Responses to Review Comments on the Silo 3 Project Rescoping Evaluation and Recommendation, Rev. 1 (March 27, 2001)

The review of the document was performed by individuals that are from DOE-FEMP, DOE-HQ (EM31), CAT, USEPA, and OEPA.

Common Comments:

There are several common comments that were made by all reviewers. First, the reviewers' expectation of the information in the document was much more detailed than what was presented. Specifically, the reviewers were interested in the evaluation of more than one potential excavation method (as presented in the document). Second, reviewers were concerned with airborne contamination control inside the silo (worker exposure and environmental exposure) and in the containment, especially during the excavation and transfer of the material from the excavation equipment to the mixing equipment. Recommend to include WPRAP Th-230 airborne contamination experience in the analysis.

Response: The objective of this document was to evaluate the feasibility of options on a consistent basis and to obtain enough information to make an informed decision of the best alternative. The rescoping evaluation is an evolution from previous work experience. Based on experiences to date, the knowledge acquired was used to develop alternatives for proceeding with the project. In order to evaluate the options with a higher degree of detail, design work must be performed.

The comments identified by the reviewers here are excellent points, which will be addressed during conceptual design. These issues do not impact the feasibility of the proposed alternatives. All of the alternatives were evaluated based on a similar level of design detail. These comments address issues that would be worked through and addressed during the course of design. In order to ensure that open issues are addressed at appropriate points during design development and operations planning, the project has developed and will maintain an "open issues" database. This database will identify the issue, the status, the deliverable that will contain the resolution, and the originator who must accept the resolution.

Comments:

1) The report should have a section which lists the minimum requirements that must be met with this technical approach. The "technical considerations" include both risks items and requirements. Many technical considerations are manageable risks. Those few risks that require further resolutions and evaluation need to be identified as risks (rated from low to high) along with what need to be done to mitigate them. This would allow reviewers to assess the "acceptable risks" and "unacceptable risks" to determine the feasibility of the approach. (Nina Akgunduz)

Response: The Key Technical Considerations will be divided into two categories – design data and technical requirements. Design data includes the key data that must be considered during the process selection and design. Technical requirements address key risks that must be mitigated during design by the process selected.

2) The document does not have a detailed examination of all of the possible methods for mechanical excavation. The descriptions are lacking in defining the type of excavator envisioned (i.e., track hoe, front-end loader, tracked or wheeled), how material is transported from excavator to stabilization, etc. Fluor Fernald must ensure that all of the possible mechanical excavation methods are evaluated before and during the Conceptual Design stage. (Doug Maynor/ Bob Roal)

Response: Agreed. The recommendation to use a particular piece of mechanical equipment was not detailed in this document specifically, because there are pros and cons associated with different pieces of equipment. Retrieval through mechanical excavation can be accomplished by many different pieces of equipment and the proper piece of equipment must still be selected. During conceptual design when the inputs and outputs for treatment (i.e., retrieval rate) are further defined and the maximum opening location is determined through structural evaluation, sizing of equipment can be best done. Selection criteria are being developed, including items such as traction, that will be used to select the proper piece of equipment during design.

3) There should be a clear documentation of the basis for the new approach (i.e., departure from the original design basis that required remote control and silo access through the top). (Nina Akgunduz/ Pete Darnell)

Response: A discussion will be added in the introduction to describe the background of previous Silo 3 efforts and why the alternatives evaluated were chosen. The evaluation does propose a clear change from the retrieval approach proposed by RMRS, however, the Silo 3 RFP did not specify that the silo had to be accessed through any certain point. RMRS proposed accessing the silo material through the top, which subsequently was implemented in design.

There is no departure from the design basis that required remote control. This requirement was driven from meeting the requirements of 10 CFR 835 Subpart K, Design and Control. The approach evaluated uses a remotely operated excavator to retrieve the material. In addition, containment, ventilation, and work area boundaries will be employed to ensure these requirements are met. It should be noted that even with the state of the art technology in the Rocky Mountain Remediation Services (RMRS) design, workers in personal protective equipment (PPE) would have still been required to routinely access (approximately a couple of hours per day) high contamination areas housing the retrieval arm for inspections, maintenance, and upkeep.

Multiple retrieval approaches were evaluated in Step 1, including the original design basis of RMRS (remote control and access through the top). Based on

the criteria used for evaluation – key technical considerations, complexity of implementation, and regulatory requirements, the retrieval approach indicated in the "Recommended Technical Approach" was identified as a better alternative than that developed by RMRS. Following the evaluation of alternatives for retrieval, stabilization, packaging/transfer, shipping and disposal based on these criteria, complete approaches were developed and evaluated based on the additional criteria of schedule, cost and risk.

4) There will be severe dusting, operating and maintenance problems with the pneumatic transfer alternative. Don't recommend considering this alternative. Separating small (less than 3 microns) particles from air is technically challenging. (Bob Roal)

Response: Silo 3 material was placed in the silo through a pneumatic transfer process. Pneumatic transfer was evaluated as a retrieval alternative, but was not deemed the most feasible. Based on new analytical data, fewer particles may be smaller than 0.3 microns than currently believed. A review of this data is underway. However, should pneumatic transfer be considered in conjunction with mechanical excavation, further analyses would be performed.

5) The conceptual design shown on the schedule is not adequate. The structural calculations, bench testing, selected excavator, conveyors, mixers and facility layout and HVAC must be represented in the conceptual design. The remediation design package seems to have the content expected for a conceptual design. The conceptual design package must demonstrate the selected approach is technically viable and baselines the technical scope, cost and schedule. (Bob Roal)

Response: Agreed. The schedule in this document will remain the same. The baseline schedule in the Silo 3 Closure Plan will be revised to reflect the agreed upon content of the Conceptual Design Package.

6) The document is not clear (it infers) that the retrieval equipment (the excavator) will be remotely operated. Is it? Is it operated via an umbilical or radio?

Response: The ability to operate the equipment remotely is considered a criteria for equipment selection. Operation by radio or umbilical has pros and cons better evaluated with the equipment selection. It may be desirable to have the equipment tethered for other reasons, such as retrieval during breakdown, closed circuit television (CCTV), or to have an umbilical for fueling. If operation by radio is considered, radio reception while operating in the silo will be analyzed for interference. The text will be clarified.

7) Fluor Fernald must ensure that the structural evaluation is performed by a licensed and knowledgeable structural engineer for the cutting of the silo wall, specifically addressing: a) will water laser cut pre-stressed tendons, b) provision for collecting contaminated water from the laser cut. (Don Pfister)

Response: A structural engineer will be used to evaluate and design the cutting of the silo wall and the pre-tensioned steel. Specific equipment to cut the silo will be selected based on the specific cutting design, although at this time a water laser is assumed. The containment will be designed to provide proper collection of any water generated from the cutting operation.

8) Page 6, 5th paragraph: ..."containment must be utilized, in conjuction with misting, if necessary" – Misting was not successful at WPRAP. (John Hall)

Response: Acknowledged. This lesson learned will be considered during conceptual design.

9) Page 13, 3rd and 5th bullets: OU1 has found no contract language to support the statement "Envirocare cannot roll-over rail cars with Th-230 specific activities greater than 4,000 pCi/g". (John Hall)

Response: It is understood that this statement may contradict with the Ohio Field Office disposal contract with Envirocare. However, based on guidance from the DOE-OFO contracting officer, Fluor Fernald cannot assume that this contract can be used for disposal of Silo 3 material. Therefore, Fluor Fernald must consider guidance provided by Envirocare for receipt of this material.

10) Page 14, 2nd paragraph and 3rd paragraph: statement in 2nd para. "..the supersaks are currently DOT approved strong-tight containers and are designed to meet IP-2 container requirements" and statement in 3rd para. "....Neither the supersaks, nor the gondola cars used for shipment of Silo 3 material are IP-2 containers" are conflicting! Which is correct? (Sharon Fauver, Nina Akgunduz, John Hall)

Response: The Lift Liners™ have been designed to meet IP-2 requirements, however the IP-2 testing certification documents have not yet been produced by the Lift Liner™ manufacturer. Therefore, the Lift Liners™ are not yet considered IP-2 certified containers. This text will be clarified in the document.

11) Page 15, Disposal Key Technical Consideration: The report over emphasizes the Disposal issues. Especially in the 1st paragraph in page 16 ("..Envirocare has requested that the State of Utah allow pre-1978 generated 11e(2) material to be disposed in the LLW cell"). What is required from the generators (Fernald) to meet this if we were to send it under this designation? Most likely it will require much work from Fernald end to use the LLW cell for silo 3 material. The silo 3 material can be disposed at either NTS or Envirocare as 11(e)2 material. The packaging considerations presented in this report are sufficiently flexible to go to either place (addressing contingency). The packaging and disposal cost of the project is relatively low compared to the total project cost. The material has a home to go to without much more "trying" to improve the disposal options. The report spends too much time and resources in this area where the risk is very low. (Nina Akgunduz)

Response: The disposal requirements for Silo 3 material are emphasized because the waste acceptance criteria drives the treatment requirements for the waste. While the overall disposal cost is low, the impact of disposal requirements is high.

12) Page 16, last paragraph, ."....as long as Th-230 concentrations were at or below 30,000 pCi/g.. .....currently a coordination issue exists at Envirocare with unloading supersaks from gondola cars, in order to meet the required turn-around time of the unit train.": a) Where does this limit of 30,000 pCi/g come from? b) It is not wise to let the unit train turn around time dictate. (John Hall)

Response: a) The 30,000 pCi/g limit is a licensing issue for Envirocare with the State of Utah. Envirocare must perform air monitoring, dose assessments, etc. and has imposed this operational limit to ensure that the airborne and dose limits imposed on Envirocare by the State of Utah are not exceeded when multiple placements are occurring in different cells. This thorium concentration limit is imposed based on the comparison of a discrete portion of work against the whole pool of activity occurring during that time. Based on conservative numbers and the worst case scenario, Envirocare has imposed the 30,000 pCi/g limit to ensure that the activity of Silo 3 material, when combined with the activity of multiple placements which may be occurring simultaneously, does not exceed their airborne and dose limits. Envirocare figures this limit based on past years' data as well as projected shipments for the current and future years. This issue will continue to be worked with Envirocare.

b) Coordination issues exist at Envirocare in order to meet the turnaround time of the unit train because of the multiple activities occurring at once. Because the number of rail cars that WPRAP is able to release for use by Silo 3 is a limiting factor on the retrieval and treatment rate, the turn-around time of the railcars is critical.

13) Page 20, 3rd para: "Retrieval" – this section needs much more detail in addressing the airborne issues. Lack of detail addressing airborne issue in this section may be misconstrued as underestimating the air born challenges. (Nina Akgunduz)

Response: Fluor Fernald agrees that management of airborne contamination is a key design criterion for ensuring exposures to the employees, public, and environment are maintained ALARA. During conceptual design, the primary objective will be to minimize internal and external exposures to ALARA. Optimization techniques will be used in determining the appropriate control mechanism. Physical design features (e.g. confinement, ventilation, and remote handling) will be considered and used where practical to control inhalation of airborne radioactive material. However, where the use of physical design features are determined to be impractical, administrative controls will be used to keep exposures ALARA.

In addition, an open line of communication will exist with the radiological control and engineering personnel from the WPRAP Project to ensure lessons learned are incorporated during the design phase of the Silo 3 Project.

14) Page 20, last para, last line: "...added to bring the mixture to optimum moisture" – Must clarify what the optimum moisture is and Envirocare must agree with the "optimum moisture". (John Hall, Doug Maynor)

Response: Optimum moisture is defined through the proctor density test. Optimum moisture for stabilized Silo 3 material has not yet been determined. This is a data gap that must be filled through bench scale testing during the design process.

15) The schedule must include those key activities that will be tracked as the DOE Capital Asset Projects (CAP) per DOE 413.3. Those key activities should be at minimum: Conceptual Design Package, Preliminary Design, final Design, Construction Acceptance Test and ICAT, SOT and ISOT, and Start Operations. (Nina Akgunduz)

Response: The Rescoping Analysis is a technical and contractual evaluation of remediation approaches, and is not meant to be a project management scoping document. The project management approach, including the applicability of DOE Order 413.3, will be addressed in the baseline Closure Plan.

16) Page 27, 9th bullet: why is "getting the subcontractor to support design or other activities as required" an assumption? Shouldn't this be Fluor Fernald's job? (Nina Akgunduz)

Response: This assumption indicates that a subcontractor may be employed, if necessary, to support those activities needed to complete remediation of Silo 3. These could include a subcontractor to perform the structural evaluation, a subcontractor(s) to perform construction activities, etc.

17) Page 28, 7th bullet: Assuming an ORR for Silo 3, but not WPRAP facilities prior to start in handling Silo 3 material is a BAD assumption. (John Hall, Sharon Fauver)

Response: This bullet has been clarified to read that an ORR will be required prior to startup of Silo 3 processes.

18) Page 28, 9th bullet: Assuming $115.18/yd3 does not seem to be based on reality. Current disposal rate ranges from $139 to $149.00/yd3. (Nina Akgunduz)

Response: Good comment. Per the Army Corp of Engineers contract, the disposal price for the current year is $115.18/yd^3. However, this rate is subject to change during yearly renegotiations. The disposal rate in past years has been in the price range noted in the comment. Therefore, the text will be changed to assume a disposal rate for Silo 3 material at Envirocare to be $149.00/yd^3. This rate may be subject to an escalation fee during extension periods of the contract (after 2002), as well as a new Utah State tax.

19) Page 5, mid page 4th bullet: a) Explain what "unoxidized nitrate" is and what issues they have in this technical approach, b) "heat of hydration" information should be available from all the treatability studies performed by IT (RI/FS) and RMRS tests they performed during the bid cycle and post award. This page has conflicting statements: In one section it says Fluor Fernald does not have the heat of hydration information and in another it states there is information about this. Which is correct? (Bob Roal, Nina Akgunduz)

Response: a) The text should have stated that the Silo 3 material contains "nitrate salts", rather than "unoxidized nitrates." Nitrate salts are one of the causes for the high solubility of Silo 3 material in water. Because the solubility of Silo 3 material is addressed previously, this sentence will be deleted from the text.

b) During the Remedial Investigation/Feasibility Study (RI/FS), the temperature of Silo 3 material was shown to increase in excess of 7°C with the addition of water. However, in samples analyzed by Nuclear Fuel Services (NFS), there was no temperature rise when water was mixed with the silo material. RMRS did not analyze for heat of hydration. Whether Silo 3 material exhibits a heat of hydration will be verified during bench-scale testing. The text will be clarified to reflect that Silo 3 material may exhibit heat of hydration.

20) If there is a heat of reaction with the Envirobond and ferrous sulfate, heat of hydration, chemical heat generation and add to this the heat input by the mechanical mixing, is there need for heat removal in the process? (Bob Roal)

Response: The RMRS process (using Envirobond, ferrous sulfate, and mechanical mixing), did not require heat removal; therefore, at this time Fluor Fernald does not anticipate the need for heat removal. However, the requirement for heat removal will be considered during conceptual design.

21) Page 14, 3rd and 4th paragraph: Recommend expanding this discussion of DOT classification, and what drivers are pushing us to use packaging versus bulk shipment as is done in WPRAP. (Sharon Fauver)

Response: The discussion will be expanded and clarified to indicate that there are two drivers for packaging versus bulk shipment of treated Silo 3 material. First, Silo 3 material is classified as LSA-II material and requires packaging in a container, that at a minimum, meets the design criteria for an IP-2 packaging per 49 CFR Section 173.427. For bulk shipment, Silo 3 material would have to be diluted by a factor of seven to meet the definition of LSA-I material or an exemption would have to be granted to allow the bulk shipment of Silo 3 material in gondola cars. Currently, WPRAP is seeking an exemption to allow the shipment of LSA-II material in DOE-owned gondola cars. For the exemption to be granted, the FEMP must demonstrate that the proposed method of shipment provides a similar level of protection of human health and the environment as provided by certified IP-2 containers.

Second, Envirocare cannot accept bulk shipments of Silo 3 material because they cannot roll-over cars with Th-230 concentrations greater than 4,000 pCi/g (refer to Comment #9). Envirocare needs a means to remove Silo 3 material without rollover, which drives placement of waste in a package that can be removed from the gondola car and transported to the disposal cell.

22) Envirobond formulation was developed for compacting and disposal at NTS. The report does not explain that this is still the best formulation for the current technical approach (to Envirocare). (Doug Maynor)

Response: The Envirobond formulation was developed by RMRS to stabilize the Silo 3 material and allow disposal at the NTS or a permitted disposal facility. The Envirobrick process was a separate process utilized for compaction of the material to achieve volume reduction. In the text (page 20), the minimum formulation mix developed by RMRS, which has been proven to adequately stabilize the constituents of concern, is identified. However, the exact formulation to be used in the Recommended Technical Approach will be definitized through bench-scale testing.

23) Page 15, 1st paragraph: It makes an assumption that the ASR for the rail loading facility under the "Bulk transfer to WPRAP" would apply for the Silo 3 material. This logic progression is not clear in this section. This sounds like "risk", but it is not clear how big of a risk it is. (Nina Akgunduz)

Response: The rail loading facility ASR is based on the same source term as the WPRAP facility safety basis. Because of the potential for encountering isolated pockets of black oxide, the WPRAP facility safety basis conservatively uses a Dose Conversion Factor (DCF) based on pure black oxide. This DCF is higher and more conservative than the DCF for Silo 3 material. Additionally, it is assumed that the Silo 3 material after treatment and packaging will be in a similar form as the WPRAP material. Therefore, the accident scenarios analyzed in the rail loading facility ASR for transfer of material would be bounding. The text in the document will be clarified.

24) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: na Pg #: na Line #: na Code:
Original Comment #: 1

Comment: Alternative Scenario 2, incorporating the treatment of Silo 3 material with Silos 1 and 2 treatment process, is an unacceptable scenario to Ohio EPA.

Response: Acknowledged. Alternative Scenario 2 was evaluated, but is not recommended as a path forward for Silo 3.

Action: NA

25) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: na Pg #: na Line #: na Code:
Original Comment #: 2

Comment: Throughout the document, when containment is mentioned, the containment does not encompass all of Silo 3. Future design work should include building containment over all of Silo 3 and adjacent treatment area.

Response: Currently, the recommended path forward involves containing any penetrations made to the silo, as well as the retrieval and treatment areas where Silo 3 material is being transferred. At this time, no driver is foreseen to require containment of the entire silo. However, the need for containing the entire silo will be considered during conceptual design based on hazards analysis and design criteria.

Action: During conceptual design, examine the need for building a containment around the entire silo.

26) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: na Pg #: na Line #: na Code:
Original Comment #: 3

Comment: Ohio EPA would like to see a direct cost comparison of the RMRS proposed silo remediation to the process being proposed in the rescoping document. Will the cost difference between the two proposals still allow for an ESD?

Response: The value of the RMRS contract was $17.7 million. The budget at completion for the Silo 3 Project, including the RMRS contract, was $38.5 million. This compares to an estimated cost of $25.8 million to perform the Recommended Technical Approach, as indicated in Table 8 (page 39).

The cost estimate in the original OU4 ROD for the selected Silo 3 remedy was $28 million. The difference in estimated cost for the current Recommended Technical Approach does not constitute a significant change in remedy. It is the belief of Fluor Fernald that this work is within the bounds of the approved ESD.

Action:

27) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Accessing the Silo Pg #: 19 Line #: na Code:
Original Comment #: 1

Comment: After the three 4' x 12' vertical pieces are removed, what will prevent the silo contents from spilling out of the opening? Is there a contingency plan in place in case this happens?

Response: The cutting procedure and containment will be designed with the assumption that Silo 3 material will enter the containment once the vertical pieces of the silo wall are removed. However, based on the data obtained during Silo 3 Small-Scale Waste Retrieval (SSWR) regarding the condition and behavior of the Silo 3 material, including the angle of repose, a limited amount of the silo material is expected to slump. Any material entering into the containment would be removed by the excavator or a HEPA vacuum.

Action: Further examine spill control measures during accessing of the silo.

28) Commenting Organization: U.S. EPA
Section #: Not Applicable (NA) Pg #: 6 Line #: NA
Original Specific Comment #: 1

Comment: The text states that mechanical excavation by an excavator will be employed inside Silo 3. It is not clear, however, how the material will be moved from the silo to the stabilization area. Because the moisture content of the Silo 3 material is unknown, misting or fogging will be required at the silo's openings to minimize the dust release. The text should be revised to address this issue. In addition, the text should state whether or not radon control is required at Silo 3.

Response: Page 6 only provides a brief description of the mechanical excavation process. Further detail on how material will be moved from the silo to the stabilization area is provided in the description of the Recommended Technical Approach (page 20). The type of conveyor to be used to transfer the material to the stabilization area will be selected during conceptual design.

It is agreed that dusting of the material will occur during retrieval. It is briefly mentioned on page 6 that misting may be necessary to comply with occupational airborne radioactivity limits. Text will be added to the description of the Recommended Technical Approach to address the possible need for misting. Dust control measures will be established during conceptual design.

Text will be added, stating that the need for treating the radon headspace in Silo 3 will be evaluated during design. Emission estimates for radon and particulates will be developed during preliminary design. The estimates will be used to identify and design the emission controls required to satisfy Best Available Technology, applicable emission limits, and other environmental and worker protection requirements. Although the need for treating the radon headspace in Silo 3 will be evaluated during design, the design provided by RMRS, which accessed the silo from the top, did not provide for treatment of the radon headspace. Because the headspace volume is relatively small, the approach under the RMRS design was to allow a controlled venting of the headspace out of the stack. The release rate would be established so as not to exceed the steady state concentrations out of the stack during operations. It is anticipated that this approach can be used with the Recommended Technical Approach, as well. Additionally, the proposed path forward accesses the silo through the side, rather than from the top. With this

approach, the headspace concentration will not be directly released. The radon from the exposed material will be released into the containment and out of the stack.

29) Commenting Organization: U.S. EPA
Section #: Not Applicable (NA) Pg #: 11 Line #: NA
Original Specific Comment #: 2

Comment: The text states that treated Silo 3 material will be transported in dump trucks to the WPRAP Material Handling Building. It should be noted that unloading of dump trucks can generate dust that must be controlled to prevent the spreading of contamination within the facility. The text should be revised to address this issue.

Response: Acknowledged. The option (Bulk Transfer to WPRAP) that utilizes transport of treated Silo 3 material in dump trucks to WPRAP was analyzed, but was eliminated as an alternative due to technical considerations, regulatory requirements and safety issues, including contamination control. (See page 17, Table 2.)

30) Commenting Organization: U.S. EPA
Section #: Not Applicable (NA) Pg #: 12 Line #: NA
Original Specific Comment #: 3

Comment: The text states that "supersaks" will be placed into loading frames, opened, and loaded. It is not clear what type of equipment will be used to load these bags and to control dust and spillage. Mechanical loading with an excavator usually causes spillage and dust. The text should be revised to discuss provisions that will be implemented to minimize spillage and dust during loading.

Response: Page 12 only provides a brief description of the supersak packaging option. Further detail on how material will be loaded into the supersaks is provided in the description of the Recommended Technical Approach (page 21). The text in this section will be expanded to indicate that a modification of the supersak liner (or an inner liner) will be made to allow cinching around a fill spout at the discharge of the mixer or around the discharge of a conveyor carrying material from the mixer, to prevent spread of contamination onto the bag.

31) Commenting Organization: U.S. EPA
Section #: Not Applicable (NA) Pg #: 12 Line #: NA
Original Specific Comment #: 4

Comment: The text states that the Silo 3 material must be packaged in IP-2 containers to meet Department of Transportation requirements. The text states that even though these containers are commercially available, they would require testing and approval to meet the FEMP standards before use. The text should be

revised to clarify why the containers must be tested to meet FEMP standards before use and what tests will be performed.

Response: Acknowledged. The text will be revised to indicate that testing would only be required to meet DOT requirements. The FEMP no longer anticipates requiring tests beyond those required for DOT certification.