UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

MEMORANDUM

Date: September 29, 1998

Subject: Response to National Remedy Review Board Recommendations on the Lenz Oil Services, Inc., Superfund (Lenz Oil) Site

To: Bruce Means, Chair
National Remedy Review Board

From: William E. Muno, Director
Superfund Division

The purpose of this memorandum is to provide a response to the January 13, 1998 memorandum issued to Region 5 regarding the National Remedy Review Board (NRRB) recommendations on the Lenz Oil Services, Inc., (Lenz Oil) site. Region 5 has carefully considered the comments received from the NRRB and has developed the ROD for the Lenz Oil site, along with plans for predesign and design work at the site, to make sure the recommendations are addressed.

A brief explanation of the format and scope of the Lenz Oil ROD will provide the Board with an update on the ROD and will also provide background for some of the Region's responses to the Board's recommendations. The Lenz Oil ROD prepared by the Region presents a two-phased approach for cleaning up the site. The objective of Phase I cleanup is to address the principal threat identified at the site, namely the light non-aqueous phase liquid (LNAPL) floating on the aquifer. Phase II cleanup will address any groundwater contamination remaining after the principal threat is removed. In the ROD, one "primary" remedial alternative and two "contingent" remedial alternatives for addressing the principal threat in Phase I cleanup are presented. The determination of which Phase I alternative is preferable will be based on the results of predesign studies. If a contingent remedy is selected, the decision will be documented either in a ROD Amendment or an Explanation of Significant Differences (ESD).

After Phase I is complete, ground water will be monitored for at least one year to determine if any further action to address remaining groundwater contamination is needed. If additional action is necessary, monitored natural attenuation, pump-and-treat alternatives, and any other appropriate approach for Phase II will be evaluated. The selected Phase II approach will be documented either in a ROD or a ROD Amendment.

RESPONSES TO BOARD RECOMMENDATIONS

The NRRB's recommendations about the Lenz Oil site were contained in five bulleted items. Each recommendation is restated below and is followed by Region 5's response to the specific matters addressed in the recommendation.

Recommendation: The Region should state in its decision document the criteria it will use to determine whether to invoke the contingent remedy (alternative 10).

The ROD states that any contingent remedy being considered, along with the primary remedy, will be tested and studied during predesign. Some of the significant questions that are to be answered through the predesign studies include: (1) are the estimated removal efficiencies, i.e., the estimated percent of total volume of light, non-aqueous phase liquid (LNAPL) that can be removed, accurate?; (2) can volatile emissions resulting from each technology be handled in a manner that is safe and protective?; (3) were there any difficulties in implementing any of the pilot studies?; (4) how would these difficulties be manifested on a large-scale basis?; (5) was a suitable stabilization matrix identified for stabilizing the LNAPL-contaminated material under Alternative 9A?; (6) what effect does the presence of a shallow water table have on each technology?; (7) did any information arise from the pilot studies that could be used to refine the ability of a technology to meet the short-term and long-term effectiveness criteria?; and (8) are cost estimates for any of the technologies affected significantly by information learned from predesign work?

Using the results of the predesign studies and the answers they provide to the questions listed above, each contingent remedy and the primary remedy will be evaluated against the nine criteria contained in the NCP. These evaluations will be done in close consultation with Illinois Environmental Protection Agency (IEPA). The reduction in LNAPL volume is one of a number of factors that will need to be carefully considered in selecting the ultimate Phase I cleanup approach; consequently, verifying the estimated LNAPL removal efficiencies for each technology, along with the margin of error in the estimates, will be important objectives of the predesign studies. It will also be important to assess not only the reduction in LNAPL volume, but also the short- and long-term effectiveness of the alternative, implementation issues, the ability of the alternative to reduce the toxicity, mobility and volume of the contamination, alternative cost, and the other NCP criteria.

If a contingent remedy is selected as the preferred remedy, either a ROD Amendment or an Explanation of Significant Differences (ESD) will be issued to document the recommendation. If the recommended remedy is a new approach developed during predesign which was not described in the ROD, a ROD Amendment would be prepared.

Recommendation: The Region's preferred alternative relies substantially on excavation and treatment that may trigger costly RCRA Subtitle C and/or State waste disposal requirements. The Board strongly supports the evaluation during remedial design of the

capability of vacuum enhanced recovery (or other equivalent technologies) for managing adequately the LNAPL. These technologies may have the potential to achieve cleanup objectives while avoiding the disposal and management costs associated with the proposed excavation and treatment alternative.

In developing the ROD for the Lenz Oil site, the Region presented excavation and treatment (via solidification/stabilization (S/S)) as the "primary" alternative and indicated that two "contingent" remedies that would be studied during predesign were vacuum-enhanced recovery (VER) and *in situ* low temperature thermal desorption (*in situ* LTTD). The ROD strongly emphasizes that each of these two contingent remedies, as well as any other approach determined to be potentially viable, will be studied during predesign and that one of these alternate approaches may be selected as the preferred remedy for the site based on treatability study results. The ROD acknowledges the potential problems associated with excavating the contaminated material and includes $1,500,000 in additional costs for the primary alternative to cover the "worst case" situation in which a complete RCRA Subtitle C cap is called for in order to dispose of the treated wastes in an on-site corrective action management unit (CAMU).

Recommendation: The information presented to the Board did not sufficiently define the physical properties (i.e., thickness of the LNAPL and smear layers) governing the interaction between the LNAPL layer/smear layer and the dissolved phase in groundwater. In order to better evaluate during the remedial design the relative performance of the competing alternatives, the Region should refine its characterization of such physical properties.

Some of the information being referred to in this recommendation, though it was not presented to the Board, is contained in site reports generated over the course of the remedial investigation/ feasibility study (RI/FS). For the most part, the consultants for the Respondents to the RI/FS Administrative Order on Consent (Respondents) indicated throughout the RI/FS that the apparent and actual thickness of the LNAPL layer, as well as the apparent and actual thickness of the smear layer, were difficult, if not impossible, to accurately calculate using the physical properties of the LNAPL, site soil information, and sampling and field data. The Region has identified at least four journal articles[1] that will be used to gain a better understanding of the interaction of the

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Nyer, Evan K. and George J. Skladany, "Relating the Physical and Chemical Properties of Petroleum Hydrocarbons to Soil and Aquifer Remediation", *Ground Water Monitoring Review*, Winter 1989, pp. 54 - 60; Chevalier, Lizette R., "Experimental and Numerical Evaluation of LNAPL Lens and Polluted Capillary Fringe Thickness", *Journal of Environmental Engineering*, February 1998, pp. 156 - 161; Testa, Stephen M. and Michael T. Paczkowski, "Volume Determination and Recoverability of Free Hydrocarbon", *Ground Water Monitoring Review*, Winter 1989, pp. 120 - 128; Abdul, Abdul S., Sheila F. Kia, and Thomas L. Gibson, "Limitations of Monitoring Wells for the Detection and Quantification of Petroleum Products in Soils and Aquifers", *Ground Water Monitoring Review*, Spring 1989, pp. 90 - 99.

LNAPL, the aquifer material, and pore spaces within the aquifer. Better understanding the dynamics of the LNAPL-groundwater-soil system will allow us to better determine how physical and sampling data can be used to shed light on the best methodology for LNAPL volume determination, the significance of treatability study results, the effectiveness of remedial approaches, and the advantages, potential drawbacks, and implementation issues of each alternative.

In addition, the Region has structured the cleanup of the Lenz Oil site so that it will have two "Phases". Phase I, described previously, will address the principal threat--the LNAPL--at the site. Following the completion of Phase I, groundwater monitoring will be conducted for at least one year to assess the quality of ground water and to evaluate whether the ground water will be able to recover via natural attenuation processes once most or all of the LNAPL is removed from the subsurface. The recommendation for Phase II cleanup, which will address any residual groundwater contamination, will be published either in a ROD or a ROD Amendment. In this way, the actual long-term impact of the site on area ground water will be clearly determined prior to selecting the final groundwater action.

Recommendation: The Board questions whether Alternative 2 (which is the least expensive alternative that complies with applicable or relevant and appropriate requirements (ARARs)), can be completed in ten years. For this reason, the Board encourages the Region to consider the effects that a longer remediation time frame would have on the Alternative 2 cost estimate.

The alternative that involves operating for only ten years is Alternative 5A. Alternative 5A is similar to Alternative 2 in that it involves collection trenches; however, Alternative 5A would involve active pumping over a ten-year period, whereas Alternative 2 would rely on passive accumulation of LNAPL in the trenches and would operate for thirty years. The Region shares the Board's concerns about whether ten years would be sufficient time in which to complete Alternative 5A. In the case that serious consideration were given to implementing Alternative 5A, the Region would require that the trenches continue to operate for thirty years. The cost of implementing Alternative 5A for thirty years would not have a significant impact on the present net worth cost of the alternative. The additional costs of operating the system for thirty years fall within the sensitivity range (+50% to -30%) of the cost estimate presented in the FS report for Alternative 5A.

However, the Respondents' consultants, when asked about this by the Region, stated that they firmly believed that compared to the amount LNAPL recovered during the first ten years of system's operation, the amount recovered thereafter would be "negligible". According to the cost estimates provided by the Respondents' consultants, operating Alternative 5A for thirty years instead of ten would entail the following additional costs (in terms of net present worth):

- $350,000 for operating the trenches for twenty additional years;
- $95,000 for replacement of instrumentation systems;

- $214,000 in electrical system costs;
- $570,000 in design engineering, construction management, insurance, and contingency costs; and
- $1,295,000 for twenty additional years of groundwater treatment O&M costs.

This would mean that instead of having an estimated capital and operation and maintenance (O&M) cost of $10,000,000, the cost for Alternative 5A would be $12,520,000.

Recommendation: The Region should consider quick response actions to protect the nearby underground pipeline from migrating LNAPL. Doing so should prevent the pipeline from becoming a preferential pathway for LNAPL migration to surface water and reduce cleanup complexity should the LNAPL move into the pipeline corridor.

Shortly after the presence of LNAPL in the unused residential well adjacent to the site was established, and, as a consequence, it was recognized that the underground pipelines to the west of the residence could serve as a preferential pathway for the LNAPL to migrate to the Des Plaines River, the Region required the Respondents to complete ten soil borings to the east of the pipelines to determine if the LNAPL was migrating towards them. This sampling, which established that the LNAPL plume was not present within five feet of the pipelines, was completed in August 1997. Based on the sidegradient flow velocity of ground water in the direction of the pipelines, another round of soil borings will be completed this fall.

To ensure that the LNAPL plume does not migrate into the pipelines, the Lenz Oil ROD will include a requirement for periodic soil boring activities in the vicinity of the pipelines, or other equally protective measure(s), throughout remedial design/remedial action (RD/RA). If LNAPL remains in the ground after Phase I cleanup, continued soil sampling or other preventative measures to protect the pipelines will be required throughout the operation and maintenance period.