Department of Energy

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JUL 20 2004

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

DOE-0340-04

Dear Mr. Schneider:

REVISED HEEL AND DECANT SUMP TANK SLUDGE REMOVAL PLAN FOR THE ACCELERATED WASTE RETRIEVAL PROJECT

References:
1. Letter from G. Jablonowski to G. Griffiths, "Reponses to Comments on the Remedial Design for Silos 1 & 2 Heel Removal and Decant Sump Tank Sludge Removal." dated February 25, 2004
2. Letter from T. Schneider to William Taylor, "Disapproval – Revised Heel and Decant Sump Tank Sludge Removal Plan for the Accelerated Waste Retrieval Project," dated February 23, 2004

On January 21, 2004, the Department of Energy, Fernald Closure Project (DOE-FCP) forwarded the subject Plan to the United State Environmental Protection Agency (USEPA) and the Ohio Environmental Protection Agency (OEPA) for review and approval. On February 25, 2004, the DOE-FCP received approval of the Plan by the USEPA (Reference 1); and on February 23, 2004, received disapproval of the Plan by the OEPA (Reference 2).

Enclosed are responses to the comments received from the OEPA on the subject document. These responses to the OEPA comments were reviewed in summary form with both the USEPA and OEPA on May 18, 2004.

If you have any questions regarding the responses to comments, please contact John Sattler at (513) 648-3145.

Sincerely,

for Johnny Reising

William J. Taylor
Director

FCP:Sattler

Enclosure: As Stated

Recycled and Recyclable

cc w/enclosure:
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Responses to Comments from Ohio Environmental Protection Agency on the Revised Heel and Decant Sump Tank Sludge Removal Plan for the Accelerated Waste Retrieval Project

1) **The remotely Operated Vehicle (ROV) should be kept in the design as an option for removing debris that are not able to be removed during slurry operations.**

Comment Response:

In consideration of the potential need for a contingency to handle recalcitrant K-65 material that may be part of the heel, and with the elimination of the ROV from the project, the project has determined prepare detail engineering plans to use the Silo 3 excavator in this service.

Process knowledge does not indicate that there is a high likelihood of encountering significant debris in the either Silo 1 or 2. The project's plan is the incorporate whatever debris remains in the silo into a grouted or otherwise stabilized form that can be removed during the D&D phase of the project. Likewise, the probability that there will be an annulus or otherwise hardened deposit within the silos is considered low, therefore it is considered unlikely that the Silo 3 excavator will be deployed. Nevertheless, it is considered prudent for the Silo 3 Excavator to be available to the project as a contingency. The function of the excavator will be to assist in the mobilization of the waste materials assuring that the residuals can be swept or plowed to the Silo sumps where the jet pumps can pump the residuals to the TTA tanks. The excavator will assist in distributing debris contained in the silos into a configuration where such debris can be readily grouted. The Silo 3 excavator will not be used to remove any materials from the Silo to external treatment, packaging or disposal.

The excavator is expected to be outfitted with the following accessories: a water knife for cutting through "sand bars" that form on the silo floor, a plow for moving debris out of the way of "dammed" residual, a hammer to break up large particles and a spray system

Fluor Fernald has requested that a CFC (Certified for Construction) design package be completed for the project by Jacobs Engineering Group (JEG) by October 2004. The basic features of this package will be interfaces with project utilities, communications, controls, decontamination and containment systems.

An enclosure jointly capable of accessing either Silos 1 or 2 will be modularly constructed and installed between Silo 1 and 2. Figure 1 shows a sketch of this structure. The enclosure will be constructed so that the flow path for air can be blocked thus segregating Silos during excavator deployment thereby containing the spread of contamination..

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2) **The design is lacking appropriate detail for decant port removal and subsequent flushing. If full scale mock-up of proposed shearing method is sought, the demolition of Silo 4 should be delayed until it is no longer needed for pretesting of silo designs.**

Response to Comment

Removal of the holdup material from the decant port system is an action related to removal of the heel materials, but is a separate function. This activity may be done in parallel with ongoing operations associated with bulk slurry removal, or may be done subsequently, and is not dependent on whether a "heel" has been encountered.

Decant port cleaning is a key element associated with the completion of the Silos 1 and 2 AWR Project. The silos decant piping system comprises externally-valved, horizontal pipe ports on vertically aligned, one-foot centers. Each individual port passes through the silo wall and opens into an individual partially-enclosed weir box assembly on the inside wall of the silo. Silo 1 and Silo 2 each have 24 decant ports mounted from top-to-bottom on their west-facing wall, and 24 decant ports on their east-facing wall. The objective of decant port cleaning is to remove K-65 waste material held-up in the silos decant piping system as a means of achieving conditions that will enable the transition from waste removal to D&D operations. The hold-up material is expected to be of a characteristic that is removable by flushing with water. The planned approach for cleaning the decant ports is to apply water by access from outside the silo, to flush individual ports and wash the material out from the port, through the weir box, and into the silo. Once inside the silo, the material flushed from the decant system and flush water will be removed from the silo in the same manner used to remove heel material. Decant port system cleaning will overlap with either bulk slurry removal or with the initial phases of heel removal when the jet pumping is employed. This approach will ensure that the material flushed from the decant ports can be removed from the silos by the principal operations for removal of K-65 waste from Silos 1&2 and that this waste will be treated in the Silo 1 & 2 Treatment facility.

The table that follows indicates the major equipment components and support systems for this step.

Major Element-Specific Equipment	Major Support and Auxiliary Systems
1. Special, custom-built apparatus for providing access through external piping system to individual (or gangs of) decant port piping and weir systems	A. Silo 1 Sluicer Module 1 (SLC-11-203) B. Silo 1 Sluicer Module 2 (SLC-11-204) C. Silo 1 Slurry Module (SLR-11-201) D. Silo 2 Sluicer Module 1 (SLC-11-205) E. Silo 2 Sluicer Module 2 (SLC-11-206)

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2. Containment equipment 3. Water lance with power and water supply	F. Silo 2 Slurry Module (SLR-11-202) G. Slurry Jet Pump (PMP-11-301) H. Slurry Booster Pump (PMP-11-302)

In preparation for cleaning of the decant ports, MSE Technology Applications, Inc. has been contracted by Fluor Fernald to develop the equipment that will be custom-made to accomplish this designated project element. MSE will conduct an operations-scale demonstration of the equipment and method. The operations approach will be to gain access to the decant system from the outside of the silos, and to flush loose deposits out of the system and into the silo. The plan is for these operations to be conducted on a schedule compatible with the scheduled end of bulk waste retrieval, or with an alternating operation schedule for sluicing and bulk waste retrieval in Silos 1 & 2. To enable these operations and expose the external decant system piping for the access required, portions of the earthen berm around the silos will be selectively removed. The custom-built apparatus will be applied to the external decant piping system, and operations conducted to gain access to individual (or ganged groups of) decant ports. Once access is achieved, a water delivery or lance device will be attached or inserted into the access opening and used to flush hold-up material out of each decant port and weir assembly and into the silo. It is expected that the flushed material will wash out of the opening in the underside of the weir box and flow down to the silo floor. The plan is to proceed with step-wise flushing operations from top to bottom of the decant system. The material flushed from the decant system is expected to be removed from the silo along with other material removed by the bulk waste removal operations and the heel removal operations.

MSE Technology will demonstrate their approach to the AWR project in August 2004..

Finally, Silo 4 has been dismantled. Based on the plan for the access of the decant ports and on the fact that the project removed numerous sets of actual decant port piping assemblies from Silo 4 and provided them to the vendor, and that the project also has sufficient prototypical ports for use by the vendor allowing it to perform the testing, preservation of the Silo 4 structure was deemed non-essential.

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3) **The design is lacking a performance specification for the Decant Sump Tank sludge removal.**

Comment Response

The plan for the cleaning of the decant sump tank is to pump out the sludge within the tank and convey this sludge to the TTA tanks for storage and subsequent treatment. The plan involves the use of the flushing and pumping equipment to be developed and demonstrated by AEA Technology Engineering Services (AEAT).

The equipment is to be custom-designed for the silos decant sump tank, and is expected to be deployed in the sub-surface tank. These pumping actions may occur during bulk slurry removal; they will be independent of heel removal. The design of the equipment by AEAT is to include provisions for pumping the recovered sludge materials from the decant sump tank via a transfer line to one of the TTA tanks for subsequent treatment in the Silos 1 and 2 waste Remediation Facility. The final decommissioning of the decant sump tank will await completion of all wet operations associated with either Silo 1 or 2.

The decant sump tank is a 9-ft diameter, 18-ft long, dished end, welded-construction carbon steel tank. It is located in a buried location between Silos 1&2, and is somewhat west of the centerline between the two silos. The decant sump tank is oriented with its long axis horizontal. The elevation of the centerline of the tank is believed to be EL 565.25 ft, while the elevation of the bottom of the base of the silos at the circumference is EL 576.1 ft. The decant sump tank was constructed with a 20-in flange manway at the top in a near-center location. Access to the decant sump tank is via a 30-inch corrugated steel pipe extending from the manway more-or-less vertically for 33 feet to the top of the soil berm constructed around Silos 1&2. The function of the decant sump tank was to receive fluid decanted from the silos during the operation to deposit the K-65 material in the silos for storage. Small quantities of K-65 solid material accompanied the decanted fluids, and a build-up of an estimated quantity of 1000 gallons of sludge exists in the decant sump tank. The material is believed to be finely-divided particles that have remained wet for their duration in the tank. Over the years, water has continued to accumulate slowly in the tank, and periodically has been pumped out. The objective is to remove sludge and K-65 material from the decant sump tank as a means of achieving conditions that will enable D&D operations to remove and dispose of the tank. The planned approach for cleaning the decant sump tank is to deploy specially-designed equipment for turbulent water flushing on the inside of the tank to suspend the solids, and then pump them out to a TTA tank for subsequent treatment. Visual inspection of the tank will be conducted to confirm cleaning.

The table that follows indicates the major equipment components and support systems for this step.

Major Element-Specific Equipment	Major Support and Auxiliary Systems
1. Special, custom-built in-tank module with wash-down jet	A. Crane

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nozzles and fluidic pumping capability 2. Jet pump skid module to supply motive power for pumping and evacuation 3. Control skid for modules	B. Water supply C. Transfer line for delivery of extracted sludge to a TTA tank D. Hook-up to the Radon Control System E. Air compressor F. Electrical power supply

In preparation for the removal of sludge from the decant sump tank, AEA Technology Engineering Services (AEAT) will develop the equipment that will be custom-made to accomplish this designated project element. AEAT will conduct an operations-scale demonstration of the equipment and method in a suitably representative mock-up facility at an off-site location. The equipment is expected to consist of the units briefly described above, with the in-tank module providing for remote operations to clean the tank. Operations for removal of the sludge from the decant sump tank are planned to commence once "wet" operations for sluicing and heel removal have been terminated in the silos. The operations approach is expected to be to gain proximate access to the buried tank by excavating the soil overburden to within a few feet or a few inches above the top of the tank, and then truncating the 30-inch corrugated steel access pipe near the surface. However, contingency plans and provisions also will be made for access to the decant tank through the full-length corrugated access pipe, in the event that the Project selects to conduct berm excavation subsequent to bulk waste retrieval operations. The plan is to insert the cleaning module through the corrugated access pipe and into the decant sump tank. The cleaning module will be used to inject water into the tank to flush down the walls and to serve to slurry and suspend the sludge in the tank. Pumping and water jetting operations inside the tank will be conducted to slurry and suspend the sludge, then the cleaning module will pump the slurry out of the tank and deliver the fluid to the transfer line to a TTA tank. The plan is to repeat the operations for addition of water, wash down of tank internals, slurry mixing, and transfer of suspended material until the tank is cleansed of the sludge. Visual inspection is planned to ascertain the results of the cleaning operation and achievement of a decision-based end point based on the visual inspection

AEA Technology Engineering Services (AEAT) will demonstrate its approach to the AWR project in October 2004.

4) **The design requires an appropriate design criteria for the rate of radon emanation that will allow for the RCS to be shut off.**

Comment Response:

Several consecutive steps are included in the concept for silos heel removal. These steps are:

1. Silos heel removal using a modified Hazleton pump.
2. Silos heel removal using a slurry jet pump.
3. Silos heel removal using the Silo 3 Excavator
4. Silos final water wash of interior walls and floor.
5. Silos heel blending or grouting for fixation

It is expected that not all of these steps will be required to remove the heel successfully. The approach taken for heel removal will be decision-based.

After the performance of each step, an assessment will be made to decide whether performance of the next step is necessary. This step-wise approach provides for contingencies. Equipment for each step will be available at the start of heel removal operations for potential deployment if needed.

An operational definition of the heel has been developed. When the Hazleton centrifugal pump is no longer effective in removing slurry during bulk waste retrieval, the material remaining in the silo is designated the "heel". The characteristics of the heel material are not known definitively from existing data nor can they easily be projected. A material with different properties may be encountered as the process of bulk waste retrieval proceeds deeper into the silos. Compaction over time may have produced a material that could be somewhat more difficult to remove than the bulk waste overlying it. However, it is also possible that the heel material will have similar mobilization characteristics to the bulk waste, and therefore, present a removal challenge no different from that of bulk waste retrieval. Therefore, rather than adhere to a fixed, specific design, a flexible, observationally based approach is proposed for removal of heel material. Figure 1 depicts the logic for making decisions during heel removal operations.

One of the key questions to be confronted in the removal of the heel is that of determining when sufficient heel has been removed in order to proceed with grouting and D&D actions. Among the considerations to be weighed is when RCS service to the silo(s) can be discontinued. This evaluation will proceed by addressing the following question: Can the radon emitted from the radium remaining in the heel residual be freely released into the environment?

To address this question an acceptable emission rate for radon needs to be established. The radon emission rate from the heel depends on the concentration of K-65 material in the heel and the emanation characteristics of the residual material. A calculation of the radon emanation rate of the potential remaining residual was performed. Then, following that calculation, modeling of the dispersion of this radon from the silos (assumed to be

open the atmosphere), was performed. These emissions were assumed to be uncontrolled. This dispersion modeling then allowed for a comparison to be made of the radon concentrations at two selected benchmark locations of potential exposure to be made.

The first benchmark is the radon level at the FCP fenceline. Consistent with the Operable Unit 4 Applicable or Relevant and Appropriate Requirements (ARARs) and with proposed Code of Federal Regulations (CFR) 10 CFR 834, an incremental, annual average fencel ine concentration of 0.5pCi/Liter was considered.

The second benchmark concerns establishing an onsite exposure level that would be acceptable from an occupational standpoint. Consistent with radiological exposure protection onsite, an exposure level of 0.1 Working Levels (WL) at 100 meters assuming no PPE was considered. The level corresponds to a radon concentration of approximately 18 pCi/Liter.

Of the two benchmarks, the one that produces the lower emission rate is the second benchmark. This level (nominally) amounts to 4 to 5 curies of radium per silo that will remain behind in the residual K-65 material comprising the heel.

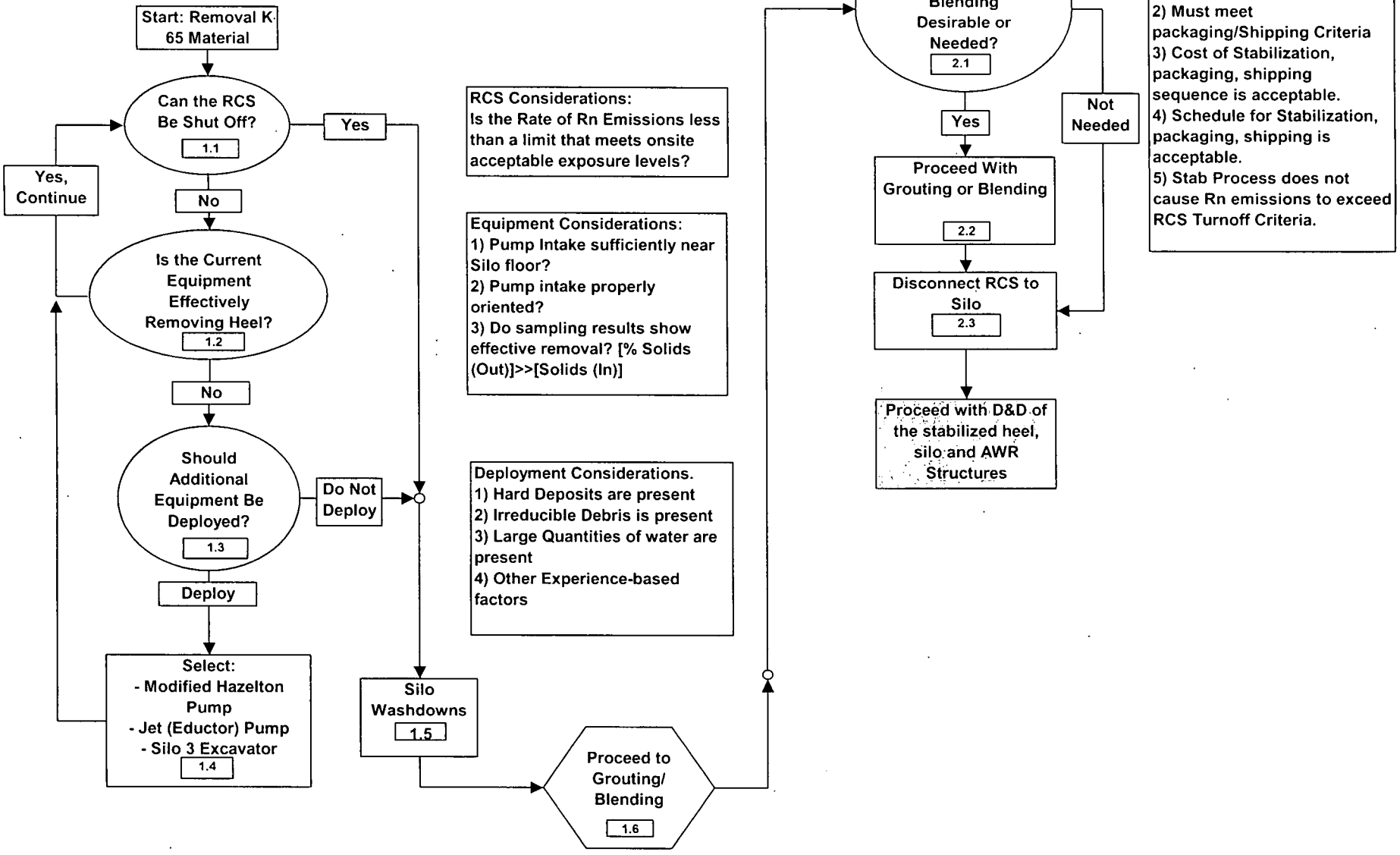
Having established an acceptable threshold radon emission rate, the actual emission rate within the silos will be measured. The measurement of this emission rate can proceed without opening the silos to the atmosphere, although the RCS service to the subject silo will need to be temporarily discontinued while the measurement proceeds.

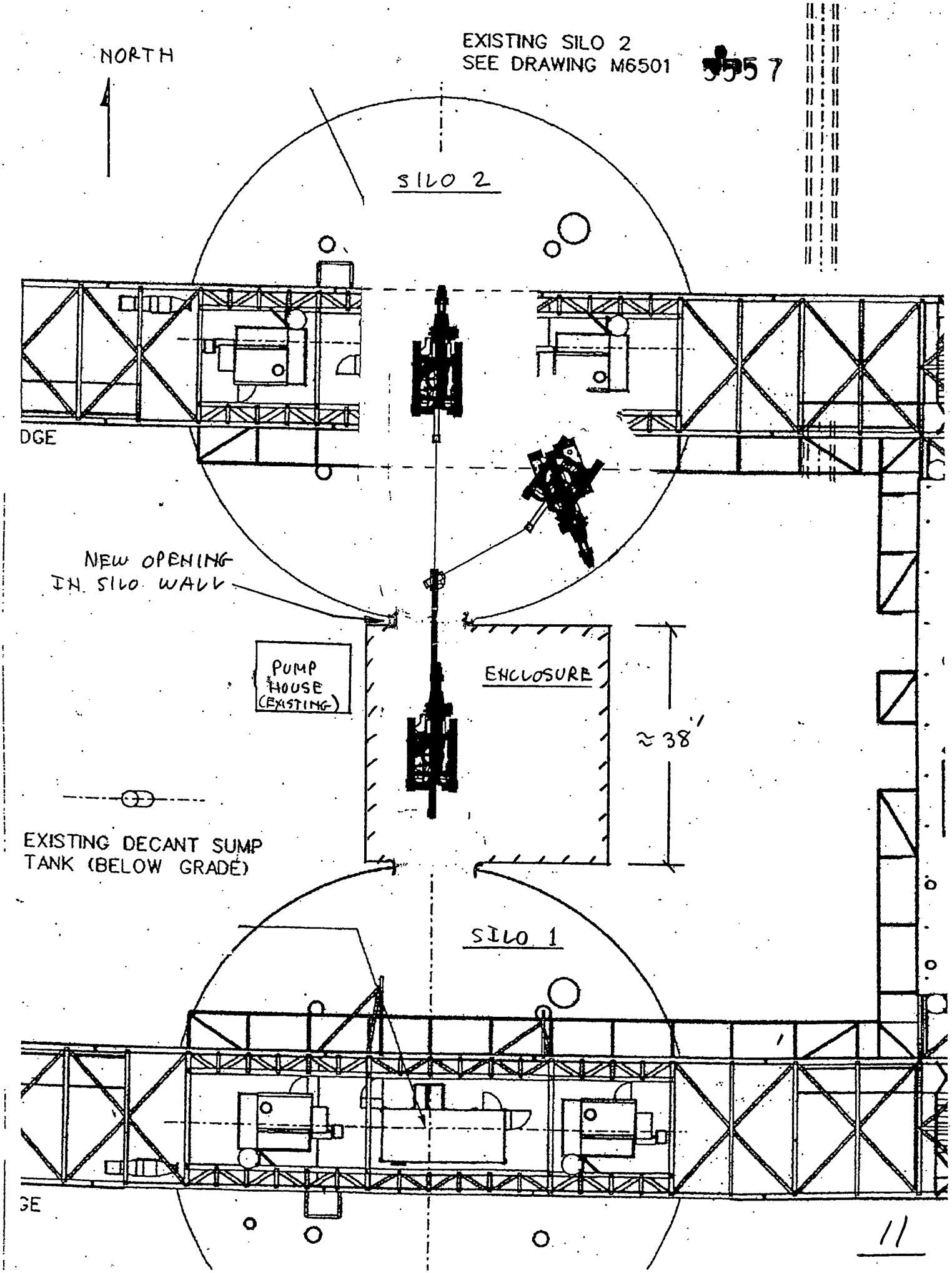
Presented above is an illustration of the exposure criterion that, for the purposes of planning, have been selected. There are additional considerations that need to be evaluated before the AWR project has determined to discontinue RCS service to either (or both) of the silos. For example, even though the emission rate may have been achieved for the residual remaining behind, there could be, depending upon schedule and cost factors, reason for prolonging the removal activities to lower the radium contents of the residual. For example, if it were established that additional removal of the residual could result in a substantial reduction in the amount of waste requiring offsite shipment or disposal, the removal action could be continued.

Alternatively, the selected exposure criterion for determining the RCS shut-off may be too stringent, causing unproductive iterations of removal attempts.

The result of the foregoing is that the shut-off criteria for the RCS will be a variable that depends on a variety of factors including the project's ability to assure minimization of exposure through the use of administrative controls and protective clothing. As the project proceeds and the issues associated with the removal of the heel material become clearer, the agencies will be notified of any direction proposed. In any case, all environmental and occupational standards will be met and modeling will be performed to insure that the concentration in the Silos will not cause any problems.

Decision Process: Removal of the Silos Heel

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