



State of Ohio Environmental Protection Agency

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June 9, 1999

Mr. Johnny Reising
U.S. Department of Energy, Fernald Area Office
P.O. Box 538705
Cincinnati, OH 45253-8705

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Re: Comments on LTS Leak Investigation Report

Dear Mr. Reising:

This letter provides Ohio Environmental Protection Agency comments on the OSDF Leachate Conveyance System Leak Investigation Report. This letter is also intended to close the administrative paper trail begun with our February 25, 1999 letter which provided our concerns on leaks found in the leachate transmission system. To accomplish that, we would like to evaluate the Reports success in addressing our concerns using the same numbering scheme we used previously.

1. By abandoning the temporary LTS and constructing a new interim leachate gravity line, our doubts about the future reliability of the temporary system are addressed. It is not as easy to address the root cause of the system failure. One possible interpretation of the cause of the failure could be that the two different methods of joining lengths of pipe (electrofusion couplings and butt fusion) were considered by all parties (including Ohio EPA) to be equally satisfactory methods. We realize now that is certainly not the case. Butt fusion welds are very robust in the field. The pipefitter has direct control over process variables such as plate temperatures, weld pressures, cooling times, etc. Electrofusion couplings are controlled by a black box. The operating parameters are not directly under the pipefitters control. The process is not robust under field conditions. Trace amounts of dirt, oxidized pipe surfaces and even fingerprints from skin oils can effect the quality of the joint. If we accept the root cause (treating two fundamentally different processes as equivalent), it is easy to list several other processes in the OSDF project where different processes are deemed equivalent; fusion-welded seams vs extruded patches, tamped pipe embedment vs flooded ditch, etc. The inherent differences of two alternative methods should be understood and acknowledged before contracts are written so that contractors have an incentive to choose the best method.

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Mr Johnny Reising
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2. Several components of the OSDF Systems Plan were never completely implemented and the recorded documentation is not complete enough to establish when the system started leaking. Progress is being made toward a re-write of the Systems Plan which will include references to detailed procedures for monitoring the integrity of the Interim Gravity Line.
3. The Leak Investigation Report satisfactorily explained that pressure testing the container pipe without pressurizing the carrier pipe caused the ovality of the carrier pipe.
4. We consider the Central Plastics Company report to satisfactorily answer our concerns. That report concluded that inadequate surface preparation of the pipe inhibited the joining of plastic from the coupling to the pipe material. The report concluded that this resulted in a compression joint rather than a fused joint. The compression joint could pass a leak test but not be strong enough to remain intact during operations.
5. Our concern is moot since the Interim Gravity Line will replace the temporary system. We may never have a satisfactory explanation why the camera was coincidentally stuck in the carrier pipe so near to the hole in the container pipe.

If you have any questions, please contact Tom Ontko or me.

Sincerely,



for
Thomas A. Schneider
Fernald Project Manager
Office of Federal Facilities Oversight

cc: Jim Saric, U.S. EPA
Terry Hagen, FDF
Mark Shupe, HSI GeoTrans
Francie Hodge, Tetra Tech EM Inc.
Ruth Vandergrift, ODH

Ohio Environmental Protection Agency Comments on the
On-Site Disposal Facility Leachate Conveyance System
Leak Investigation Report

Leak Investigation Report

- 1) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.2 Pg #: 7 of 16 Line #: Code: c
Comment: The DCN and RCI processes are both designed to facilitate changes to contracts between FDF and its subcontractors. It has not proved to work satisfactorily in making changes to design documents that have been approved by the regulators. We need a process that allows Agency review and written approval of all DCNs that change plans which are deliverables under approved Remedial Action Work Plans. We are willing to be flexible and we can expedite our reviews. In certain cases it may be possible to transmit approvals by facsimile.
Until a mutually agreeable process is worked out, no DCNs should be considered to be approved by Ohio EPA unless it has been received in writing.

- 2) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.4 Pg #: 8 of 16 Line #: Code: c
Comment: The Ohio EPA reviewed and approved the Phase I CQA Report. We acknowledged that the LCS had been built in accordance with the approved design and that all quality control and quality assurance requirements had been satisfactorily performed. Despite the best efforts of many well trained and highly motivated people, the system failed to perform as designed. One of the lessons to be learned is that CQA/CQC oversight can not substitute for a failure to achieve a high level of workmanship. A culture that nourishes and promotes personal pride in workmanship is necessary to before systems will perform as intended over a 200 year design life. Developing this culture is hard enough within a given organization. The possibility that it can be developed within a sub-contracted organization is even more problematic. Another important component of the OSDF, the geosynthetic liner, is also installed by a sub-contractor to the OSDF construction contractor. Even a casual observer of the Cell 1 secondary geosynthetic liner could easily see the difference in the number of patches needed by the two sub-contractors. The Ohio EPA is available at all times to participate in the continuing development of this culture.

- 3) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.5 Pg #: 9 of 16 Line #: Code: c
Comment: The report does not provide an estimate of the volume of leachate that leaked from the line into either the manholes or the environment.

- 4) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 5.1 Pg #: 15 of 16 Line #: Code: c

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Comment: During the repairs to the temporary gravity line and construction of the interim gravity line, written procedures were developed for the hydrostatic testing of the HDPE lines.

- 5) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 5.2 Pg #: 15 of 16 Line #: Code: c
Comment: This discussion of lessons learned about electrofusion couplings does not go far enough to prevent similar problems in the future. The Ohio EPA will not approve the use of electrofusion couplings on future projects for the following reasons:
- 1) Electrofusion couplings are not robust under field conditions. Skin oils, traces of dirt, moisture in even trace amounts can all cause failures of the joint.
 - 2) The couplings are controlled by a "black box" and failure modes are not always revealed by the machine.
 - 3) It is possible to design piping systems that do not require couplings. By sequencing the construction so that there are always moveable lengths of pipe, butt fusion joints can be used in virtually every situation.
 - 4) If proper planning and sequencing (or repairs to the system) do not permit the use of butt fused joint, an extrusion-welded sleeve can always be used instead of a coupling.
- 6) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 5.3 Pg #: 16 of 16 Line #: Code:
Comment: We agree that the Engineer of Record should be evaluating significant changes to the OSDF design. It is our understanding that past practice has been to allow the GeoSyntech project manager to determine when the Engineer of Record should be consulted on proposed changes to the design. As part of a re-evaluation of the DCN process, this strategy should be revisited to assess if the significant changes are actually being forwarded to the Engineer of Record for his review.
- 7) Commenting Organization: OEPA Commentor: HSI GeoTrans
Section #: Appendix B Pg #: B-3 Item: 4 Code: C
Comment: The equation that is used in this calculation is for pipe that is fully supported by surrounding soil, which is not the case for the 6-inch diameter carrier pipe. Rather than this equation, Chart 14 on page 25 of the Driscopipe System Design Manual should have been used. This chart identifies the allowable pressure on an unsupported pipe. This chart indicates that the 6-inch SDR 26 pipe would buckle with an exterior pressure of only 8 psi, which is far less than the 17.2 psi that was calculated to be the critical pressure.

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GeoSyntech Report

- 8) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.6 Pg #: 26 Line #: 2nd paragraph Code: c
Comment: This paragraph refers to preliminary testing of the LCS line that was performed by the construction contractor. This preliminary testing was not required by any approved plans, was not carried out according to an approved plan and the test pressures used were poorly documented. It is likely that some of the out-of-round conditions of the carrier pipe were caused by this unauthorized testing. Procedures need to be developed so that complex systems like dual-containment piping are not subjected to seemingly harmless practices that could inadvertently damage them. The construction contractor should conduct all activities in accordance with either approved plans or standard operating practices. The CQC contractor is authorized to review and approve all deviations and additions to those activities.
- 9) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.7 Pg #: 27 Line #: 3rd line Code: c
Comment: The text states that the pressure testing was accomplished by first filling the pipe of interest from the *upstream* end with water. That may be the case but the interim gravity line is being tested by filling from the *downstream* end. This makes more practical sense because when filling from the upstream end you are trying to push water into the same valve that air is being forced out of.
- 10) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.7 Pg #: 29 Line #: 1st complete paragraph Code: c
Comment: It is unclear why the test of the container pipe from MH-3 to the PLS was allowed to continue after the observation of the slow leak at the fixed-end seal. A 2.4 psi pressure drop was observed during the 3 hour test. This is the largest pressure drop that was deemed acceptable in testing the temporary system. In most cases, a pressure drop of 0.1 psi per hour was the largest leak that was judged to be acceptable. In retrospect, the test should have been deemed invalid when the leak was first observed and a new test should have been started after the fixed-end seal was repaired.
The observations here are consistent with the leak in the carrier pipe observed at Excavation 4. It was never clear why a pipe that was punctured during initial covering could have passed a pressure test. The answer appears to be that the hole was plugged almost perfectly by the clay bedding material. (The specification called for the pipe to be bedded in sand.) Tiny leaks from the puncture at excavation #4 could have been masked by the leak at the fixed-end seal.

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- 11) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 4.2 Pg #: 45 Line #: Code:
Comment: The deficiencies in the inspections and records do not allow a determination of when the LCS began leaking or the volume of the leachate that leaked from the carrier pipe and into the containment pipe.
- 12) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 7.5 Pg #: 85 Line #: 1st bullet, reason (ii) Code: c
Comment: The text cites contractor preference as a reason for the large number of electrofusion couplings. In general, contractor preference is a valid reason for choosing one course of action over another when the two actions yield equivalent results. Knowing what we know now, couplings are not equivalent to butt-fused joints. In the future, contractual documents should be written so that contractors are not allowed to choose an inferior course of action over one which has proven to be superior.
- 13) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 8.1 Pg #: 89 Line #: 2nd bullet Code: c
Comment: As stated in a previous comment, the Ohio EPA believes that the final pressure test referenced here was actually inconclusive.
- 14) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 8.2 Pg #: 92 Line #: 1st bullet Code: c
Comment: This is not the only instance in which the Systems Plan was not followed. With the drain port open as in the design, it is not clear how the carrier pipe could be checked for leaks. With the drain port closed, the entire 2800 odd feet of container pipe has to fill before excess leachate flows from the weep holes into MH-3. The leachate then has to be observed in the bottom of MH-3 and identified as leachate (and not as rain water infiltration through the leaky seals of the manhole lid) before it can be determined that the carrier pipe leaks.
The Ohio EPA did a cursory review of Petro daily logs and could not find a record indicating that the carrier pipe was drained after it was pressure tested. Add that uncertainty to the unknown amount of leachate that was incorrectly dismissed as rain water, and it seems impossible to determine even approximately the volume of leachate that leaked from the carrier pipe. Given that the container pipe was also breached, we have no way to estimate if any leachate escaped into the environment. Our only way to estimate environmental releases is direct observation during the excavation of the temporary line. The Ohio EPA did not observe saturated soils that we were able to attribute to environmental releases of leachate.

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- 15) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 9.2 Pg #: 102 Line #: 1st bullet Code: c
Comment: Please elaborate on the rationale for monitoring the containment pipes after a 0.25 inch rainfall in a 24 hour period. The organization newly charge with monitoring the system balked at checking after rainfall and we could not persuasively argue the point. The Systems Plan as newly drafted does not have this requirement.
- 16) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 9.4 Pg #: 103 Line #: Code: c
Comment: We agree with the advantages of thicker-walled pipe over SDR 26 pipe as listed here. However, we believe that these advantages also apply to SDR 11 over SDR 17. Consensus was achieved during the preliminary design of the interim gravity system that the advantages of SDR11 pipe greatly outweighed the negligible increase in cost.
- 17) Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 9.5 Pg #: 104 Line #: Code:
Comment: Construction of the interim gravity line is being accomplished without the use of either electrofusion couplings or sleeves. With proper planning and using stubs on fixed ends that are long enough, the butt fusion equipment can be used when joining lengths of pipe to fixed structures such as the permanent lift station.