May 1, 2018

Soil Remediation Excavation Rates Review and Recommendation @ Energy Technology Engineering Center (ETEC), Ventura County, CA

Prepared for

Environmental Management Consolidated Business Center (EMCBC)
ETEC Field Site, Federal Project Director

by the

EMCBC Office of Cost Estimating

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Table of Contents

Objective/ Purpose:

The DOE Environmental Management (EM) ETEC Federal Project Director (FPD) requested the EM Consolidated Business Center (EMCBC) Office of Cost Estimating (OCE) to examine the productivity and other assumptions included in the Draft Environmental Impact Statement (EIS) for excavation and disposal of contaminated soils, that were used as the basis for the programmatic rough order of magnitude (ROM) estimates completed by the OCE in support of the Draft EIS, against site constraints.

The purpose of this independent review is to provide the EIS team with reasonable assumptions concerning the rate of excavation and disposal of contaminated soils at ETEC for inclusion in the Final EIS. The Draft EIS included assumptions based on the maximum number of truckloads allowed for DOE's portion of the work instead of accounting for the amount of soil that could reasonably be excavated and disposed of in a safe and compliant manner.

Background:

The Santa Susana Field Laboratory (SSFL) was established in 1947 by North America Aviation as a facility to test liquid propulsion rocket engines. This testing, first conducted for the Department of Defense and subsequently for the National Aeronautics and Space Administration (NASA) was part of the manned-space program. The testing of rocket engines was performed in Areas I, II, and III of SSFL and lasted until 2006. Area IV of SSFL was used for conventional and nuclear energy and liquid metals research from the mid-1950s until 2000. Atomics International (AI), a subsidiary of North America Aviation, began establishing Area IV for energy research in 1954. A 90-acre portion of Area IV (Area IV is 290-acres in size) was leased first to the Atomic Energy Commission and subsequently to DOE for nuclear energy and other research. This 90-acre portion of Area IV was termed the Energy Technology Engineering Center (ETEC).

Based on previous studies and investigations completed for SSFL, the primary geologic units present are Quaternary Alluvium and the upper Cretaceous Chatsworth Formation. The alluvium is a mixture comprised principally of sand and silty sand, with minor amounts of silt and clay. The thickness of the alluvium is typically five to 15 feet, but in a few locations, it is over 30 feet thick. However, depths in Area IV are expected to be in the five to 15-ft range. Sandy soil typically experiences a 20-30% swell and clay soils experience a 20-40% swell in volume once excavated depending on water content and other soil properties.

Figure 1: Winding Road to ETEC Site

Review Approach

In order to conduct this review, the OCE developed a three pronged approach to meet the objective in conjunction with ETEC SMEs. This included establishing an experienced team of OCE cost estimators familiar with developing work package level details for soil remediation efforts throughout EM sites; conducting a review of relevant documentation related to ETEC soil remediation that included information in the Draft EIS, and; having the team conduct an on-site review with site SMEs to assess other possible constraints that would have an impact on soil remediation efforts.

Review Team:

- ETEC SMEs:
  - John Jones, FPD
  - Stephanie Jennings, Deputy FPD
- EMCBC OCE:
  - Kevin Barry, Lead Cost Estimator (OCE Team Lead)
  - Bruce Hemphill, Cost Estimator
  - Michael Mills, Senior Cost Estimator (Peer Reviewer)
  - M. Allen Moe, Assistant Director (Quality Assurance/Quality Control (QA/QC) reviewer)

Document Review:

- Technical Memorandum, "MWH Americas, Inc. (MWH) Initial Report-Area IV Soil Volume Estimate", April 8, 2013
- Technical Memorandum, "MWH Rough Order of Magnitude Estimates for AOC (Area of Contamination) Soil Cleanup Volumes in Area IV, and Associated Truck Transport Estimates based on DTSC (Department of Toxic Substances Control) Look-up Table", September 4, 2013
- Various Basis of Estimate Documentations Developed by the OCE related ROM estimates in support of the FPD (2013-Present)
- Draft EIS
- Summary of ISRA (Interim Source Removal Action) Soil Management Unit Costs; Based on NASA Contract (2011), May 31, 2013

On-Site Review:

- Reviewed information provided by ETEC Site personnel, Boeing, CDM (Draft EIS)
- Reviewed documented/regulations for site activities
- Completed on-site review the week of February 26th
- Site tour of Area IV provided by the FPD on February 27th
- Reviewed site complexities as pertaining to topography, excavation, acceptable areas for staging/lay down areas/storage/stock-pile, haul roads and disposition pathways.
- Determined task sequence, resources, and durations for reasonable quantities to be removed.

Findings/Observations:

Based on site topography, physical constraints, and the contaminated work environment, the review team determined excavation, hauling of soils and stockpiling will be the limiting factors in overall disposal of soils. The review team then developed crews/resources for excavating, stockpile management, as well as hauling and disposal that would be most efficient for excavating the soil in a safe and effective manner, taking in to consideration stakeholder's interests. Previous ROM estimates should be re-evaluated based on the findings and observations from this review.

- Soils/Topography: No additional soil property documentation was provided to the review team. Based on the previous information provided, the 30% swell factor for excavated soils is reasonable. Site topography is uneven with surface comprised of primarily sandy soils, rocky terrain with a number of large rocks visible, and limited plant cover but with mature trees.
- Excavation: Based on the visible conditions and the information in the MWH Technical Memorandum, mass excavation techniques do not appear to be a viable option. Excavation using a mid-size track-hoe and a mini excavator to work around obstacles, with suitable attachments available to address working around trees or rock formations, is viable. In addition, excavation work crews should include a Native American representative, to ensure their interests are not disrupted; and a Radiological Technician, to ensure the soil removed has the radiological profile expected. Due to the necessity to inspect, survey, and test excavated materials, productivity factors should be included that limit the quantities that can be excavated in a given time period. Excavated materials will have to be hauled or placed in a stockpile area for screening and/or other processing. Based on the expected contamination in any area of excavation, special provisions will be needed (such as establishment of a containment area (CA) perimeter for areas of expected radiological contamination) which impact productivity and work planning. Dust suppression methods should be applied during earthwork operations as appropriate.
- Excavated Material Processing: Excavated soils will have to be hauled to a stockpile area (each CA would require a separate stockpile area.) Where possible, contaminated soils and non-contaminated soils should be segregated to avoid unnecessary waste disposition costs. Existing site roadways appear adequate to move materials around the site. Haul containers can be loaded using front-end loaders which could also be used for nearby hauling of materials. Stockpile management can be completed using front-end loaders and/or skid steers.
- Waste Management: Chemically contaminated soils should be suitable for hauling in roll-off containers with lids. Based on the use of 20CY roll-off containers for the chemically contaminated soils, it is expected that the average truckload will contain ~16CY (~24 tons) of soil. This is based on using a conversion factor of 1.5 tons per one cubic yard of soil, established during similar work done at the site by Boeing, as outlined in the referenced documentation. Chemically contaminated soils will be disposed within the state of California at an approved Resource Conservation and Recovery Act (RCRA) disposal facility. Radiologically contaminated soils should be suitable for loading and transport in super-sacks. Large super-sacks, each containing ~8CY (~12 tons) of soil, could be used and each truckload of radiological soils could include up to two super-sacks. Loading crews will have to include a crane for handling of sack loading frame and movement of super sacks. Radiological soils meeting

required waste acceptance criteria, can be transported to the Nevada National Security Site (NNSS), Energy Solutions, or Waste Control Specialists for disposition.

- Site restoration: Excavated areas are planned to be restored using a "grade to drain" approach. This should result in less imported soil and it has been assumed that approximately 75% of the excavated quantities will be needed for site restoration. Since mass earthwork methods will not be used in lieu of more limited area spot excavations, the grade to drain approach may have limited applications. The ultimate amount of borrow or imported soils needed will be based on final grading plans. This could be addressed as a risk in project planning.
- Haul Roads: As stated before, existing on-site haul roads appear adequate for movement of materials around the site. Access to the site is via local roadways. Near the site, these are two-lane winding roads leading up to the site. These roads should be evaluated further regarding their long term use for heavy haul trucks, both during waste hauling from and import of borrow materials to the site. The review team did not asses this as a limiting factor, however, road maintenance and upkeep could affect the total cost.

Summary:

The review team conducted their review which included review of relevant documents and site observations. The team identified a number of items that will impact the cost of the soil remediation efforts at ETEC. These included:

- The review team concluded that mass earthwork methods are not viable, however, multiple sites could be excavated concurrently. The team concluded that two excavating crews could be used. There are safety concerns associated with having more than two excavating crews active at one time. The terrain in the excavation area limits visibility for additional vehicles to be transferring and hauling soil on limited roads with frequent blind corners.
- The review team acknowledges the need for dust suppression during the excavation and backfill portions of the project, but did not consider it a limiting factor.
- The team concluded that the most efficient means of processing excavated materials would be to haul much of the excavated materials to a single stockpile area for additional processing, Excavation of radiologically contaminated areas will require establishment of a Containment Area boundary with additional considerations.
- The team considered characterization of the soil during the excavation and loading into shipping containers during the review process. Based on final project requirements, this could be a limiting factor on shipping soil off the site, but the review team assumed that based on the extensive field characterization done to date at the site, and the inclusion of a Rad Tech with the excavation crew, that characterization would not be a limiting factor for this review.
- Prior to this review, it was thought that site limitations regarding daily restrictions for trucks hauling materials to and from the site would be a limiting factor. However, based on site conditions, safety concerns, and the suggested means and methods required to perform the work have greater impact. These considerations will limit productivity and impact the overall schedule and costs.

APPENDIX A:

The following are possible means and methods to perform the work used by the review team to develop ROM projections for cost and schedule, based on various assumptions.

Crews/Resources:

- Excavation of Soil, haul to stockpile
  - Equipment
    - 1 - Excavator (1.5 CY Bucket)
    - 1 - Excavator (.5 CY Bucket)
    - 1 - Bulldozer (300-340HP)
    - 2 - Front-end Loader (wheeled/articulated 3.25 CY Bucket)
  - Labor
    - 4 - Heavy Equipment Operators
    - 2 - Laborers (Semi-Skilled)
    - 1 - General Superintendent
    - 1 - Rad Tech
    - 1 - Native American Representative (Inspector)
  - Crew Out-put: 16 CY per hour

- Stockpile Management / Loading of Containers (Characterization)
  - Equipment
    - 1 - Front-end Loader (wheeled/articulated 2.75 CY Bucket)
    - 1 - Skid steer (Loader, front end, i.e. Bobcat)
    - 1 - Crane (Hydraulic, self-propelled, 15 ton)
    - 20 CY Roll-off Containers w/lid for Chemically contaminated soil
    - Lift Pac type Super Sack for Radiological Soil (https://www.pactecinc.com/products/ip-1-ip-2-flexible-packaging)
  - Labor
    - 3 - Heavy Equipment Operators
    - 3 - Laborers (Semi-Skilled)
    - 1 - Rad Tech

- Hauling & Disposal
  - Equipment
    - Trucks (~16 CY/shipment)
  - Labor
    - Drivers
  - Disposal Sites
    - Chemical ~ 250mi Roundtrip

- Soils with chemical contamination will be handled as industrial or hazardous waste, depending on characterization data, and disposed of at an appropriate location approved to receive the waste.
- Excavated soils will be loaded, in bulk, in roll off containers with lids (20 CY containers filled to ~ 16 CY average) then placed on trucks suitable for hauling on public highways.

▪ Radiological
- Energy Solutions (Clive, UT) – 1,400mi Roundtrip
- Waste Control Specialist (Andrews, Texas) – 2,240mi Roundtrip
- NNSS (Las Vegas, Nevada) – 740mi Roundtrip
  - ❖ Soils in the Radioactive Contaminated Areas (RCA) will be handled as Low Level Waste (LLW). These soils will be loaded into super sacks and transported via trucks suitable for hauling on public highways.

- Backfill
  - Backfill will be brought to the site in 20CY dump trucks.
    - The project team has concerns regarding ability to find clean backfill in amount required.
    - Expected need of at least 75% of excavated soil in order to return site to "grade to drain" condition.

Expected Output:

- Scenario 1
  - Single Excavating Crew & Single Stockpile Management Crew
    - 8 Containers per day
    - 128 CY per day
    - 240 days/year (48wks, 5 days/wk)
    - 30,720 CY per year

- Scenario 2
  - Two Excavating Crews & Single Stockpile Management Crew
    - 16 Containers per day
    - 256 CY per day
    - 240 days/year (48wks, 5 days/wk)
    - 61,440 CY per year