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K-65 SILOS REMOVAL ACTION ENGINEERING EVALUATION/COST ANALYSIS RESPONSIVENESS SUMMARY

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REPORT

K-65 Silos Removal Action

Engineering Evaluation/Cost Analysis

Responsiveness Summary

A. Overview.

On August 1, 1990, the United States Department of Energy (DOE) released the K-65 Silos Removal Action Engineering Evaluation/Cost Analysis (EE/CA). This report outlines DOE's near-term plans for controlling radon emissions from the K-65 silos during normal and tornado conditions.

The alternative selected is to place an optimized layer of bentonite slurry over the K-65 residues to reduce the normal radon emissions. The layer thickness will be a minimum of 12 inches. Surface irregularities of the K-65 residues will cause the bentonite layer to be thicker in some areas.

To inform the general public of the nature and scope of the removal action, DOE held a public workshop in Harrison, Ohio on Thursday, August 16, 1990. The workshop included an opportunity for participants to make formal verbal comments. In addition, the public comment period which started August 5, 1990 was extended to September 18, 1990 to allow for further review and written comments.

This Responsiveness Summary summarizes and responds to public comments received during the public comment period. The Ohio EPA and US EPA did not make comments that call for a written response. Therefore, DOE will not revise the EE/CA.

B. Background on Community Relations.

Community relations activities for the K-65 silos removal action are part of the site-wide strategy that the U.S. Department of Energy (DOE) has incorporated in the draft Community Relations Plan (CPR) for the Remedial Investigation and Feasibility Study (RI/FS), and Removal Actions at the Feed Materials Production Center (FMPC). The most recent draft version of the plan was submitted to the U.S. Environmental Protection Agency in August 1990. It is available for public review in the Administrative Record, in the FMPC Public Environmental Information Center, located at 10845 Hamilton-Cleves

Road, Ross, Ohio 45061.

This plan provides the framework for the Community Relations Program at the FMPC. It presents the background on the FMPC; the technological challenges that cleanup present; a community profile; lists of key contacts in the local community, media, and government; locations suitable for community meetings; Administrative Record and reading room information; and, most notably, highlights and rational of the site's Community Relations Program. The Highlights Section (Section 4.0) includes a discussion and schedule of removal action community relations activities. Community Relations activities designed to support the K-65 silos removal action comply with the removal action schedule provided in the CPR.

The site-wide Community Relations Plan discusses community relations activities for removal actions such as the K-65 silos removal action as part of the integrated community relations program designed to inform and involve the community in the FMPC cleanup process. Activities designed for community information and involvement at the FMPC include community meetings and workshops, public comment periods, community interviews, development and distribution of information materials, documentation in the Administrative Record, and public notification.

The silos have been a focal point for community concern, as shown in Community Assessments conducted in 1986 and again in 1989 (refer to Section 3.4 in the CRP). Interviews conducted in 1989 revealed that there was a general lack of information about silo contents; that persons interviewed expressed fear about radioactive contamination from the silos either leaking out over a period of time or spilling into the local environment all at once due to a major structural failure of the silos.

The silos have been discussed at each RI/FS community meeting held in the pas two years. These meetings have been held locally in January, May and October of 1989, and in February, May and September of 1990. Transcripts or reports of each meeting are available in the Administrative Record. Doe held a Community Roundtable May 23, 1990 that focused specifically on the silos.

The two K-65 silos are the focus of one of four removal actions identified in the 1990 Consent Agreement between DOE and U.S. EPA. This agreement provides the framework and schedule for the RI/FS and related removal actions. Pursuant to the Consent Agreement, DOE conducted an Engineering Estimate and Cost Analysis (EE/CA) in the Spring of 1990 to identify, analyze, and evaluate potential

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removal actions for the K-65 silos. The EE/CA was issued on August 1, 1990 at which time DOE opened a 30-day public comment period on the EE/CA. A public notice in local newspapers announced the availability of the EE/CA and the start of the public comment period. At the request of the community, the comment period was extended until September 18, 1990.

Shortly after the Consent Agreement was finalized, DOE agreed to hold community workshops during each formal public comment period. DOE hosted a public workshop on the K-65 silos on August 16, 1990, at the Plantation Restaurant in nearby Harrison, Ohio. Approximately 50 community members attended. Some of the concerns presented in this responsiveness summary were raised by community members during the workshop. A transcript of the discussion is available for public review in the Administrative Record.

Community relations efforts have continued after the public comment period ended. For example, the silos were featured in a detailed display about the RI/FS and removal actions. This display was available to approximately 2,000 persons who attended the open house at FMPC on September 22, 1990, and to approximately 50 community residents who participated in the RI/FS Community Meeting held at the Plantation Restaurant on September 25, 1990. The display about the silos discussed Operable Unit 4, which includes all four silos at the FMPC, as well as information about the K-65 silos removal action. The display was staffed by technical personnel and included a fact sheet about both Operable Unit 4 and K-65 silos removal action. A six-minute videotape about the silos was shown at both events. The videotape has since become available for public viewing and checkout at the FMPC Public Environmental Information Center. A copy of the videotape was also provided to Fernald Residents for Environment Safety and Health (FRESH).

C. Public Comments and DOE Responses.

Public comments were provided by 5 members of the general public. Three members of the general public provided written comments and three members made formal statements at the public workshop. In one case, the same individual made identical comments both in writing and as a formal statement.

Since there are a limited number of comments, no attempt has been made to summarize the comments into categories. Each comment is repeated as stated and a specific response provided.

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Comment 1: The weight and bulk of the slurry (bentonite clay) may cause an immediate collapse of the silos. Do you have any emergency plans? (clay slurry equals 16% more bulk)

Response to Comment 1: The bentonite slurry is not expected to cause a collapse of the silos and would have the effect of lessening the stress on the silo walls by providing opposing forces. One of the reasons for the berms was to lessen the stresses placed on the silo walls by having only the residues pushing on the walls. Westinghouse Materials Company of Ohio (WMCO) Procedure SOP 65-C-107 "K-65 Silo Numbers 1 and 2 Area Emergencies" provides for emergency action in the case of silo failure and other emergencies. In addition, WMCO's "Response Plan for a Hazardous Materials Emergency at the FMPC" provides for emergency notification in both Hamilton and Butler counties. This plan is available in the FMPC Public Environmental Information Center, located at 10845 Hamilton-Cleves Road, Ross, Ohio 45061.

Comment 2: The evaporation of slurry water will greatly increase the corrosion of the domes.

Response to Comment 2: The water used in the slurry will be bound up in the slurry matrix which will be several feet distant from the silo domes and will not effect the silo domes. The only mechanism for removal of water from the slurry matrix would be evaporation, however as the silos will remain closed after the slurry is placed, conditions (relative humidity) inside would remain relatively constant with no air movement (wind). Some minor evaporation is expected after the bentonite slurry is placed in the silo which will raise the relative humidity in the dome. Additional minor evaporation may occur during the daily heating and cooling of the silo atmospheres which causes the silos to exchange air with the outside environment. The humidity of the internal silo atmosphere is not expected to

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significantly effect the strength of the silo domes. The reduction of strength in the domes is believed to have been caused by precipitation falling atop the domes and that moisture subsequently migrating though the concrete.

Comment 3: Does not propose anything for the weakened domes. (In report 60% damage).

Response to Comment 3: In the selection of alternatives, repair of the silo domes was not considered for the following reasons:

* only a complete replacement of the domes is considered adequate and that would require the removal of the existing domes,

* replacement of the domes would result in a large radiation dose to the work force and

* would require an enclosure to prevent the release of radon.

It should also be noted that none of the alternatives assumed the existence of the domes in determining the protectiveness of the removal action.

Comment 4: Does not address water drainage problem from "domes".

Response to Comment 4: The dome drainage system will not be altered by the removal action. There are no identified drainage problems

Comment 5: If you have cracks develop in silos - slurry water would drain out, soften foundation, cause a total collapse and contaminate the water table with K-65 silos contents.

Response to Comment 5: During installation the consistency of the bentonite slurry will be similar to that of a milk shake which will allow the bentonite to evenly cover the residues. The bentonite will seal any cracks it comes in contact with (in both the

residues and the concrete walls) thus protecting the K-65 residues from any water (such as rainwater) which might infiltrate the silo. This waterproofing capacity of the bentonite would further protect the silos walls and inhibit the K-65 residues from becoming mobilized. Within hours of installation, the bentonite slurry will have the consistency of pudding. Water will remain within the matrix due to the addition of cement grout.

Comment 6: No provision for a containment building.

Response to Comment 6: A primary objective of the recommended removal action is to prevent the chronic release of radon gas to the environment and to mitigate the effects of a potential dome failure. A permanent containment building while providing some protection is further removed from the source whereas a slurry is placed directly on the source. During placement of the slurry, a temporary containment system will be installed. The containment system may be a full enclosure i.e. covers the entire silo or a local containment such as a glove bag placed over the man ways used during slurry placement. The bentonite slurry is in fact a 'containment' placed directly on the source.

Comment 7: The "overwhelming choice" is Alternative 2 - Construction of a Tornado Resistant Enclosure. This plan "safely" addresses all of our concerns. Time it takes to build (10 months) is same as (bentonite clay slurry process). The clay plan is totally unacceptable!

Response to Comment 7: The concept of 'covering' a radon source to reduce emissions is a well proven and accepted method. The perception that the water in the bentonite slurry will separate and mobilize the residues is incorrect. DOE apologizes for presenting the material at the public workshop in such a way as to lead the public to that

conclusion. For reasons stated in the EE/CA, the bentonite slurry is preferred over the proposed Tornado Resistant Enclosure.

Comment 8: When metric measurements are used, the equivalent english unit could be put in parentheses after it. The full name for acronyms should be repeated at the beginning of each section.

Response to Comment 8: The comment is well taken and will be used when possible in future documents.

Comment 9: On page 25 of the EE/CA, the statement is made that "the K-65 residues would probably remain stable beneath the collapsed silo dome and would not be of immediate concern." Elaborate on "probably". Also, even a small amount of residue leaving the silos is of great concern to the public.

Response to Comment 9: DOE shares the commentor's concern over any amount of residue being released. The "probably" in this statement is based upon the assumption that the dome fails under "relatively calm atmospheric conditions". Under relatively calm conditions there would be very little atmospheric turbulence (i.e. wind, updrafts, etc) to mobilize any of the K-65 residues. This holds especially true if samples of the residues show that the residues have a "crust" over them.

Comment 10: During the workshop on the EE/CA, radon was stressed as a hazard. We were informed that the day to day emissions should be of concern. This is a direct contradiction of what DOE and Westinghouse have been telling us for the past several years. We have been led to believe that the radon is so diluted by the time it gets to the boundary that it is of negligible concern.

Response to Comment 10: The EPA has recently issued regulations which are applicable, relevant and appropriate requirements (ARAR) to the K-65 removal action. The specific standard requires that radon emissions from the

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silos not exceed 20 pCi/m^2-s. The radon emissions from the silos exceed this standard. Radon measurements taken at the site boundaries which average .6 pCi per liter meet:

* EPA standards for indoor radon concentrations 4.0 pCi per liter

* DOE standards for uncontrolled areas 3.0 pCi per liter

It is DOE's position that regardless of the actual or calculated exposure, action will be taken to reduce the radon emissions until such time as the K-65 residues can be properly remediated as determined by the RI/FS process.

Comment 11: On page 14, it talks of the silo vents being sealed in 1979. Prior to that date were larger amounts of radon released to the environment? If so, how much?

Response to Comment 11: On page 23 of the EE/CA, the radon production rate inside the silos is estimated at 11 curies per day. This is an equilibrium condition that has existed since shortly after the final placement of residues in the silos. 11 curies per day equates to 4100 Ci of radon per year. It can be assumed that with the silos vented a large portion of the radon was released. This compares to current radon release estimates of 650 curies per year.

Comment 12: Alternative 2 calls for a "tornado resistant" enclosure. How close to "tornado-proof" is it?

Response to Comment 12: The terms "tornado resistant" and "tornado-proof" are equal with respect to the engineering codes and standards used to design the structure and the structure would therefore be the same for a selected tornado strength. DOE chose the term "tornado resistant" since the term "tornado-proof" may imply an absolute ability to withstand any tornado. A

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tornado which exceeds the design basis tornado (an extremely unlikely event) might damage the structure.

Comment 13: More detail on the SECURE containers would help. Can they be used for permanent disposal? What are they made of? How big are they? What is their volume that must be added to the total waste that would require disposal? Which adds more volume, the SECURE containers or the bentonite cap that might be added? Where are they made? How much does each one cost? Can they be placed inside Type B containers and transported to an off-site facility for permanent disposal or processing at that facility? Could vitrification or stabilizing the residues be done while they are in a SECURE container?

Response to Comment 13:

* The Secure containers could be used for permanent disposal if the residues required neither treatment nor alteration in form prior to final disposal.

* The containers are fabricated of steel reinforced concrete.

* Their dimensions are 7'8" x 7'8" x 8' high with 8" thick walls, floor, and cover. They have a 267 cu. ft. capacity and the container material volume is 203 cu. ft. per container.

* Approximately 1100 containers, adding 223,300 cu. ft. of volume at a cost of $3,000.00 per container ($3.3 million) would be used.

* The SECURE containers would add almost six times as much waste as would a four foot layer of bentonite (40,000 ft^3) and over twenty times as much waste for a one foot layer (10,000 ft^3)

* The containers would be fabricated on site.

* Type B containers would not be required for transport.

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* The residue would have to be removed for vitrification or other means of stabilization.

Comment 14: I'd like to see the bentonite and how it flows as a slurry and why the water in it doesn't migrate. It seems to me that water in the silos might eventually leak out of the silo carrying K-65 residues with it. Maybe a sample could be shown at a RI/FS meeting.

Response to Comment 14: DOE is taking steps to provide a physical sample in the FMPC Public Environmental Information Center, located at 10845 Hamilton-Cleves Road, Ross, Ohio 45061 before the end of 1990.

The only mechanism for removal of the water from the slurry which can be reasonably expected to occur inside the silos is through evaporation. The water is otherwise bound up in the bentonite and cement grout which have an extremely high affinity for water.

Comment 15: On page 99, it says that no new technology is needed for Alternative 3. Yet page 78 says resolution of some "technical concerns" would be needed.

Response to Comment 15: The concerns which must be addressed include placement of material and equipment, protection of workers, dewatering of secure containers (if hydraulic mining were utilized), and other material handling requirements.

The use of remote handle equipment does not require the use of new technology however, the application of such technology to the silos will require detailed investigation and design.

Comment 16: A new alternative possibility? Build the tornado resistant structure large enough to hold the gantry cranes of the EIE in remedial alternative 9. It wouldn't have to be too much larger and the cost

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looks reasonable. Then after the testing is complete on the silos, removal and repackaging could commence in a safe, tight building for off-site disposal. In the mean time the radon and tornado risks would be minimized.

Response to Comment 16: The scope of the removal action is to alleviate the immediate threat posed by the potential failure of the domes and the chronic release of radon. Removal actions are expected to be relatively quick. Focusing on an alternative currently under consideration in the RI/FS would be inappropriate. Given that removal actions are required to minimize interference with possible permanent remedial alternatives, it is not in the best interest of the public to continually add new alternatives to look at.

Comment 17: Availability of documents continues to be a problem. The public needs a full 30 days of having the document in hand. Obtaining a document should be made as easy as possible for the public.

Response to Comment 17: DOE will make every effort to provide the necessary documents in a timely manner.

Comment 18: "..the remedial action that's been proposed thus far says nothing whatsoever about the gamma radiation that is being given off..."

Response to Comment 18: The removal action is focused on the threat posed by the release of radon gas and K-65 residues. Gamma radiation levels are well within current requirements and the final remediation is expected to address that issue. The bentonite slurry will provide some reduction in direct gamma radiation from the silos. In addition, by reducing radon emissions, it will reduce gamma radiation resulting from radon decay in the open atmosphere.

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Comment 19: "..to put a permanently wet bentonite clay cap on top will add much more water to this and will increase the rate of seepage into the groundwater.."

Response to Comment 19: See response to comment 5.

Comment 20: "..the major releases from the silos are from around the edges, not from the dome itself. That's not to say that the dome isn't about to collapse, but that if we put a cap of bentonite on top of those wastes, I would predict that these rates of releases may in fact go up because we would be forcing radon out the side rather than up through the center..."

Response to Comment 20: According to the Qualitative Analysis Report of Alternatives for Interim Remediation of K-65 Silos IT/ASI 1988, the large increases in radon flux were noted to be near cracks in the concrete surface of the domes. The fact that some of the larger readings are near the edge of the domes does not suggest that the radon is coming from the sides rather than from the top.

Comment 21: "..it is clear to me that the one that is going to be in the long run most appropriate, and this is page 94, it doesn't have a page number, but Table 6-1, is going to be a combination of alternative 2 and alternative 3. Namely, to build an adequate protective structure over the top of these silos so that the silos may be opened up and repackage the wastes and to ship them to a suitable site..."

Response to Comment 21: See responses to comments 5 and 16.

Comment 22: "I feel like the bentonite clay is going to create more waste that will have to be dealt with in the final remediation action. I don't believe that justification has been clearly shown that the bentonite clay is the best alternative, and I think more thought needs to be put into other alternatives, not the easiest, fastest, and cheapest way to do this."

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Response to Comment 22: We believe that the selected alternative is the best method of achieving the goals of the removal action. As stated earlier, the use of a cover for radon abatement is a well understood and accepted method. The added material does increase the waste volume, however, the increased protectiveness to the environment provided outweighs the increased cost of waste handling. The prime evaluation criteria was the ability to meet the objectives of the removal action. Cost and schedule are important considerations in the context of a removal action which is by nature supposed to be adequate, quick, and inexpensive.

Comment 23: "The issue of using the water to keep the clay wet concerns me with regard to the possible leakage underneath and off to the sides of the silos. I don't believe that any regard was given to the leakage into the water table, and this along with the concern for the radon emission should have been addressed together."

Response to Comment 23: As stated more fully in comment 5 the water is bound to the bentonite which has a very high affinity for water.

Comment 24: "Building a tornado-resistant building, radon treatment building would accomplish the same results at not much more money and in the same time frame. It also would not create more waste and we wouldn't be dealing with water possibly leeching into the groundwater. It would also allow for a cover for the final remediation of possibly removing the K-65 waste. This would save money in the long run and enable the K-65 waste to be under cover and out of the environment."

Response to Comment 24: See response to comments 5 and 16.

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Comment 25: "Lastly, emergency preparedness should be a high priority, with all concerned parties being alerted that removal actions are beginning and underway. All should be on alert throughout the entire procedure."

Response to Comment 25: DOE and WMCO will make every effort to provide timely notification of planned activities to all parties concerned.

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