UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
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DALLAS TEXAS 75202-2733

MEMORANDUM September 27, 1990

Subject: In-situ Vitrification at the Arkwood Site

From: Jamie VanBuskirk, RPM

To: Garret Bondy
Chief
Arkansas/Louisiana Section

As per your request. I have researched the applicability of in-situ vitrification at the Arkwood site. The result of my research is summarized below.

Issue: EPA's consideration of the PRP's proposal for in situ vitrification (ISV) at the Arkwood Superfund Site.

Background: Mass Merchandisers Inc. (MMI), a PRP at the site, conducted the RI/FS from May, 1985, to May, 1990. During the PRP conducted RI/FS, MMI proposed a consolidation/capping remedy for the abandoned wood treating facility. The FS showed that incineration was the only evaluated alternative that would permanently destroy the site contaminants (PCP, dioxin, other organics) and provide long term protection. Therefore, on July 16, 1990, EPA proposed an incineration remedy for this site. On September 6, 1990, at a meeting requested by MMI, MMi proposed to EPA an ISV alternative that was not previously evaluated in the FS.

Current Status: The ROD is nearly complete, calling for sieve/wash followed by incineration. However, the ROD can be amended, if warranted, to allow ISV to undergo treatability testing and if successful, amend the ROD to ISV.

Findings:

Factors supporting the incineration only ROD:

- The ISV technology has not been applied on a large scale on organics, including dioxins. Therefore, ISV's ability to successfully meet EPA cleanup requirements is not known. The Office of Technology Assessment (OTA) stated in a July 1, 1988, report that several concerns about the effectiveness of ISV have been identified by various EPA and independent investigations and that these concerns require further study. These same concerns apply today at the Arkwood site. The major concerns include:

1) Possible lateral migration of vaporized organics into

adjacent soil or perhaps downward into ground water. Instead of being destroyed , the vaporized chemicals could simply move away from the hot core melt. In order to test for this effect, it would be necessary to test a large volume of soil so that temperatures away from the molten zone are low enough to have condensation of vaporized contaminants.

2) The effectiveness of off-gas collection and treatment is not fully known. ISV depends on the effectiveness of the collection and treatment system for released gases to keep undestroyed organic contaminants from entering the environment.

3) No significant examination of the risks posed by ISV have been made. These risks include safety questions about the effects from soil heating, ground subsistence, and the consequences from a failure of the off-gas collection and treatment system on the surrounding environment.

- The majority of ISV information describing its effectiveness is generated by the exclusive vendor of the technology, Geosafe Corp., The OTA report cited a 1987 EPA study that examined 8 emerging technologies for treating PCB contaminated sediments and ranked ISV as the least promising. While PCB contamination is not a contaminant of concern at the Arkwood site, it is important to note this, because, most of the previous information on IVS, that touted PCB decontamination effectiveness, came from the developer. This situation exists today as well. In addition, because Geosafe Corp. controls the exclusive worldwide rights for this process, no competitive bid process appears possible.

- Because ISV has not been successfully demonstrated on a large scale on organics, including dioxins, indepth treatability testing would be necessary before enough evidence could be generated that would indicate ISV's effectiveness and applicability at the Arkwood site. Treatability testing can be lengthy (a year or more) and costly ($100,000s) and does not always provide conclusive evidence that the technology will work. The focus of ISV treatability testing has been on the performance requirements for the off-gas treatment system, the type and quality of secondary waste generated, (ie. the monolithic mass) and the possible contamination in the surrounding soils. Other Superfund sites that have conducted ISV treatability testing (e.g. Northwest Transformer, Region 10) have had cost over-runs and time delays, due in part to inadequate initial testing proposals and the many uncertainties and unknowns that surround this technology. Even still the results of bench scale treatability testing may not necessarily provide Region 10 with sufficient information to make a decision to implement the ISV remedy or not. The results may only provide enough information to warrant increasing the scale of testing to gather more conclusive information.

-Actual costs to implement ISV may not be that much lower than incineration. The OTA report did a detailed analysis on cost

comparison between ISV and incineration alternatives at the Pristine Superfund Site (Region 5) and concluded that onsite incineration is not likely to be more expensive than ISV at that site, and in fact, may be less expensive. This also appears to be the situation at the Arkwood site. ISV implementability is lower than that for incineration because ISV has a higher level of uncertainty with regards to site conditions and requires a more detailed site specific design and oversight. Incineration offers considerably more certainty as to effectiveness, reliability, and cost. Also, ISV is more costly and harder to implement when water content of the treated material is high. MMJ is proposing to sieve and wash the material before placing the contaminated material into the treatment zone. This will severely increase the moisture content.

- Possible delay by having to go back to incineration if testing shows ISV to be inappropriate for this site.

Factors supporting a contingency ROD:

- ISV could be successful and meet EPA remediation goals. An independent study cited in the OTA report stated that the process destruction was greater than 99.9% and the small amount of material released to the off-gas system can be removed by the treatment system for a total destruction efficiency of >99.9999%.

- Eleven other Superfund sites have chosen ISV as the remedy. (It should be noted that many of these selections have occurred without the benefit of treatability testing; the selections were based on lower cost projections and community acceptance in compared to incineration.)

- There is stiff opposition to the incineration proposal by the public and PRPs.

Conclusions: The purpose of the OTA report was to assess Superfund implementation. It looked at 10 Superfund case studies (Pristine was case #6) and evaluated the remedy making decision. It concluded that there were several flaws with that particular decision to select ISV over other technologies. Part of the problem with that particular decision rested with EPA's failure to recognize and consider various uncertainties that existed with ISV technology. The concerns raised regarding ISV were genuine concerns that still exist today. The Arkwood site presents similar unknowns and uncertainties and raises other uncertainties, including the performance on dioxin. The final conclusion drawn by this report stated that incineration is a less risky selection in the absence of treatability study data that could remove the uncertainties about ISV, especially with regard to off-gas collection and treatment, the migration of contaminants into surrounding soil, the degree of destruction of all organics, cost, and safety.