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**Responses to DOE Comments on MWH's Northeast Church Rock Mine Site Removal
Action Pre-Design Studies Dated August 16, 2013**

**Northeast Church Rock Mine Site Removal Action Pre-Design Studies Work Plan, Church
Rock Mill Site Specific Comments:**

1. Sections 1.2.1 & 1.6: *Section 1.2.1 of the report states approximately 870,000 cubic yards (cy) of mine spoils and debris will be removed from the NECR mine site and consolidated into a new repository at the Church Rock mill site as specified in EPA's Action Memorandum: Request for a Non-Time Critical Removal Action at the Northeast Church Rock Mine Site (Action Memo) released in September 2011. However, DOE believes the Action Memo also indicates an additional 139,800 cubic yards of material will be removed. If DOE's understanding of the Action Memo is correct, approximately 1 million cy of material from the NECR mine site will be placed in the proposed repository. DOE requests clarification on whether the +/- 20 percent volume contingency specified in Section 1.6 is based on the estimate of 870,000 cy or 1 million cy of material. DOE is concerned that the 20 percent contingency may be exceeded and additional, unanticipated waste could expand the footprint area of the proposed repository which the existing predesign studies work plan may not address. Is there an additional contingency in place if the 20 percent contingency is exceeded?*

Response: This has been addressed in Section 1.6.

2. Section 2.2.4
 - a. *2nd Paragraph: Characterizing soil hydraulic properties of analog soil profiles is important. Because it is necessary to understand soil structure as structural planes and fissures can form over time. The establishment of soil structure in an ET cover may influence its performance with respect to radon flux. Will data also be collected which can be used to evaluate possible long-term changes in radon diffusion and flux?*

Response: The soil structure formed in the cover due to soil pedogenesis over a long period of time alters the soil hydraulic properties. We acknowledge that hydraulic properties of the cover system will change in time, due to these processes. However, the testing of cover materials based on soil structure development is not included as a part of the PDS Work Plan. The design process will evaluate a cover system for both near-term and long-term hydraulic properties. Properties measured in the laboratory at remolded densities, matching those expected during installation of the cover, will be evaluated, as well as hydraulic properties measured from applicable natural analogs that will help evaluate the cover system for its long-term hydraulic properties.

- b. *2nd Paragraph: Obtaining information about past land use at natural analog areas would help validate whether soils and vegetation are undisturbed.*

Response: This has been addressed in Section 2.2.4.

- c. *3rd Paragraph: The report states that "a tension infiltrometer or similar instrumentation" will be used. As possible alternative instrumentation to the tension infiltrometer which will allow measurement of in situ soil properties, DOE suggests considering the use of undisturbed block sampling and laboratory analysis. An example follows.*

Block samples would be collected by hand-trimming large intact soil pedestals following the procedure in ASTM D 7015. The larger than normal ring diameter would ensure that pedogenic features are included in the sample. All samples would be sealed for transportation to the lab. Test specimens would be trimmed from the block samples for testing in flexible-wall permeameters using the falling headwater rising tailwater procedure in ASTM D 5084. After the completion of hydraulic conductivity tests, soil water characteristic curves (SWCCs) would be measured on the test specimens following the procedures in ASTM D 6836. A pressure plate would be used to determine the wet end values of the SWCC and a chilled mirror hygrometer would be used to determine the dry end values.

Response: Block samples may be collected depending on the soil type and field judgment. The text has been modified in Section 2.2.4.

3. Section 2.2.4 & 2.2.6: *Please clarify whether the natural and vegetation analog areas are the same as those proposed for the borrow materials investigation (Section 3.1.2). If the samples used for the analog areas assessment are the same as those specified in 3.1.2, the tests and methods are thorough and appropriate as agronomic and edaphic properties will be determined. However, if the samples used for the analog areas assessment are different (even if taken from nearby areas), DOE requests that consideration be given to fully characterizing those samples as well, to include the testing of agronomic and edaphic properties. Soils from nearby areas may differ. The usefulness of data will depend on how similar the analog soils are to soils used for the proposed repository cover.*

Response: This has been clarified in Sections 3.1.4 and 3.1.6.

4. Section 2.2.9: *If an aerial topographic survey is performed, would a survey of the entire area of the existing disposal cells be conducted? This could help establish a baseline to assess potential future settlement and erosion.*

Response: The area included in an aerial survey will be performed for the areas of the surface and peripheral features of the north and central cells, pipeline arroyo (including the rock jetty), and diversion channels and adjacent berms. The aerial survey will generally extend from the North Drainage Borrow Area south to the West Borrow Area. This has been clarified in Section 3.1.9.

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5. Section 3.1.1.1 & Table 3-3: *This section and table specify testing to be conducted on the cover materials associated with the existing tailings cover at the Church Rock mill site. As suggested on the supplemental data needs report, DOE still believes it necessary to test for agronomic and edaphic properties. DOE requests that reconsideration be given to testing for these properties, as agronomic and edaphic properties of the admixture soils may also have changed over time (e.g., leaching may have modified the chemical composition, organic matter may have accumulated). Although the soil portion of the admixture was derived from known borrow areas, the admixture has been in place on the existing cells for a period of time. Additionally, it is not known whether the original source of the admixture was topsoils or subsoils, and properties of these two sources can be different. If admixture soils are potentially used in an ET cover, it would still be of benefit to test these soils in the same manner as the borrow soils to allow for full characterization.*

Response: Testing for agronomic and edaphic properties has been included in Section 3.1.1.1 and Table 3-3.

6. Section 3.1.1.2 (item #3): *DOE suggests consideration be given to specifying a standard penetration speed for cone penetration test (CPT) soundings at 2 cm/sec. Additionally, continuous observations and records of all sounding readouts would provide more complete data than observations only at specified intervals.*

Response: Soundings at 2cm/s has been included in Section 3.1.1.2 and Appendix C, SOP-01.

7. Section 3.1.4 (item #2): *The report states that tentative depths for tension infiltrometer measurements of the proposed borrow soil material(s) are 1, 2, and 3 feet below surface. Will the established depths correspond to the full range of possible soil sponge layer depths in an ET cover if it is proposed? Changes in soil morphology can occur at depths below 3 feet. It would be useful to have data for depths further below the surface if a soil sponge layer thicker than 3 feet is proposed in order to better predict its overall effectiveness.*

Response: The depth of the soil analog testing has been extended to evaluate soils to a depth of 5 feet below the ground surface, as shown in Sections 2.2.4 and 3.1.4.

8. Section 3.1.1.3 (item #7): *This section states that an alternative may be to conduct geotechnical testing onsite which would not require taking the samples offsite. If this alternative is developed, DOE requests the opportunity to review any supporting documents further describing this option.*

Response: This option was described at the Design Team meeting held on September 11, 2013. We have not identified a geotechnical laboratory with a license to test radioactive materials as well as the capabilities to perform the soil moisture retention tests. An on-site laboratory will be set up and used to conduct

the geotechnical and hydraulic testing presented in the Report. Use of an on-site lab will also minimize sample disturbance resulting from sample shipping. Some soil samples that have been scanned and determined to be non-hazardous may be shipped to an offsite lab for geotechnical testing. This has been updated in Section 3.1.1.3.

9. *Section 3.6: The pre-design studies work plan associated with the mine site describes a laboratory analytical program to be used for the analysis of surface and subsurface soil samples. This includes identifying soil analytical methods (Section 2.4.2), geotechnical analysis standards (Section 2.4.3), and the laboratories which will conduct the analyses (Section 2.4.5). DOE suggests consideration be given to including a similar level of detail, or analytic program, in the pre-design studies work plan for the mill site. The geotechnical testing laboratory used for the analysis will need to be a licensed or permitted to handle radioactive materials.*

Response: See the response to Comment No. 8 above. The testing standards for the proposed geotechnical testing at the Mill Site are listed in Tables 3-3 through 3-5.

Northeast Church Rock Mine Site Removal Action Pre-Design Studies Work Plan, Church Rock Mill Site General Comments:

1. *Sections 2.2 and 3.0 address previous DOE comments on the supplemental data needs report regarding cover soil edaphic properties, natural analogs, revegetation plans, success criteria and monitoring metrics, and biointrusion. DOE's comments were addressed. Including these items in the pre-design studies and using the results to inform the design of a new repository cover will increase the likelihood of the repository being more sustainable for the long-term.*

Response: Acknowledged.

2. *DOE suggests considering electrical resistivity cone penetration testing (RCPT). RCPT would produce a more comprehensive set of data than CPT, including relative moisture content. An RCPT combines downhole analysis of soil resistivity with piezocone penetration testing to provide real time estimates of soil stratigraphy, permeability and strength. The electrical resistivity provides relative moisture contents if the tool is uncalibrated for specific tailings, or absolute moisture contents if the resistivity piezocone is calibrated for the tailings.*

Response: If the schedule allows, cone penetration testing will include electrical resistivity measurements. Additionally, a CPT evaluation will include a seismic piezocone to obtain measurements of shear wave velocity in areas of saturated tailings, if they exist. This information will be used during the design of the repository. The text has been updated in Section 2.2.1.2.



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Northeast Church Rock Mine Site Removal Action Pre-Design Studies Work Plan, Church Rock Mill Site Observations:

1. *Section 1.5: The 8th bullet states that ground water concentrations shall not exceed remediation goals set in EPA's 1988 ROD for a Ground Water Operable Unit (to include any potential ROD amendments) for the proposed waste repository at the Church Rock mill site. It is not understood whether the design will also take into consideration standards set in accordance with 40 CFR 192 which also apply at the mill site.*

Response: This list of objectives was taken directly from the ROD amendment, verbatim, and is not meant to imply that impacts to groundwater may occur; groundwater will not be impacted by the proposed Removal Action. Federal regulation 40 CFR 192 is addressed in Table 1-1.

2. *Section 2.2.1.2 (item #2, pg. 7): Is it intended that three CPT soundings, rather than two, are proposed in Burrow Pit No. 1? Section 3.1.1.2 as well as Figures 3-1 and 3-2 state three CPT soundings will be located in or near Burrow Pit No. 1.*

Response: The sample locations have been revised (See revised Figures 3-1 and 3-2). The borrow Pit No. 1 area will include four CPT and two boreholes.

3. *Section 3.1.1.3 (item #7): This section references Table 5-1 and Table 5-2, but tables with these numbers were not found in the report.*

Response: This has been corrected in Section 3.1.1.3.

Northeast Church Rock Mine Site Removal Action Pre-Design Studies Work Plan, Northeast Church Rock Mine Site Specific Comments:

1. *Section 2.1.2: Will a linear relationship between the existing borehole and a new hole to establish where principal threat waste (PTW) material may be found be delineated, or will another method be used (e.g., assuming the extent of PTW ends at half way between the two holes)?*

Response: A response to this comment is provided in Section 2.1.2. A weighted average between the two holes will be used to estimate the extent of PTW between two boreholes.

2. *Section 2.1.4: DOE requests assurance that if suspect waste (odors, discolored, broken batteries, transformers, etc.) is discovered during sampling or excavation of mine waste materials that a process is established to further sample the suspect material to determine if RCRA hazardous waste is present.*



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Response: Revised text in Section 2.1.4 provides a response to this comment. Methods and procedures to be used during construction will be specified in the Construction Work Plan.

3. *Section 2.2.4: If sampling for radium-226 occurs every 5 feet, it is unclear how the depth of contamination will be determined with a fair amount of accuracy. DOE believes the depth needs to be determined with precision to help estimate the volume of material as well as the dimensions of the proposed repository. Downhole logging has proved to be a useful tool to delineate contaminated soils and was successfully used by the DOE to characterize 4000 vicinity properties. DOE has established procedures for using Eberline and Bicron gamma-ray detectors and published papers, such as the Technical Measurement Center Report- GJ/TMC-03(82), on the use of the detectors for downhole total count logging.*

Response: Revised text in Section 2.2.1 and 2.2.2 provides a partial response to this comment, concerning sample frequency (samples collected for PTW screening or laboratory analysis will be collected at a frequency of at least 2.5 feet). While downhole logging may be a useful tool, it is MWH's professional opinion and experience that the proposed ex-situ screening method provides results consistent with laboratory analytical results as demonstrated during prior sampling programs at the site. Furthermore, it may require significant effort to find and utilize a suitable calibration target (e.g., the DOE calibration pad in Grants, NM) with a borehole of similar geometry and construction (e.g., steel auger diameter and thickness). It is our recommendation that downhole logging not be utilized on this project.



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Responses to EPA Comments on MWH's Predesign Sampling Plans for Design of a Repository and Placement of Mine Material on the Existing UNC Mill Site Tailings Impoundment Dated August 16, 2013

- A. *The proposed borings on the Mine Site may not be sufficient to estimate the waste volume to use ± 20 percent design volume contingency.*

Response: The waste volume estimate will be updated based on the results of the Pre-Design Studies (PDS). Several factors will be used in development of the updated waste volume estimate: (1) the volume between the current top-of-waste surface and pre-mine topography; (2) the known horizontal limits of the mine facilities; (3) surface soil analyses and static gamma results; and (4) field observations and survey measurements from all of the subsurface soil borings and trenches that have been advanced at the mine site. The proposed borings are located to confirm specific elements of previous removal site evaluations. This is described in Section 2.1.

- B. *The sampling plan for refinement of the volume of PTW is based on the premise that the sampling conducted in the RSE found all the locations where PTW is located. However, the historic boring locations were not systematically located on a grid but were randomly selected.*

Response: Three phases of subsurface soil screening, sampling and analysis were conducted at the mine site in 2007 and 2008 (the results of these SRSEs are shown in Appendix B of the Mine site draft PDS Work Plan). The subsurface sampling and analysis plan was conducted in accordance with the approved RSE Work Plan, which specified sampling locations based on a judgmental sampling plan. This was done to allow the use of site-specific data and knowledge of the mine site features and distribution of mine spoils in selecting sampling locations. The selection of sampling locations based on knowledge of mining activities on site provides for a focused sampling program, and is preferable to a grid sampling program. Previous sampling locations and the proposed PDS sampling locations, address the likeliest locations in which to find PTW and the areas where the thickest portions of each survey area exist. Excavation control radiation surveying will be conducted during construction to evaluate the presence of PTW levels of Ra-226.

- C. *Items that are of specific interest to the community include:*

- revegetation plan
- potential settling associated with debris
- potential for squeezing
- whether a liner is included or not

Response: Data collected from the Pre-Design studies will help to address each of these items. The information collected during the Pre-Design Studies will be used to design the repository and the Removal Action.



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- D. *The community has also requested that they be consulted prior to any cultural or vegetation survey. Given the community's interest, EPA requests that the biologist and archeologist consult with the local community prior to performing any vegetation or historical/cultural surveys to acquire local knowledge about the current resources. The biologist may need to conduct a community meeting prior to the surveys.*

Response: The surveys will be conducted on private property owned by UNC. However, both the archeologist and the biologist will attempt to consult the local community prior to performing the surveys. This has been added in Section 3.1.7 of Volume I – *Pre-Design Studies Work Plan, Church Rock Mill Site*.

Mine Area Comments:

1. *Section 1.2, pg 2 – excavation will be based on Ra-226, but the final site survey also has to verify that other COPCs remain below action levels selected in the Action memo. (arsenic, molybdenum, selenium, uranium and vanadium).*

Response: The mine site Removal Action will be based on excavation of soils containing Ra-226 above the Removal Action Level (RAL) of 2.24 pCi/g Ra-226. Concentrations of Ra-226 above the RAL are related to mine operations and assumed to be co-located with other COPCs related to mining. Therefore, impacted soils can be addressed by sampling, surveying and analyzing for Ra-226. No change to the work plan has been made.

2. *Section 1.4; pg 6 “The majority of the soils removed during the interim actions contained Ra-226 concentrations at or near the 2.24 pCi/g RAL. Composite soil samples will be collected of these soils from select areas on the NECR-1 pad to evaluate the average Ra-226 concentrations to assist with the removal design”. Please explain how composite soil samples will be used in the design.*

Response: The objective of this sampling design is to estimate the bulk Ra-226 activity to confirm that those soils contain low levels of Ra-226 (at or below the RAL) to allow consideration of placing those soils near the top of the repository in the design. These soils will be screened during construction to further confirm the radiation levels. It is not necessary or helpful to analyze individual discrete Ra-226 concentrations, as these soils were adequately characterized during the RSE.

3. *Section 1.5: The preferred format for delivery of geospatial data to EPA is the geodatabase. For an explanation of geodatabases, see: <http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//003n0000007000000>.*

Response: Section 1.5 has been modified to state that the geospatial database will be provided to the EPA in the ESRI geodatabase format.



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EPA Region 9 requires a minimum set of data elements in EPA's free Metadata Editor. The EPA Metadata Editor (EME) can be downloaded at <https://edg.epa.gov/EME/>.

Response: Section 1.5 has been revised to state that the minimum set of data elements required by EPA Region 9 for each data layer, and will utilize the EPA Metadata Editor tool.

4. *Section 2.1.2, Sampling in the areas where an earlier sample indicated PTW will only provide a better estimate of the extent of PTW in that one location, but does not identify other locations where PTW may be located but had not been found due to infrequent borings. It may be useful to explain how GE/UNC anticipates separating the PTW from other waste before determining adequacy of the plan.*

Response: The locations of PTW previously detected (see RSE Report) were at the most likely locations to encounter PTW. Proposed PDS sampling locations are targeting these same areas, and are based on previous RSE results, as well as based on knowledge of mining activities on site and knowledge of where materials with potentially higher radioactivity would be located. PTW will be separated during excavation based on field screening. No change to the work plan has been made.

The method to segregate PTW during construction will be described in detail in the Removal Action Construction Plan. However, the basic method consists of excavation control surveying that will be conducted during construction to provide real-time excavation guidance. The survey will consist of in-situ direct gamma radiation level measurements in the field, using a 2x2-inch NaI gamma scintillation detector in shallow areas and ex-situ direct gamma radiation level measurements in the field using a 3x3 NaI detector for areas deeper than approximately 2 feet below ground surface. The gamma radiation level in counts per minute (cpm) that is equivalent to the RA Action Level (2.24 pCi/g Ra-226) will be based on a site-specific correlation.

5. *Section 1.5, pre-studies design report. Is the report going to include the basis of design?*

Response: The Pre-Design Studies Report will include the results of the PDS investigations. An updated Basis of Conceptual Design will be provided in the Design Work Plan.

6. *Section 2.1.2: Please provide a copy of the historic mine maps to EPA.*

Response: Single copies of historic mine maps are available on Mylar film paper and can be reviewed at the UNC offices by request.



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7. Section 2.2.1: "samples will be collected for ex-situ gamma screening a minimum of every five feet screened using....." missing end of sentence. Please explain why a five foot interval is adequate to detect the presence of PTW.

Response: Revised text in Section 2.2.1 provides a response to this comment. Samples will be screened in the PTW holes at a frequency of at least every 2.5 feet until the vertical extent of PTW is encountered.

8. Section 2.2.1: A composite sample over the interval may not be representative if the interval is too long. Please explain the rationale for determining the interval in the field.

Response: Revised text in Section 2.2.1 provides a response to this comment. The term "composite" is in error; samples collected for laboratory analysis will be collected from discrete intervals, as described in Section 2.2.1.

9. Section 2.2.2: Will the representative sample collected for calibration for the ex-situ gamma be sent to the lab?

Response: Revised text in Section 2.2.2 provides a response to this comment. There will be two reference samples used for this investigation, a low level one near the FSL of 2.24 pCi/g and a high level one near the PTW level of 200 pCi/g. The low level reference sample already exists, as it was prepared for the use during the 2009 IRA, was again used during the EDRA, and has since been kept in storage for later use. That sample was prepared by collecting a soil sample at the site where it was known the concentrations were near the FSL. That sample was then sent to the laboratory for analysis of Ra-226 to confirm the concentration. This low level reference sample has a Ra-226 activity of approximately 2.0 pCi/g, which is conservatively below the RAL.

The high level reference sample will be prepared for this investigation. This reference sample will be prepared by blending a local matrix soil near background levels with a Certified Reference Material (CRM) from the Department of Energy's New Brunswick Laboratory (NBL). The matrix blending will provide compensation for local background. The higher radium content CRM will be diluted with the local matrix to bring the reference sample concentration to approximately 200 pCi/gm of Ra-226. This reference sample will then be used to screen the samples collected during drilling to assess the presence of PTW, as described above. Due to the use of a CRM, laboratory analysis is not necessary.

10. Section 2.5: Please include the number of borings.

Response: The proposed number of borings are listed in Table 2-1.

11. Table 1-1, Site restoration. Also, will need to evaluate impact of site land reconfiguration's potential to cause downstream flooding.



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Response: The design will include storm water modeling for the proposed grading plans to determine runoff volumes that could discharge to downstream areas during the design storm event. The design storm event will be developed during the design.

12. AVM SOP-01, SOP-2, SOP-3 and SOP-4: *These SOP's are verbatim from the previous removal action, and therefore, the purpose and scope do not reflect the pre-design sampling program.*

Response: The existing AVM SOPs are already site-specific and don't need to be changed. SOP-1 referenced the EDRA, but that SOP was inadvertently included; it is not needed, as it is not necessary to revise the correlation. AVM SOP-1 has been removed from the plan.

13. Response to DOE comments: *GE states that the sampling program is not intended to accurately calculate volumes and that actual extent of clean soils will be done as part of the excavation control survey during construction. EPA agrees that the final status survey is what will be used to determine final clean-up. Proposed sampling of clean areas will need to be verified at completion of the action.*

Response: Acknowledged.

Mill Area Comments:

1. Section 1.1: *EPA understands that the QAPP and H&SP will be submitted shortly.*

Response: The QAPP was submitted on August 30, 2013, and the HASP was submitted on September 6, 2013. These documents are currently being revised to address agency comments.

2. Section 1.5: *The performance standards stated are not the RAOs listed in the ROD. To avoid confusion, the actual RAOs should be used verbatim.*

Response: Section 1.2.1 has been revised to list the RAOs verbatim as presented in the ROD. Section 1.5 includes a summary of the performance standards.

3. Section 1.6: *If GE designs for a +/- 20% contingency, then GE should provide a proposal for how to proceed if estimates exceed 20%.*

Response: This will be addressed in the design package.



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4. Section 1.6: *Table 1-1 is a summary of the criteria considered but does not provide sufficient detail to be considered the basis for design.*

Response: The title of the table has been changed to *Basis of Conceptual Design Summary*.

5. Section 2.1: *The plan states that procedural elements will be included in the design, but the basis for procedural processes, such as what the design rain event will be, what are the evapotranspiration assumptions in the ET cap, water balance calcs, etc has not been provided.*

Response: These items will be provided with the design.

6. Section 2.2.1.2: *From the figure it looks like there are 3 CPT's (#7, #8, #9) but text states two CPTs.*

Response: Section 2.2.1.2 has been updated to reflect the changes to the impoundment investigation.

7. Section 2.2.1.2 and Table 3-1: *Given that the fine tailings are the most sensitive material in the model and the design, it may be better to collect and analyze more fine tailings and less coarse tailings. (Current proposal has 20 coarse grain tailings analyses and 8 fine grain tailings analyses). Including more fine tailings may require a revision to the proposed boring locations.*

Response: We agree that the fine-grained portion of the tailings are the most critical for evaluation of settlement and porewater migration. Existing borehole data was used to develop the thickness of the tailings within the impoundment and historic information regarding mill operation that indicates about 20-25% of the tailings is considered "fine-grained". Text summarizing the sampling locations and basis for selecting each location has been included in Section 2.2.1.2. The number of tailings samples proposed for testing (Table 3-3) is based on the quantities of materials (fine-grained tailings, coarse-grained tailings, alluvium, etc.) we expect to encounter in each borehole.

Sample location 8 has been moved to the Borrow Pit No. 1 area which may result in more fine tailings samples than previously proposed. Sample location 9 has been moved closer to historic tailings boring 660, located in Borrow Pit No. 1. Based on the revised boring locations and the materials encountered in historical borings drilled at the site we expect to recover at least twice as many coarse tailings samples as fine tailings samples. (See Revised Figures 3-1 and 3-2). If more fine tailings are encountered than anticipated and these materials can be sampled, the test quantities will likely be adjusted to reflect the actual proportions of each type of tailings material. Table 3-3 has been revised to reflect the updated, projected test quantities based on the revised sampling locations.



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8. Section 2.2.4: Please explain if a recent rain event would impact the results of the analog site testing.

Response: The moisture retention is best developed over a range of moisture contents from dry to wet. Therefore, if a recent rain event significantly increased the soil moisture content above the intended range, the test would be delayed until the soil dried to an acceptable level. The saturated hydraulic conductivity would be unaffected.

9. Section 2.2.6: Please explain why a survey of the vegetation on the existing cover is not also being completed. The existing vegetation on the Tailings Disposal Cell was not designed or planted, but has established itself under current conditions.

Response: Sections 2.2.6 and 3.1.6 have been modified to include a baseline vegetation survey of the existing impoundment cover.

10. Sections 2.2.7. Please verify that the cultural studies on or adjacent to the disturbed area is for use in the design and any studies required for the Environmental Report will be discussed in subsequent documents.

Response: Any studies performed for the Environmental Report will be described in documents separate from these Pre-Design Work Plans.

11. Section 3.1.1.2: Where is the SOP for the pore pressure dissipation tests?

Response: The SOP for drilling has been revised to include details describing how the pore pressure dissipation tests will be performed during the CPT investigation.

12. Section 3.1.1.3: Describe how to deal with little to no recovery of material.

Response: If sampling results in two or more pairs of consecutive samples with no recovery at a given borehole location, up to two step-out borings will be attempted two to five feet away from the original borehole location. If the two additional boreholes encounter similar results, the location will be considered complete and no further sampling will be attempted.

13. Section 3.1.1.3: If samples are left at Mill Site, how will they be secured?

Response: Samples will be stored in a heated and secure area within one of the existing mill buildings until laboratory testing is complete. After testing is complete, any remaining samples from the impoundment investigation will be containerized and stored in a locked location on Site.



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14. Section 3.1.1.3 #3: *Vertical sampling locations and sample interval is unclear. It reads that a 2.5' foot sample will be collected for every 5 foot interval, and then a 2.5' sample collected using SPT, followed by another 2.5' sample within the next 5 foot interval. In a 12.5 foot interval, three samples will be collected. Please clarify.*

Response: In a 5-foot interval, full recovery would include two 30-inch acrylic liner samples (inserted inside the 60-inch continuous core barrel) and one modified SPT sample between each 5-foot interval. The five-foot core barrel will be extracted on five-foot intervals and the two 30-inch acrylic liner samples will be extracted from inside the continuous core barrel upon removal. The text in Section 3.1.1.3 has been modified to clarify the sampling program.

The continuous core barrel sampler is 5-feet long. The sampler can be lined on the inside with one 60-inch acrylic liner, two 30-inch acrylic liners, or can be left unlined, depending on the nature of the materials sampled. Due to the potentially sensitive nature of the tailings, the sampling will be attempted using two 30-inch liners placed end-to-end within the 60-inch core barrel. Upon removal of the core barrel, the liners will be capped for classification and transport to the laboratory. The smaller diameter and sample lengths will allow more stability during handling and transport, and facilitate the testing of discrete layers. The modified SPT samples will be collected between the five-foot core intervals.

15. Section 3.1.6.1: *Are all of the listed species present during the proposed period of sampling or could some of them only be present during other times of the year?*

Response: The sample period and duration will be specified in the survey plan, and will be based on sound biological principles, in accordance with standard practice.

16. Table 1-1: *EPA may provide more comment on criteria at a later date, but agrees that there is sufficient information provided to design a pre-design sampling program. (EPA also notes that its previous comments on the table were not addressed.)*

Response: Acknowledged.

17. Table 3-3: *EPA would like to discuss this table at our September 11 meeting. It may be more beneficial to analyze more of the fine tailing material than the alluvium or the coarse grain tailings*

Response: Refer to Response No. 7.



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The proposed index testing regimen on the alluvium has been reduced; not only because of the extensive classification data that already exists for the underlying alluvium, but also as a result of the changes to the proposed sampling locations.



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NMED Comments on the Pre-Design Studies Work Plan – Church Rock Mill Site, August 2013:

1. Page 3, Section 1.5 2nd bullet: should be “maximizing” erosion protection?

Response: The text has been changed to: “...optimizing erosion protection.”

2. Figure 1-2: Could excavation of borrow areas (E&W) have a potential future impact on ground water by acting as a storage retention ponds that could recharge the SWA and the Zones 1 & 3 aquifer systems?

Response: Depending on the amount of cover material required for repository construction, the objective during design will be to design the borrow area grading plans that they drain to existing drainage channels. If that cannot be accomplished, we anticipate any water storage created by excavation in those areas will be minimal and the net evaporation for the Site will result in minimal infiltration.

3. Table 3-3: Is there more coarse tailings than fine? Is that the reason for the number of samples? Why are only two particle size samples proposed for radon barrier? Is this a sufficient number?

Response: Yes, because historic information indicates that approximately 20-25% of the tailings in the impoundment is considered “fine-grained”, we expect to encounter more coarse tailings than fine. The number of tests listed in Table 3-3 is based on the quantities of materials we anticipate encountering at the proposed sampling locations. Table 3-3 has been revised to reflect the updated, projected test quantities.

The two particle size analyses presented in the previous version of the report has been corrected to show 12 tests.

4. Table 3-4: Based on the figures and text, why are there more drilling locations (13 borings with 2 samples/boring) but fewer samples for testing in the primary borrow areas compared to the alternative borrow area (6 borings, 2 samples/boring)? Is this because testing had previously been done in the primary borrow area?

Response: There is laboratory data collected from the test pits previously conducted in the East and West Borrow areas. However, the test quantities and column headings in Table 3-4 have been revised to reflect the updated of samples per borrow area.

5. Table 3-4: (1) Is the number of Atterberg limits tests sufficient for testing this much material?

Response: Table 3-4 has been updated to show 3 to 4 Atterberg limits tests per



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borrow area. Additional Atterberg limits tests will be added if the materials classified in the field show significant variability.

(2) Should the soil class & particle size analysis method be the Unified Soil Classification System instead of the USDA Soil Textural Triangle? Are you interested in the engineering aspects of the soil for the cover design or the ability of the soil to support plant growth, or both?

Response: The materials will be classified both under the USCS and the USDA methods, as both apply for the cover design. The referenced test method for soil classification in Table 3-4 has been changed to D2487.

(3) Has or will the borrow material be tested for Ra-226 & U to ensure it is below cleanup standards and acceptable for cover?

Response: Testing for RA-226 is included in Table 3-4.



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Responses to EPA Region 6 Comment on Pre-Design Studies Sampling and Analysis Plan, Volume III - Quality Assurance Project Plan, dated August 30, 2013

1. **Comment 1:** *The QAPP should define the DQOs for the UNC Mill Site. Can you prepare an addendum of those site specific DQOs?*

Response: An addendum describing the DQOs relevant to the sampling and analysis plan proposed in the *Pre-Design Studies Work Plan Church Rock Mill Site* (SAP Volume I), dated August 16, 2013, has been prepared to accompany the QAPP (SAP Volume III).



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**Responses to U.S. Nuclear Regulatory Commission (NRC) Comments
on the report entitled “Northeast Church Rock Mine Site Removal Action Pre-Design
Studies Sampling and Analyses Plan, Volume IV–Health and Safety Plan” (Enclosure 4)**

1. *In Section 5.4.2, the licensee has not provided the minimum frequency at which the air sampling filters will be replaced.*

Response: Revised text in Section 5.4.2 of the RPP provides a response to this comment. Work area air sampling will be performed on three days for the first week (1st, 3rd and 5th day) of drilling activities on the tailings pile. Air sampling will also be conducted at the background (upwind) location. If, the work area net airborne concentrations are less than <10% of DAC for gross alpha activity, the work area air sampling will be continued at a rate of once per week. If the work area airborne concentrations are >10% of DAC, personal air sampling will be conducted (an individual of the group having the greatest potential for exposure in the work area will be equipped with a personal air sampler). The personal air sampling frequency will remain at three days per week as long as the net airborne concentrations are >10% and <30% of the DAC. When the airborne concentrations decline below <10% of the DAC as a result of implementation of necessary control measures, the air sampling frequency will be reduced to once per week.

2. *In Section 5.4.3, it states that “if needed, track etch monitors will be utilized for airborne radon and radon progeny concentrations.” How would the need for using track etch monitors will be determined?*

Response: Text in Section 5.4.3 of the RPP has been revised to state: “However, as per the NRC license requirements and as an added safety control and monitoring, track etch radon monitors will be utilized for airborne radon and radon progeny concentrations.”

3. *In Section 5.4.2, the licensee states that “if the RSO determines that there is a potential for airborne gross alpha activity to exceed 10 percent of the DAC for gross alpha activity, an individual of the group having the potential for the greatest exposure in the work area will be equipped with a personal air sampler. However, the licensee has not provided the criteria by which it will determine the potential for airborne gross alpha activity exceeds 10 percent of the DAC.*

Response: See response to Comment No. 1 above.

Additionally, as per the NRC License requirements, the text in Section 5.4.4 has been revised to state: “...all workers who will be in the restricted areas of the Mill site will be required to submit an entry and exit urine sample for bioassay.”