    - Inspections of the Slag Pit Sump warning signs.
    - Maintenance or repair as needed to comply with the performance standard based on the inspections.

The DQOs associated with maintenance of the Slag Pit Sump security system are presented in Table 1.3 of the *Slag Pit Sump QAPP* (see Appendix A-1 of the *Slag Pit Sump Post-Closure Plan*).

3.0 MONITORING LOCATIONS AND FREQUENCY

The Slag Pit Sump cap monitoring locations and frequency are summarized in Table 2.1 of the *Slag Pit Sump Post-Closure Plan* and discussed in the subsections below.

3.1 CAP INTEGRITY MONITORING

The cap integrity post-closure monitoring locations and frequencies for each activity are discussed below:

Settlement monitoring – For the Slag Pit Sump, settlement monitoring will be performed (1) annually until the total cumulative movements for the previous five years are less than the following limits:

- Vertical settlement: 0.03 foot
- Horizontal movement: 0.2 foot

and then every five years during the post-closure period after the above limits are reached; (2) if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events. The criteria for visible subsidence requiring settlement monitoring has been established as an area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater. A triggering seismic event is defined as an event that (1) exceeds a magnitude 5.0 on the Richter Scale with an epicenter within a 20-mile radius as reported by USGS or (2) exceeds a magnitude 6.0 on the Richter Scale with an epicenter within a 50-mile radius as reported by USGS. Settlement monitoring will be based on control stations "94-1" and "94-4," which are local stations in FMC's survey control system. The Slag Pit Sump is equipped with one settlement monument.

The settlement monitoring results will be summarized in the *Slag Pit Sump Annual Post-Closure Report*. Any damage to settlement monuments requiring maintenance will be noted on the inspection form.

Rodent Infestation Monitoring – For the slag pit sump, rodent infestation is monitored on a semiannual basis (typically in June and again in September) on the soil / slag slope around the perimeter of the slag pit sump cap surface. The rodent inspections will be summarized in the *Slag Pit Sump Annual Post-Closure Report*. Any areas of the slope around the Slag Pit Sump cap that require attention (i.e., repair burrowing activities or pest control) will be noted on the inspection form.

3.2 STORMWATER/SNOWMELT RUNOFF OR OTHER DAMAGE TO THE FINAL COVER MONITORING

Stormwater/snowmelt runoff monitoring at the Slag Pit Sump will be conducted on a semiannual basis and within 48 hours of a triggering precipitation event, defined as 2.1 inches (or more) of precipitation within a 24 hour period (NOAA, 1973) as reported for the Pocatello airport weather

station. The monitoring will be conducted over the areal extent of the slag pit sump cap and at all diversionary/accumulation structures associated with stormwater/snowmelt runoff. The stormwater/snowmelt inspections will be summarized in the *Slag Pit Sump Annual Post-Closure Report*. Any areas of the slag pit sump cap or diversionary/accumulation structures that require maintenance (i.e., repair erosion channels or seeding) will be noted on the inspection form.

3.3 SURVEY BENCHMARK MONITORING

Survey benchmarks are used to determine the exact location and dimensions of the Slag Pit Sump and as reference points while performing the Slag Pit Sump cap settlement monitoring. Survey benchmarks associated with the Slag Pit Sump will be inspected annually in conjunction with the settlement monument monitoring. The survey benchmark inspections will be reported in the *Slag Pit Sump Annual Post-Closure Report*. Any survey benchmarks that require maintenance (i.e., damaged, missing, or covered) will be noted on the inspection form.

3.4 SECURITY MONITORING

Monitoring of the security system (i.e., warning signs) will be conducted on a semiannual basis at the Slag Pit Sump. One warning signs will be posted inside the slag pit, adjacent to the slag pit sump, and one warning sign will be posted outside and above the slag pit. The security system monitoring results will be summarized in the annual *Slag Pit Sump Annual Post-Closure Report*. Any security systems that require maintenance (i.e., damaged, missing, or covered) will be noted on the inspection form.

4.0 MONITORING PROCEDURES

This section describes the procedures to be used to perform the Slag Pit Sump cap monitoring and record results. All monitoring will be conducted in accordance with the procedures presented in this section and associated attachments.

Each of the monitoring procedures in this section prescribes the method of observing and documenting variances to acceptable conditions at each of the Slag Pit Sump on a routine basis. In addition to the post-closure monitoring and maintenance activities described in this section, all FMC and FMC contractor personnel working in the Slag Pit Sump area will be responsible for reporting to FMC any observations of conditions that are or reasonably may represent an unacceptable condition at any time. FMC will be responsible for recording the reported condition, assessing the condition based on the requirements of this plan and performing any necessary maintenance to correct unacceptable conditions.

4.1 FIELD DOCUMENTATION

4.1.1 FIELD INSPECTION AND MAINTENANCE FORMS

Field inspection and maintenance forms will document information/data obtained in the field as well as maintenance activities. Field form entries will be complete and accurate enough to permit reconstruction of field activities. At a minimum, the following monitoring information will be recorded:

- Monitoring location and description.
- Monitor/Inspector's name(s).
- Date and time of inspection and monitoring.
- Type of monitoring equipment used.
- Measurement data (e.g. soil thickness). The data will include the numerical value and the units of each measurement.
- Field observations and details important to interpreting the monitoring results (e.g., heavy rains, odors, colors).
- Issues that require maintenance attention.
- Any other observation relevant to a potential threat to cap integrity.

The date(s) of monitoring (monitoring period) will be indicated in mm/dd/yy format, and the time will be indicated in accordance with the military convention. The monitored parameter will be indicated in an unambiguous shorthand.

Each form will be dated and the time of entry noted in military time. All entries will be legible, written in black, waterproof ink, and signed by the individual making the entries. The person recording the notes will sign and date the bottom of every page. Changes will be crossed out with a single line so that the original text remains legible; the change will be initialed and dated. Language will be factual, objective, and free of personal opinions or inappropriate terminology.

4.1.2 PHOTOGRAPHS

In addition to written records, photographs also may be taken as necessary to supplement written descriptions of field activities entered on inspection and maintenance forms.

4.2 SAMPLE LABELING, CHAIN-OF-CUSTODY, HANDLING, AND SHIPPING

While the Slag Pit Sump cap monitoring activities do not routinely involve sampling and laboratory analysis, there are occasions when RCRA waste determination sampling may be performed as described in Section 3.2 of the *Slag Pit Sump Post-Closure Plan.* In these cases of non-routine sampling, the following sample handling procedures will apply.

Sample Labeling: A label will be placed on each sample container submitted for analysis and will include the following information:

- Project name and location
- Sample designation
- Date and time of sample collection
- Preservative (if applicable)
- Sampler's initials
- Requested analyses.

Sample Chain-of-Custody: A chain-of-custody form will be completed and will accompany each sample cooler submitted to the laboratory. This form includes project identification, project location, sample designation, and analysis type. In addition, there are spaces for entry of the sample collection date and time, signatures of the persons relinquishing and receiving samples, and the conditions of the samples upon receipt by the laboratory.

*Sample Handling and Shipping***:** After collection of each sample, the sample container will be placed in a cool dry place pending delivery to the laboratory (e.g., a sturdy cardboard box or plastic cooler).

Because none of the waste determination analyses anticipated for waste determination have short holding times, samples will be delivered to the laboratory either by the sampling team or by carrier (e.g., FedEx, UPS), at the discretion of the sampling team. If samples are to be delivered

to the laboratory on a Saturday or Sunday, the laboratory will be contacted to arrange for sample acceptance.

4.3 CAP INTEGRITY AND EFFECTIVENESS MONITORING PROCEDURES

4.3.1 CAP SETTLEMENT MONITORING PROCEDURES

The cap settlement monument monitoring will be performed on the surface of the Slag Pit Sump cap (1) annually; (2) if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events. The criteria for visible subsidence requiring settlement monitoring has been established as an area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater. A triggering seismic event is defined as an event that (1) exceeds a magnitude 5.0 on the Richter Scale with an epicenter within a 20-mile radius as reported by USGS or (2) exceeds a magnitude 6.0 on the Richter Scale with an epicenter within a 50-mile radius as reported by USGS. To monitor final cover settlement on the Slag Pit Sump cap, the elevation and coordinates of the monument will be surveyed to determine the vertical and horizontal components of the final cover monuments. For accuracy, a surveying instrument will be used to take measurements with the following tolerances:

- Elevation readings: 0.01 foot
- Horizontal displacement: 0.1 foot

Elevation and displacement measurements will be plotted cumulatively versus time. The time scale will be in logarithm of time or square root of time. The settlement curve will be kept up to date with each reading. The displacement measurements (vertical and horizontal movements) will be made annually during the remaining post-closure period or until the total cumulative movements for the last five years are less than the following limits:

- Vertical settlement: 0.03 foot
- Horizontal movement: 0.2 foot

Displacement measurements will be made (1) at least once every five years during the post-closure period after the above limits are reached; (2) if visible subsidence is noted during semiannual run-on and/or run-off erosion monitoring or other monitoring and/or maintenance; and (3) after local seismic events. The criteria for visible subsidence and a triggering seismic event are defined above. Settlement monitoring will be based on control stations “94-1” and “94-4,” which are local stations in FMC’s survey control system. The coordinates for these stations were derived from the U.S. Coast & Geodetic Survey (US C&GS) Control Station

MCDOUGAL-2 and BM Y-96. The vertical datum is based on the 1968 adjustment of the National Geodetic Vertical Datum of 1929 (NGVD 29) by the US C&GS.

Any damaged monument detected during post-closure inspections/measurements will be noted on the surveyor's field log and entered on the maintenance form. Any maintenance necessary to clear access to or repair settlement monuments will be performed as soon as practicable so as not to cause any delay for the next scheduled monitoring event.

Any repairs or maintenance of the final cover necessary due to observed visible subsidence will be performed as soon as practicable so as not to cause any localized ponding of precipitation on the cap surface or if the subsidence was identified due to observed localized ponding of precipitation on the cap surface so as to eliminate the potential for future ponding of precipitation on the cap surface. An area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater will require maintenance as soon as practicable. Repairs and/or maintenance to eliminate or prevent potential ponding on the cap surface will commence within seven (7) days unless delayed as specified below. Commencement of repairs and/or maintenance includes actual field work (for simple or minor maintenance) and initiation of engineering, planning and/or procurement of additional materials to perform the maintenance and/or repairs (for more complex or larger scale maintenance). Maintenance or repairs will not be performed if frozen soil / snow cover / muddy conditions exist such that the cap surface cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or are not feasible due to frozen soil/snow cover conditions (typically between November 15 through April 15) where maintenance/repairs are required. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable cap surface conditions. In the event maintenance or repairs must be delayed beyond commencement within seven (7) days for cause(s) other than frozen soil / snow cover / muddy conditions, FMC will notify EPA within 48 hours of the observation of a condition for which the maintenance/repair will be delayed. The notification will include a description of the reason(s) for the necessary delay and a schedule for commencing the maintenance and/or repairs.

All repairs to the final cover will be conducted in accordance with the final cover construction specifications, and all testing and inspections will be conducted in accordance with the final cover *Construction Quality Assurance* (CQA) *Plan* attached to the Slag Pit Sump Closure Plan. Following completion of repairs, confirmation of completion of repairs will be documented on the maintenance form.

4.3.2 RODENT INFESTATION MONITORING PROCEDURES

The cap rodent monitoring will be performed semiannually. The purpose of the cap rodent infestation monitoring is to inspect the soil / slag slope around the perimeter of the Slag Pit Sump cap to visually identify evidence of rodent burrowing. Inspections will be performed during the late spring (typically in June) and again in the fall (typically in September when burrowing rodent

activity has declined).

Using the inspection form, the inspector will perform the following at the Slag Pit Sump:

- Record the date, time, inspector's name on the form and sign the form.
- Walk around the outside of the slag pit sump cap perimeter. Note any evidence of unusual rodent activities, i.e., excessive burrowing and/or mounds of soil that, in the judgment of the inspector, would result in unacceptable soil erosion per run-off erosion monitoring.
- Record any unacceptable conditions requiring maintenance and enter on the maintenance form. Record the date entered on the maintenance form.
- Corrective actions to address rodent activity, e.g., fill holes or burrows, will be performed as soon as practicable. Maintenance to fill holes or burrows will not be performed if frozen soil / snow cover / highly muddy conditions exist (typically between November 15 through April 15) where the maintenance is required, but, if delayed by surface conditions filling holes / burrows will commence within seven (7) days of the presence of acceptable cap surface conditions. Burrowing activity may also warrant the use of pesticides to eradicate the pest. Following completion of repairs/corrective actions, confirmation will be documented on the maintenance form.

4.4 CAP STORMWATER/SNOWMELT RUNOFF OR OTHER DAMAGE TO THE FINAL COVER MONITORING PROCEDURES

The cap stormwater/snowmelt runoff monitoring will be performed (1) semi-annually and (2) within 48 hours of a 25-year, 24-hour storm event defined as 2.1 inches (or more) of precipitation within a 24 hour period (NOAA, 1973) as reported for the Pocatello airport weather station. The objective of these visual inspections will be to determine if cap surface erosion, including cracking or deterioration of the asphalt cap, or ponding has occurred. The criteria for localized erosion or ponding requiring maintenance has been established as an area of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater. The surface and edges of the slag pit sump cap will be visually inspected semi-annually for evidence of cracking or deterioration of the asphalt cap that, in the judgment of the inspector, could reasonably be expected to diminish the asphalt layer capability to protect the integrity and functionality of the underlying low permeability geosynthetic layers of the cap system. Stormwater/snowmelt diversionary/accumulation systems are inspected to note and remove debris, sediment, or other obstructions. As the stormwater/snowmelt runoff monitoring requires that the surface of the cap and the associated diversionary structures are visible, this monitoring cannot be performed if the cap is snow-covered. If snow-covered, the stormwater/snowmelt runoff monitoring will be re-scheduled when conditions permit inspection.

Using the inspection form, the inspector will perform the following at the Slag Pit Sump:

- Record the date, time, inspector's name on the form and sign the form.
- Walk around the outside of the Slag Pit Sump perimeter. Note any evidence of sheet erosion or erosion channels (rills).
- Walk over the entire surface of the Slag Pit Sump cap. Note any evidence of sheet erosion or erosion channels.
- Note any ponding of accumulated precipitation particularly areas of approximately 10 square feet (a 3 foot by 3 foot or 3.5 foot diameter area) or greater where precipitation ponding is observed or could occur to a depth of 1 inch of water or greater, erosion channels, or evidence of rodent activity that, in the judgment of the inspector, could reasonably be expected to result in soil erosion per run-off erosion that could compromise the integrity and functionality of the cap system.
- Inspect all associated stormwater diversionary structures (i.e., swales, ditches, accumulation areas, etc.) and note any excessive erosion or other damage and/or accumulation of sediment or debris that could impair the functionality of the diversion and drainage structures.
- Record any unacceptable conditions requiring maintenance and enter on the maintenance form. Record the date entered on the maintenance form.

Any maintenance shown to be required based on inspection of the Slag Pit Sump cap surface and diversion structures will be performed as soon as practicable. Maintenance or repairs to the diversion and drainage structures that could impair the functionality of the diversion and drainage structures and maintenance and/or repairs to eliminate or prevent potential ponding on the cap surface will commence within seven (7) days unless delayed as specified below. Commencement of repairs and/or maintenance includes actual field work (for simple or minor maintenance) and initiation of engineering, planning and/or procurement of additional materials to perform the maintenance and/or repairs (for more complex or larger scale maintenance). Maintenance or repairs will not be performed if frozen soil / snow cover / muddy conditions exist such that the cap surface cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or are not feasible due to frozen soil / snow cover conditions (typically between November 15 through April 15) where maintenance/repairs are required. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable cap surface conditions. In the event maintenance or repairs must be delayed beyond commencement within seven (7) days for cause(s) other than frozen soil / snow cover / muddy conditions, FMC will notify EPA within 48 hours of the observation of a condition for which the maintenance/repair will be delayed. The notification will include a description of the reason(s) for the necessary delay and a schedule for commencing the maintenance and/or repairs. Following completion of repairs, confirmation will be documented on the maintenance form.

4.5 SURVEY BENCHMARK AND SECURITY MONITORING PROCEDURES

Monitoring of survey benchmarks will be conducted annually at the same time as the settlement monument monitoring is performed. The surveyor performing the settlement monitoring will inspect the following at each survey benchmark control stations:

- Ensure the survey benchmark is in place;
- Check for survey benchmark damage;
- Note any evidence of tampering; and
- Record any unacceptable conditions requiring maintenance and enter on the maintenance form. Record the date entered on the maintenance form.
- Any maintenance shown to be required based on inspection of the survey benchmarks will be performed as soon as practicable and within a timeframe that will not delay the next scheduled monitoring event.
- Following completion of repairs, confirmation will be documented on the maintenance form.

Monitoring of security systems will be conducted semiannually to ensure all security systems are in place and functioning as designed. The monitoring will involve:

- Inspections of warning signs to ensure that signs are properly posted, are legible, and are posted in English;
- Observations of any evidence of unauthorized entry or attempted entry into the Slag Pit Sump area; and
- Record any unacceptable conditions requiring maintenance and enter on the maintenance form. Record the date entered on the maintenance form.
- Any maintenance shown to be required based on inspection of the security systems will be performed as soon as practicable. Repairs and/or maintenance of the warning signs will commence within seven (7) days unless delayed as specified below. Commencement of repairs and/or maintenance means performing actual field work, in the case of simple or minor maintenance, or, in the case of more complex or larger scale maintenance, initiation of engineering, planning and/or procurement of additional materials to perform the maintenance and/or repairs. Maintenance or repairs will not be performed if frozen soil / snow cover / muddy conditions exist such that the cap surface cannot be accessed and/or perimeter slope could be damaged to implement the repair/maintenance activity or if that work is not feasible due to frozen soil/ snow cover conditions (typically between November 15 through April 15) at the area where maintenance/repairs are required. If maintenance or repairs are delayed by surface conditions, any repairs or maintenance will commence within seven (7) days of the presence of acceptable cap surface conditions. In the event commencement of maintenance or repairs must be delayed beyond seven (7) days for cause(s) other than unacceptable surface conditions as described above, FMC will notify EPA within the initial 48 hours of the seven (7) day period. The notification will include a description of

the reason(s) for the necessary delay and a schedule for commencing the maintenance and/or repairs.

- Following completion of repairs, confirmation will be documented on the maintenance form.

4.6 EQUIPMENT DECONTAMINATION PROCEDURE

Equipment for cap integrity monitoring will not typically require decontamination. All of the monitoring equipment will be dedicated to a specific monitoring location. As a result, there is no possibility of cross contamination.

5.0 DISPOSAL OF WASTE

The following waste streams are anticipated as result of the cap integrity monitoring.

- Anticipated waste generation as result of monitoring and/or maintenance activities:
    - Debris removed from stormwater ditch maintenance;
    - Groundwater monitoring well purge water; and
    - Spent PPE.

RCRA waste determination and disposal is addressed in Section 3.0 of the *Slag Pit Sump Post-Closure Plan.*