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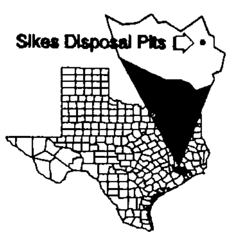
Control of Excavation Depths at the Sikes Disposal Pits Superfund Project

Office of Emergency and Remedial Response
Hazardous Site Control Division 5203 G

Quick Reference Fact Sheet



Frequently at Superfund sites, excavation of contaminated material is part of the selected remedy. There are a variety of approaches for determining and documenting the removal of the appropriate amount of material. This fact sheet documents one specific approach taken by Region 6 and the Texas Natural Resource Conservation Commission at the Sikes Disposal Pits Superfund project. The Texas Natural Resource Conservation Commission (TNRCC) administered the clean-up of the Sikes Disposal Pits site under a Cooperative Agreement with Region 6 of the U.S. Environmental Protection Agency. The high level of on-site oversight support used by TNRCC to make determinations, provide direction and monitor the remediation contractor's efforts made this project unique. Remediation goals included the excavation of contaminated material for incineration, the minimization of the excavation of material that does not exceed the action criteria, and the minimization of contractor remobilization when halting excavation for sampling and analysis.

SITE DESCRIPTION

The 185-acre Sikes Disposal Pits site was used as a dump for petrochemical wastes from 1960 to 1967 prior to being listed on the National Priorities List of the Superfund program. Numerous drums were deposited in old sand pits and indiscriminate dumping of wastes took place throughout the site that is in the flood plain of the San Jacinto River. Six times since 1969, the waste overflowed the pit boundaries during floods, contaminating the surrounding area. There are two shallow water-bearing zones lying above several hundred feet of clay. Below this clay layer lie the Chicot and Evangeline aquifers. A residential development lies 1,000 feet to the south. The wooded areas immediately surrounding the site are largely undeveloped, with numerous active and abandoned sand pits and low-lying swampy areas. Sport fishermen and water sports enthusiasts use the adjacent river and bayou.

THREATS AND CONTAMINANTS

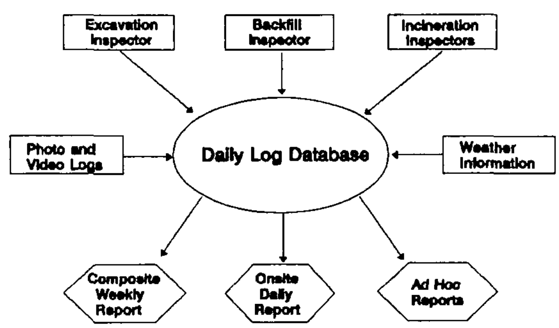
Heavy metals; volatile organic compounds (VOCs) such as toluene and xylene; and polycyclic aromatic hydrocarbons (PAHs) including creosote, phenolic compounds, and halides, contaminated the ground water, surface water, and soil. The frequent flooding of the area threatens the recreational use of the San Jacinto River and the Jackson Bayou. Although the ground water in the shallow aquifer was heavily contaminated, neighboring residential wells currently remain unaffected by site contaminants. Neither surface water nor ground water contamination has migrated beyond the site boundaries.

INFORMATION MANAGEMENT

To meet the oversight goals of minimizing both the unnecessary excavation of material and the down time and remobilization resulting from sampling and analysis, Region 6 and TNRCC instituted continuous oversight activities. Region 6 and TNRCC knew this level of oversight was greater than most Superfund projects, but they felt the money spent on oversight activities would save money in delay claims and change orders. TNRCC procured the services of an Architect/Engineer (A/E) contractor to serve as the oversight official at the Sikes Disposal Pits site. The A/E contractor was familiar with the site, as they had performed the remedial design (RD) and the remedial investigation and feasibility studies (RI/FS).

Prior to moving on-site, the A/E contractor evaluated the information likely to be generated during the project and how that data would be utilized both near-term to report project progress and long-term in settling disputes. From previous experience in environmental projects, the A/E contractor knew of the value of readily accessible information to monitor the work accurately, minimize disputes, and complete work in a timely manner.

For quick and easy retrieval,, the A/E contractor established and maintained computerized information on daily inspection reports, technical inspectors' photographs and video material, daily analytical reports, daily quality control reports, daily health and safety reports, remediation contractor submittals, and correspondence. The A/E contractor utilized digital terrain modeling software to compute payment quantities and final costs.



Inspectors' Daily Log Book Information Management

The A/E contractor then used the information in these databases to prepare daily and weekly progress reports for the TNRCC and Region 6. The one page composite daily report contained information on weather, remediation contractor's manpower and equipment used, and incineration facility production. The daily report also included extracts from the excavation, health and safety, and incineration inspectors' daily reports. The weekly composite report provided information on weather, manpower, equipment used, and the amount of billable incinerated material in a table format on a single sheet. These two composite reports provided the TNRCC and Region 6 project managers with a wealth of information on just a few sheets of paper. Ad Hoc information regarding a specific day, grid, or person can be easily retrieved through these databases as well. The A/E contractor can retrieve and construct a chronology of events of the contractors activities for a specific area or "grid," report the activities that occurred on site for a given day, or report when a specific person visited the site. Medical surveillance data for all remediation contractor personnel were also maintained and used to ensure personnel received the required medical monitoring.

ON-SITE OVERSIGHT TEAM

FIELD STAFF
- Four Incineration Inspectors
- Excavation Inspector
- Backfill Inspector
- Health and Safety Officer

OFFICE STAFF
- Secretary
- Chemist
- Computer Operator
- Office Engineer
- Construction Manager

Technical inspectors were on duty during the remediation contractor's working hours. Excavation and backfilling activities occurred from Monday through Saturday, while the incinerator operated 24-hours, seven days a week. The A/E contractor trained its backfill inspector to fulfill the responsibilities of the excavation inspector when necessary, as a qualified person had to be available to render decisions at all times. The major field tools provided to the excavation and backfill inspectors consisted of a camera, radio and truck for moving around the large site.

The excavation inspector was supported by a secretary, a computer aided design and drafting/digital terrain modeling (CADD/DTM) operator, and an on-site manager for quality assurance/quality control (QA/QC) purposes. The secretary provided the communication point between the inspector and the remediation contractor. The CADD/DTM operator provided updates of drawings and quantity calculations.

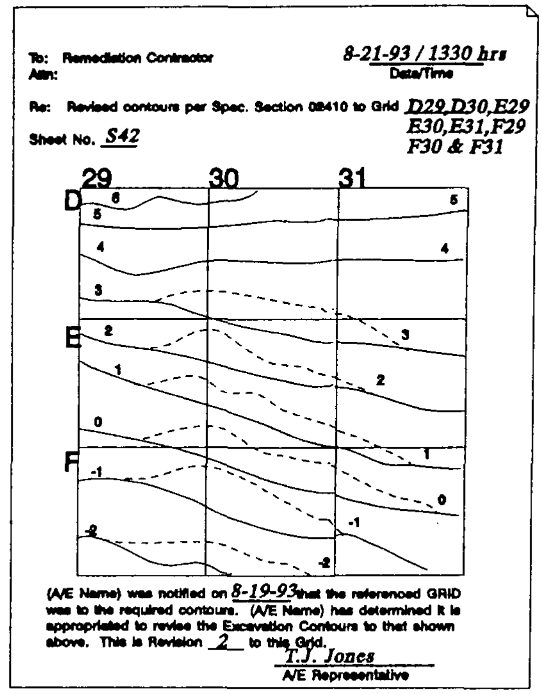
CLEANUP APPROACH

In the design phase of the project, the designers divided the 35-acres of contaminated area to be incinerated into fifty foot by fifty foot (50' X 50') grids. The "grid" was the common term at the site for the contractually required sampling area. The designers determined a "bottom elevation" for each grid that represented a depth one foot above the anticipated depth of the contamination in that grid. The grids where then combined to form a contour map of the entire area of excavation. Excavation, sampling, analysis, and backfilling activities by the remediation contractor were all keyed on the grid concept.

The remediation contractor began excavation with the intent to remove contaminated material to the original contract contours. The excavation inspector observed the excavation watching for changes in the excavated material. Evidence of change included variations in color, consistency and granularity of the material. These changes were a prime consideration in deciding when excavation should cease. Upon reaching the bottom elevation or observing a change in material, whichever came first, excavation ceased and the remediation contractor collected samples. Sampling locations were determined by dividing each grid into four quadrants. The remediation contractor took a sample from the center of each quadrant 3 to 9 inches below the surface. The contractor then combined the four samples and analyzed the composite sample to determine if contaminant levels met the soil cleanup goals. Contract requirements called for the submission of analytical results to the oversight contractor within 48 hours of sampling.

Excavation contours for a specific grid sometimes varied with the physical evidence found in the surrounding grids. If so, the excavation inspector, observing the remediation contractor's excavation in adjacent grid(s), revised and issued new contours prior to reaching the originally anticipated contours. The excavation inspector also provided revised contours to the remediation contractor when excavation reached the excavation contours in the original contract drawings, and physical evidence in the field indicated additional contaminated material existed. The remediation contractor received all revisions to contours on an 8-1/2" x 11" enlarged portion of the contract drawing formatted in a letter from the excavation inspector. The inspector drew the contours free hand and signed and dated the letter upon delivery to the remediation contractor. Copies of these letter revisions went to the CADD/DTM operator to be digitized into the modeling software for record purposes and cost projection.

Excavation continued until the physical evidence would change or the remediation contractor reached the revised contours. This sequence continued until the contractor reached contaminated material that met the soil cleanup



Sample Contour Change Letter

goals. Then excavation was halted, samples taken, and analysis performed as described above.

In isolated cases, particularly where there was a potential for a dispute, extra work was underway, or a difficult area was encountered, an inspector was assigned solely to that particular excavation, and the remediation contractor removed the material to a visually acceptable condition. In these cases, the inspector made determinations without confirming compliance with contour drawings, and informed the remediation contractor when observed physical evidence warranted sampling and analysis. The remediation contractor halted the excavation, took survey data, and collected soil samples for analysis.

For both methods, once the analysis of the samples collected indicated that the area met the soils verification criteria, the A/E contractor provided the remediation contractor with written direction that backfilling could begin.

DISCUSSION

With remediation nearing completion, oversight costs were running approximately 5 - 6 percent of the total remedial action costs at the Sikes Disposal Pits site. While these costs may appear high, consider the following:

- Incinerator installation was 80 days ahead of schedule. The final cost of this phase was $31,636,105 with less than one percent in change orders ($230,778). The A/E contractor's oversight costs were $1,440,000, less than five percent (5%) of the construction cost;

- After incinerating over 496,000 tons of material, the project is 10 - 11 months ahead of schedule; and

- Increases to the project's costs and potential claims have been limited to approximately 30%. Over 80% is a result of increased quantities of contaminated materials.

These figures are impressive for a hazardous waste remediation site of this magnitude. Region 6 and the TNRCC were able to develop a proactive means of providing oversight to maximize the relationship between Region 6 and TNRCC and the remediation contractor. Through this effort Region 6 and TNRCC were able to preserve and enhance the quality of the project, and control construction costs and time.

A primary reason for the success at the Sikes Disposal Pits site was the empowerment of the excavation inspector. The inspector's presence during all excavation and ability to control the depth of excavation in a specific grid minimized delays to the remediation contractor. Without this delegation of authority, the potential for increased delays existed, along with frustration between the contracting party (TNRCC) and the remediation contractor.

In evaluating the project, Region 6 has identified several areas where further improvements could be made. Although the digital terrain modeling system was beneficial in tracking excavation progress, its potential was never fully realized. As with most computer aided applications, the digital terrain modeling system requires good up front planning and experienced operators to realize its full potential. The Region also cited the need for specifications that are not only specific, but that can not be misinterpreted.

SUMMARY

Quality in a project is achieved by all participants working together to reach common goals. This fact sheet demonstrates how Region 6 and the TNRCC worked together to achieve their common goal of a successful remediation of the Sikes Disposal Pits site. The use of an oversight contractor, the establishment of verification sampling and testing procedures, and the use of a computer based information management system to record and track progress and costs are examples of their willingness to commit sufficient upfront resources to ensure good project planning and management and avoid costly construction delays and claims.

For more information contact Earl Hendrick, Region 6, at 214-665-8519 or Jo Ann Griffith, US EPA Headquarters, at 703-603-8774.

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