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US DEPARTMENT OF ENERGY
Fernald Area Office
P.O. Box 398705
Cincinnati, OH 45239-8705

Mr. James A. Saric
US EPA, 5HRE 8J
77 W. Jackson Blvd.
Chicago, IL 60604

GEOSAFE CORPORATION COMMENT ON THE REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Dear Messrs. Stegner and Saric:

Geosafe Corporation herein submits its comments on the Revised Proposed Plan for Remedial Actions at Silos 1 and 2, in response to DOE's call for public comments. Our comments are based on a detailed review of the Revised Feasibility Study Report for Silos 1 and 2, our close monitoring of the Silos 1 and 2 project over the past three years, and significant familiarity with the technologies involved in the project.

Our primary comment is that the ROD should NOT be changed to identify chemical stabilization as the preferred treatment remedy in lieu of vitrification. This comment is based on the fact that the Revised Feasibility Study is flawed and gives erroneous results, for the following reasons:

1) It fails to recognize the superiority of vitrified waste over chemically stabilized waste relative to the most important threshold criteria of overall protection of human health and the environment. To conclude that both vitrification and chemical stabilization technologies are equivalent relative to the threshold criteria is technically indefensible. The TCLP test employed for this comparison is artificially biased toward chemical stabilization due to the high pH of the wasteform and the resulting leachate, and the dilution of contaminants that resulted from the 5-fold bulking up of the wasteform. The evaluation also fails to recognize the significant differences in life expectancy between the wasteforms, and the impact of life expectancy on long-term protection of human heal th and the environment.

2) It establishes preference for chemical stabilization based on evaluation against the five primary balancing criteria. This is not appropriate in that the specific vitrification technologies evaluated are not representative of vitrification technologies that have been specifically developed for treating earthen waste materials such as are in Silos 1 and 2. Thus the cost, implementability, short-term effectiveness, and related performance factors developed are not representative of this technology class, and the balancing criteria evaluation is inadequate.

Given these flaws, the Revised Proposed Plan appears to be an attempt to select a lesser remedy as an expedient to resolve the prior failure of the Silo 1 and 2 vitrification program. Geosafe recognizes the difficulties posed by that failure, but comments that the Revised Proposed Plan is not an acceptable way to resolve the problem. Geosafe suggests that the vitrification aspect of the current ROD is acceptable as it stands. The errors of the prior vitrification program lie in the specific technology, equipment and management that was employed, and should not be used to condemn the whole class of vitrification technologies and to justify a less effective remedy.

Geosafe recognizes the political need for DOE and EPA to identify an alternative to vitrification due to the past failure of the vitrification program at Fernald. As noted above, it would be an even greater failure if vitrification is excluded from future consideration. If DOE must identify an alternative, then Geosafe suggests that chemical stabilization be included in the revised ROD as a lesser contingent remedy; but it certainly should not replace the vitrification alternative as the primary remedy. Such replacement would be an injustice relative to the environment, and would result in an unfair restriction of commercial competition. We are aware that the use of contingent remedies within a ROD are an acceptable CERCLA practice.

Geosafe also believes that inadequate consideration has been given to the possibility of offsite treatment of the waste by commercial vendors. We believe that such offsite treatment capability either presently exists, or will shortly. In any case, such offsite capability can be established at far less cost than is projected for a temporary facility at Fernald which will be destroyed at the end of the project. Establishment of commercial facilities would also benefit the Government and the public through their availability for continued use, and their lower overall cost to this project. The Revised Feasibility Study produced estimates of total project costs exceeding $20,000 per ton of waste treated. That is an exorbitant cost for a waste that can be treated by vitrification for direct vendor costs of less than $1000 per ton. Geosafe very strongly suggests that the ROD additionally be revised to allow offsite treatment by commercial vendors as an acceptable alternative.

DOE should define a performance specification consistent with the capabilities of best available technology, and then should procure remediation of the Silos 1 and 2 waste on an open competition basis. As a vendor of vitrification services, Geosafe would be pleased to compete in a procurement for remediation of Silos 1 and 2 waste, at either an onsite or offsite facility. The GeoMelt technology has been demonstrated to be effective on this type of waste and it does not require the same constraints that led to the failures of the prior vitrification program. It can also be applied more cost effectively.

Geosafe's comments relative to specific errors and omissions in the Revised Proposed Plan are attached. Please contact me if I can provide clarification of these comments.

Sincerely,

GEOSAFE CORPORATION

James E. (Jim) Hansen, President

DETAILED COMMENTS BY GEOSAFE CORPORATION ON THE REVISED PROPOSED PLAN FOR REMEDIAL ACTIONS AT SILOS 1 AND 2

Page 2-16, line 14 - The basis for development of alternatives is said to have included "commercial and DOE-complex experience...". It is obvious from the Revised Feasibility Study and the Revised Proposed Plan that this statement is not true relative to vitrification technologies. Geosafe has provided information on its GeoMelt vitrification technology to DOE and Fluor Daniel Fernald (FDF) several times; and it is apparent that this technology has been ignored by the studies. This technology has been used commercially on hazardous and radioactive waste more than any other vitrification technology.

Page 6-1, line 10 - The two vitrification technologies selected for Proof-of-Principle (POP) testing are judged to be "representative" of the class of vitrification technologies. The two technologies tested are certainly not representative of available vitrification technologies. There are vitrification technologies better suited for treatment of earthen materials such as the Silos 1 and 2 waste. One such superior technology is the GeoMelt vitrification technology.

Page 7-1, lines 21-23 - The Proposed Plan states here and several other places that "equivalent processes" may exist and "are not precluded from consideration ...". In fact equivalent and even superior systems are being excluded from further consideration by not having been appropriately considered in the Revised Feasibility Study or the Revised Proposed Plan.

Page 7-3, lines 14-15 - The statement that "both vitrification and chemical stabilization provide overall protection of human health and the environment" is very misleading. In fact they may both meet or exceed a minimum threshold value relative to leaching resistance, for instance; however, there are major differences in the level of performance relative to this criterion. Additional comments below relate to this position.

Page 7-5, lines 4-7 - The erroneous implication in these statements is that both technology classes are equivalent relative to leaching resistance, even when the "original wasteform is degraded". It is well known by DOE and EPA that vitrified waste has superior long-term leaching resistance to chemically stabilized waste. It is also known by these parties that the TCLP test produces positively biased results for chemically stabilized waste in that the presence of alkali materials in the waste buffers the acid used in the TCLP testing. This is evidenced by the TCLP results for the POP-tested technologies. The leachate from the chemical stabilization wasteform testing was highly basic, whereas it started out acidic. It is known that once the alkali is "spent", the leaching resistance of chemically stabilized waste falls off dramatically when exposed to acidic conditions.

The TCLP results are also biased due to dilution of contaminants that occurs due to the bulking (volume increase) of the chemical stabilization wasteform. A volume increase of nearly 500% has been used to dilute these wastes; and then the diluted waste's TCLP performance is compared to that of the vitrified wasteforms which did not dilute, but rather concentrated the waste. For this reason it is not appropriate to say the four wasteforms were equivalent on the TCLP basis.

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It is also known that the estimated life expectancy of chemically stabilized product falls in the range of 10 to 100 years; whereas vitrified waste has a life expectancy of thousands to millions of years. It is certainly misleading to state that the two technology classes are equivalent in terms of leaching resistance over the long term.

Page 7-7, lines 6-7 - The statement that chemical stabilization ensures "long-term protectiveness of human health and the environment ..." is very misleading. It is only a matter of time and the chemically stabilized waste will fail and become a risk to human health and the environment. The comments in the item above apply here also.

Page 7-10, lines 27-28 - The statement regarding generation of waste streams may be true for the vitrification technologies that were POP tested; however, this is not true for all vitrification technologies. For instance, the GeoMelt vitrification technology consumes its own secondary waste, by recycling back to subsequent melts, and substantially reduces the total amount of waste generated compared to the alternative technologies.

Page 7-11, lines 26-27, continuing on Page 7-13, lines 1-2 - The statements relative to radon release are true; however, they omit recognition that the overall amount of radon released from the vitrified wasteform throughout its lifetime will be far less than that released by the chemically stabilized wasteform. Vitrification results in essentially stopping the release of radon to the environment. Chemical stabilization temporarily slows the release; and at some time in the future, when the product is degraded, radon emanation and release to the environment will return to high levels. This is another benefit of vitrification that relates to long-term protection of human health and the environment.

Page 7-11, lines 18-15, and Table 7.2-1 - The text cites an "occupational hazard analysis" which "evaluated the potential physical and chemical hazards to the workers ...". The logic used resulted in vitrification being rated lower than chemical stabilization. The analysis missed the point that due to greater intrinsic hazard (i.e., high temperature and high voltage), the vitrification industry has taken steps to ensure worker safety. A more appropriate comparison would have been to compare the actual safety records of the two technology classes on a manhours worked basis. In the 20+ years that the GeoMelt technology has been under development and in commercial use, there has not been a single worker lost time injury associated with the technology. The analysis used in this evaluation was inappropriate relative to what really counts ... actual personnel safety.

Page 7-14, lines 1 through 14 and Table 7.2-3 - The analysis and conclusions presented here are an example of error resulting from the assumption that the POP-tested vitrification technologies are representative of the class. "The time period between the approval of the ROD amendment and the initiation of treatment operations ..." specified for vitrification technologies is far longer than would be required for the GeoMelt technology. In addition, the 8-month requirement for performance of "Proof of Process" testing for vitrification is unnecessary for technologies such as the GeoMelt vitrification technology. More than 25,000 tons of waste and debris have been commercially processed by the GeoMelt technology. This amount is far more than the combined total of all the other vitrification technologies under consideration by DOE. It would not be necessary to perform such testing on the GeoMelt technology. This technology has been demonstrated several times before on behalf of DOE. For example, a 300-ton demonstration

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melt, performed on mixed waste-contaminated soil and debris, was performed for DOE at LANL in April, 2000. The technology has also been demonstrated capable of treating simulated Silos 1 and 2 waste without difficulty.

Page 7-16, lines 1-2 and Table 7.2-4 - The comparison of operating times is misleading due to differences in scale between the technologies being compared. The vitrification alternative can be made to operate at higher rates if desired. See further comments regarding scale below.

Page 7-16, lines 1-11 and Figure 7.2-5 - The implementability evaluation may be correct for the POP-tested vitrification technologies, but unfairly judges others, like the GeoMelt technology. As noted above, the GeoMelt technology has excellent commercial experience and has no uncertainty relative to successful implementation. The analysis is clearly biased toward chemical stabilization, particularly in the areas of commercial demonstration, ease of acceleration, and constructability.

Page 7-19, lines 2-14 - The section on scaleup fails to recognize vitrification technologies beyond those that were POP-tested. GeoMelt vitrification, which involves joule heating, but does not use a refractory-lined melter vessel such as the POP-tested technologies, has been demonstrated and used commercially many times before on radioactive and hazardous materials at rates far exceeding the 15-tpd scaleup size evaluated in the Revised Proposed Plan. GeoMelt capacity to 150 tpd exists, and many thousands of tons of materials have been treated in the range of 30 to 80 tpd. On an 80 tpd basis, the hours required for GeoMelting would be less than half those required for the Chem 1 alternative (reference Table 7.2-4). Scaleup risk is not a concern for the GeoMelt technology. This scale of equipment can be provided at lower capital cost than that of the POP-tested alternatives. Similarly, there is no need to scaleup the off-gas treatment technology that would be employed with the GeoMelt technology.

Page 7-19, lines 20-25 - The Plan states that joule-heated vitrification has not been used on material "reasonably similar to Silos 1 and 2 material at the scale being proposed by the POP contractors". As noted above, that is an erroneous statement. The GeoMelt technology has been used to treat actual simulated Silos 1 and 2 material (unpublished data provided to Fluor Daniel Fernald and DOE in 1997); and that material behaved during processing in a manner very similar to the great majority of the >25,000 tons of earthen materials processed to date.

Page 7-20, lines 15-21 - The statements made are true for the vitrification technologies cited; however, they are misleading relative to vitrification as a class. The GeoMelt vitrification technology, including its off-gas treatment system and other equipment, has been judged by EPA and DOE as highly reliable (reference EPA/540/R-94/520). The comparison regarding reliability is misleading.

Page 7-20, lines 22-28 - Vitrification can easily equal chemical stabilization relative to "schedule acceleration/recovery by simply employing a larger scale of equipment. It is apparent that the two technologies being compared are "apples and oranges" relative to processing scale (refer to discussion above for page 7-19, lines 2-14).

Page 7-21, lines 1-2 - Not all vitrification technologies require the installation of custom refractory. The GeoMelt technology would rate more favorably relative to constructability.

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Page 7-23, Table 7.2-2 - The vitrification cost estimates are not representative of all vitrification technologies. The GeoMelt technology could be applied at significantly lower cost than all the technologies evaluated.

The summary cost data points out in a glaring way the need to consider offsite treatment as opposed to onsite treatment of the waste. The logic of building a $55-69 million facility for three years of use, and then to spend $24-25 million to decommission (destroy) it should be subject to serious evaluation. These are costs that would be better spent on behalf of the Government, public and industry if they were instead invested in commercial waste treatment capacity. In addition, commercial offsite treatment would greatly reduce or nearly eliminate other costs associated with project management and the cost of money.

Page 7-25, lines 7-20 - The capital and operating costs cited for vitrification are again not representative. GeoMelt vitrification capital costs are typically less than half of melter-based technologies. As noted earlier, neither an 8 month testing period of expensive spare parts nor refractory replacement are necessary for GeoMelt vitrification.

Page 8-1, lines 21-27 - The comparative evaluation against the five primary balancing criteria is not appropriate because the vitrification technologies evaluated are not representative. The evaluation does not appear to give adequate importance to the superior environmental properties and life expectancy of the vitrified product compared to the chemically stabilized product.

Page 8-5, lines 17-28 - These summary statements regarding vitrification are in error as indicated in the comments above.

Page 8-7, lines 7-8 - It should be noted that the GeoMelt vitrification technology is capable of processing soils and debris related to the OU-4 remediation project. The use of this process at the site for the Silos 1 and 2 waste could have subsequent benefit to DOE for completion of the OU-4 cleanup.

Page 8-10, line 4 - Whereas the remedy may be permanent as far as the Fernald facility is concerned, the chemical stabilization alternative is certainly not a permanent solution for the waste itself. The problem will have been moved to another location and the public will once again have the opportunity to spend further resources on its ultimate treatment at a future time. It is inappropriate to call the Proposed Plan a permanent remedy.

GeoMelt Vitrification Advantages Relative to Melter-Based Vitrification

3. Simpler technology
   - No melter vessel
   - No waste pretreatment requirement
   - No additive requirement
   - No feeding equipment
   - No withdrawal equipment

4. Lower cost
   - Capital
     - less expensive construction
   - Operating
     - larger scale
     - longer equipment life expectancy
     - lower personnel requirement
     - no need to purchase additives
     - less material to treat due to absence of additives
     - less product to ship due to absence of additives and higher volume reduction
     - less product to landfill due to lesser volume

5. More robust technology
   - Larger scale
   - Higher melting temperature
   - Unconstrained by melt temperature
   - Tolerance of heterogeneity, waste and debris

6. Superior vitrified product
   - Higher metals retention in melt
   - Greater leaching resistance

7. Greater experience
   - More than 25,000 tons processed
   - EPA SITE Program demonstrated
   - EPA permitted for treatment of PCBs
   - DOE demonstrated several times
   - Seven scales of equipment to 150 tpd
   - Prior treatment of surrogate Silos 1 and 2 waste
   - Experience treating far more hazardous/radioactive waste than Silos 1 and 2 waste