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DEPARTMENT OF THE ARMY
U.S. ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002-

REPLY TO
ATTENTION OF

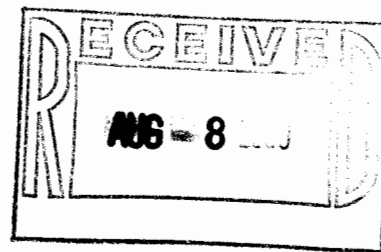
July 19, 1999

National Range Directorate of Environment and Safety

Ms. Julie Jacobs
Groundwater Bureau
New Mexico Environment Department
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502

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GROUND WATER BUREAU



Dear Ms. Jacobs:

This letter is to provide your office with the final Soil and Preliminary Groundwater Investigation at Malpais Site (encl 1). The erosion potential assessment that you requested is included in this report at Section 4.1.5, page 10.

To define the extent of contamination, a soil and preliminary hydrogeologic investigation using a drill rig was completed. The depth to groundwater at the site is approximately 26-29 feet below ground surface and the approximate groundwater flow direction is south-southeast. Ten soil borings were completed within and surrounding the diesel contaminated area. Additionally, an upgradient groundwater monitoring well was completed to evaluate the groundwater quality at the site. Analytical results indicated diesel contamination in the groundwater located immediately beneath the former aboveground storage tank (AST) location at a concentration of 0.7 parts per million. However, the horizontal and vertical extent of contamination in the vadose zone was high (13,000 to 17,000 mg/kg). Groundwater at the site was determined to have a total dissolved solids concentration of approximately 16,000 mg/l.

Based on the results of the soil investigation provided in this report, we believe that removal of the source area is the most feasible and rational remediation alternative, and this is the course of action we propose to execute. The vadose zone will be abated such that the contaminants in the vadose zone will not infiltrate groundwater or surface water. White Sands proposes removal of all soil with a total petroleum hydrocarbon concentration above 1,000 mg/kg. Removal of the source area will meet the abatement requirements set forth in 20 New Mexico Administrative Code, Chapter 6, Part 2, Section 4103 A & B. Upon approval of this proposed remedial action by the New Mexico Environment Department, a Corrective Action Plan and proposed work schedule will be developed and submitted to the Groundwater Bureau.

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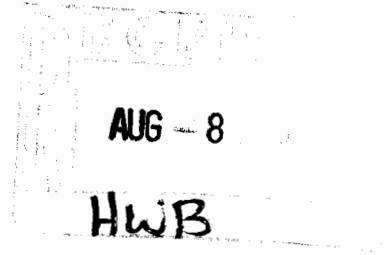


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GROUND WATER BUREAU



SOIL AND PRELIMINARY GROUNDWATER INVESTIGATION AT MALPAIS SITE



FOR



BY

July 1999



White Sands Missile Range, New Mexico
National Range
Directorate of Environment and Safety
White Sands Missile Range, New Mexico 88002



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4. TITLE AND SUBTITLE Soil and Preliminary Groundwater Investigation at Malpais Site, White Sands Missile Range, NM		5. FUNDING NUMBERS	
6. AUTHOR(S) Greg Watterson E.I., Civil Engineer Kyle Williams, Geologist			
7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES) MEVATEC Corporation Box 399 WSMR, NM 88002		8. PERFORMING ORGANIZATION REPORT NUMBER 300GG/99/005F	
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13. ABSTRACT (MAXIMUM 200 WORDS) A leaking aboveground storage tank was identified at Malpais Site during a field survey. Following removal of the tank, an initial hand auger boring investigation completed at the site identified two distinct plumes of diesel contaminated soil. This report summarizes the initial hand auger investigation and the ensuing hollow-stem auger drilling investigation to further evaluate the horizontal and vertical extent of contamination. Additionally, this report summarizes the results of a preliminary hydrogeologic investigation performed at the site to evaluate the hydrogeologic characteristics beneath and surrounding the release site.			
14. SUBJECT TERMS Leaking Aboveground Storage Tank (AST), Malpais Site, Diesel Contamination, Building 31152, Soil Investigation, New Mexico Environment Department (NMED) Groundwater Bureau, Water Quality Control Commission (WQCC) Regulations Section 1203, Hollow Stem Auger Drilling		15. NUMBER OF PAGES 42	
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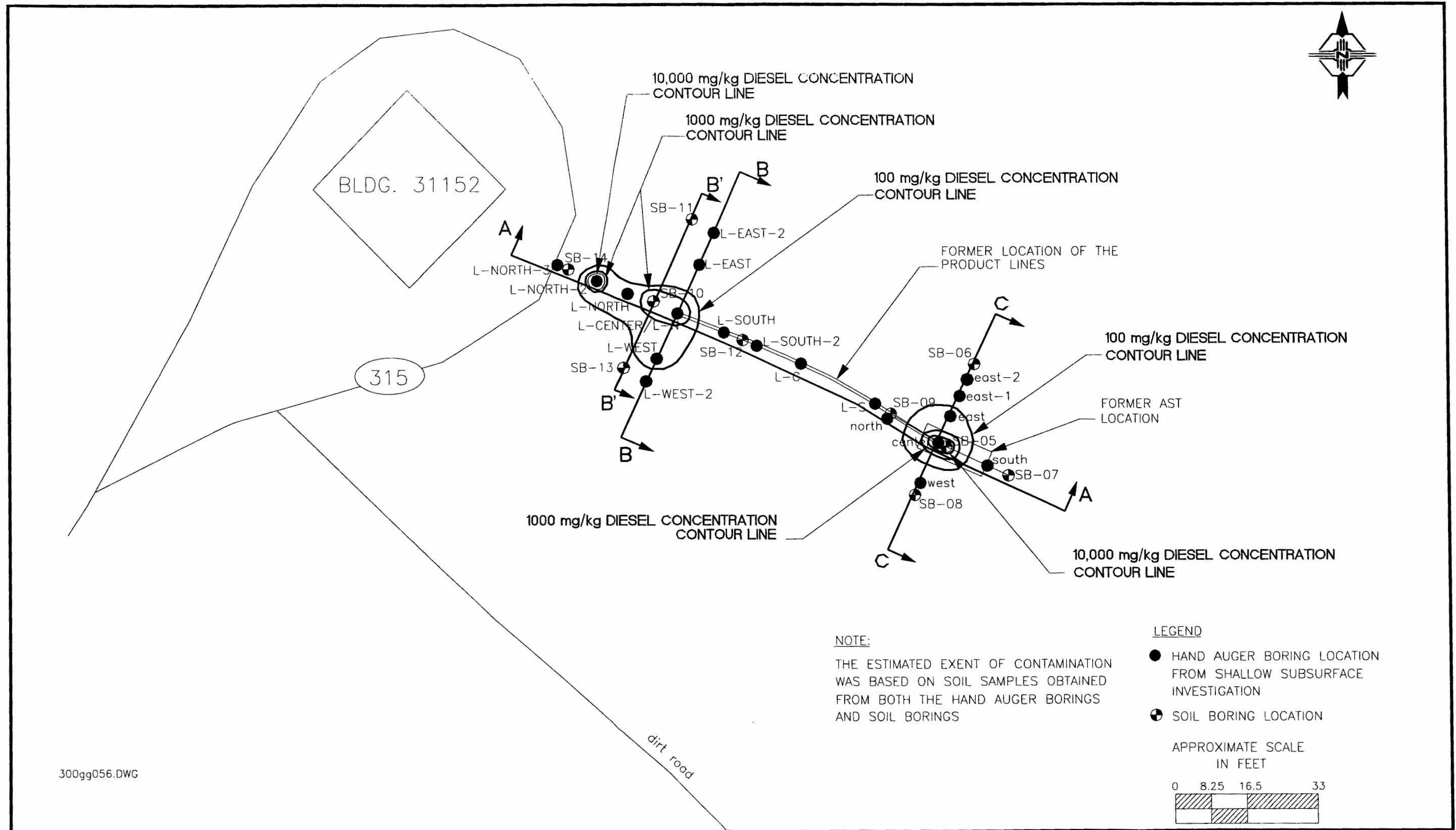


Figure 6-2. Estimated Horizontal Extent of Contamination

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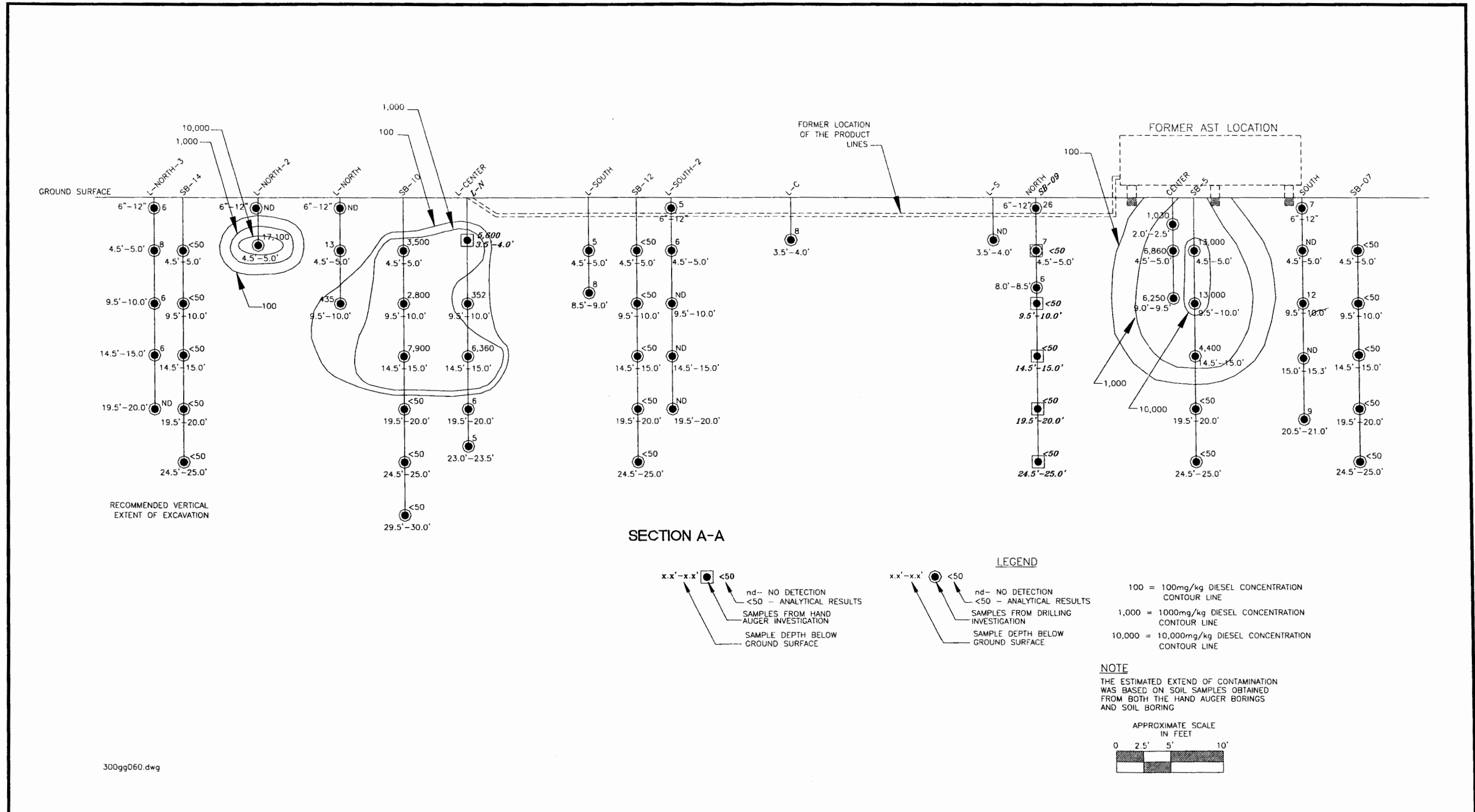


Figure 6-3. Estimated Vertical Extent of Contamination At Cross Section A-A

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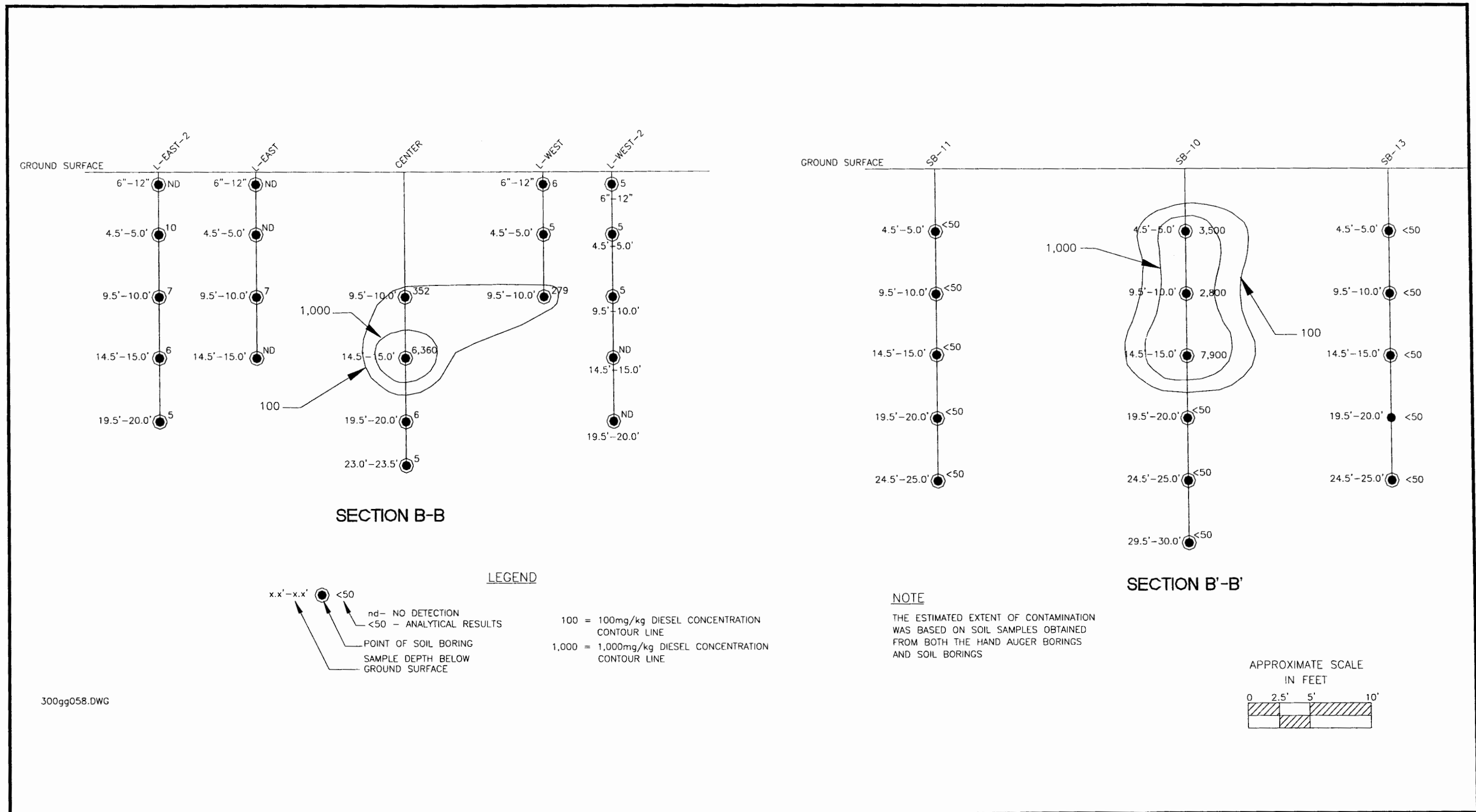
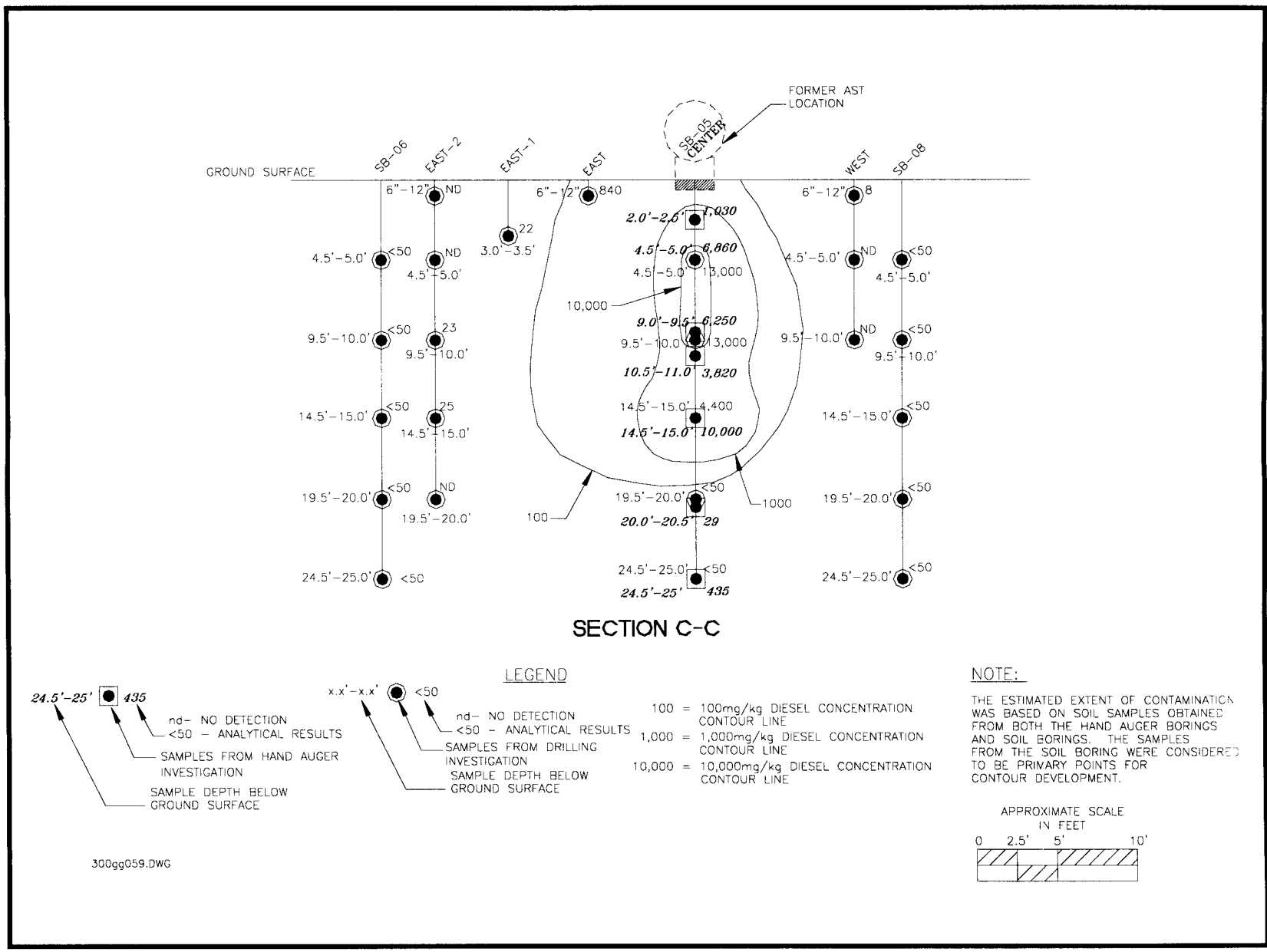


Figure 6-4. Estimated Vertical Extent of Contamination at Cross Sections B-B and B'-B'

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Figure 6-5. Estimated Vertical Extent of Contamination at Cross Section C-C.



7.4 Air

The principal air pathway is the airborne release of diesel vapors from the site. The likelihood of a release to the air pathway is evaluated based on site and pathway conditions, and considers whether a release of contamination to the air could be detected. As previously stated, a field PID was used to monitor the breathing zone when drilling soil borings located inside the exclusion zone. No hydrocarbons were detected in the breathing zone during the first 2.5-ft (0.76-m) of each boring, and the PID never exceeded 10 ppm within the breathing zone during the investigation. Therefore, this pathway is considered incomplete.

8.0 REMEDIAL ALTERNATIVES

Two possible alternatives were considered for remediation of this site: natural attenuation and source removal. The following sections describe each alternative.

8.1 Natural Attenuation

This alternative consists of no removal of the source area. Although diesel will degrade over time in soil, a significant volume of soil containing diesel concentrations up to 13,000 mg/kg would remain in the soil. Additionally, Malpais Site is located in a low-lying area adjacent to the lava flow, which has high water runoff characteristics. Storm water tends to pool on the ground surface over the entire surface area at the release site. As water infiltrates through the contaminated subsurface, additional diesel will be transported through the vadose zone to groundwater. Over time, a significant amount of diesel could potentially enter the top of the saturated zone, located approximately 26.5-29.0 ft (8.0-8.8 m) bgs, which would increase the existing, low diesel concentration (0.7 ppm or 0.7 mg/L). Additionally, pooling surface water at the site would attract animals, which would in-turn ingest potentially diesel contaminated surface water. Installation of downgradient groundwater monitoring wells would likely be required to monitor the local groundwater for potential migration of the diesel contaminated groundwater. This alternative is not considered protective of the surrounding environment.

8.2 Source Removal

This alternative consists of removal and proper disposal of the source of contamination. Due to the low mobility characteristics of diesel in soil, excavation of all contaminated soil with diesel concentrations above 1,000 mg/kg will serve an economical and rational removal of the source. Figures 8-1 through 8-4 identify the recommended extent of excavation. It is estimated that approximately 125 cu yd (96 cu m) of soil is contaminated with diesel at concentrations above 1,000 mg/kg. The soil will either be land farmed at a site approved by the NMED, or transported off-site and properly disposed at a certified facility. Confirmatory soil samples will be collected from the bottom and side walls of the excavations to ensure that all soil above 1,000 mg/kg was removed. Upon receipt of the analytical results, the excavation will be backfilled with clean soil and the ground surface will be graded to promote positive drainage away from the release area.

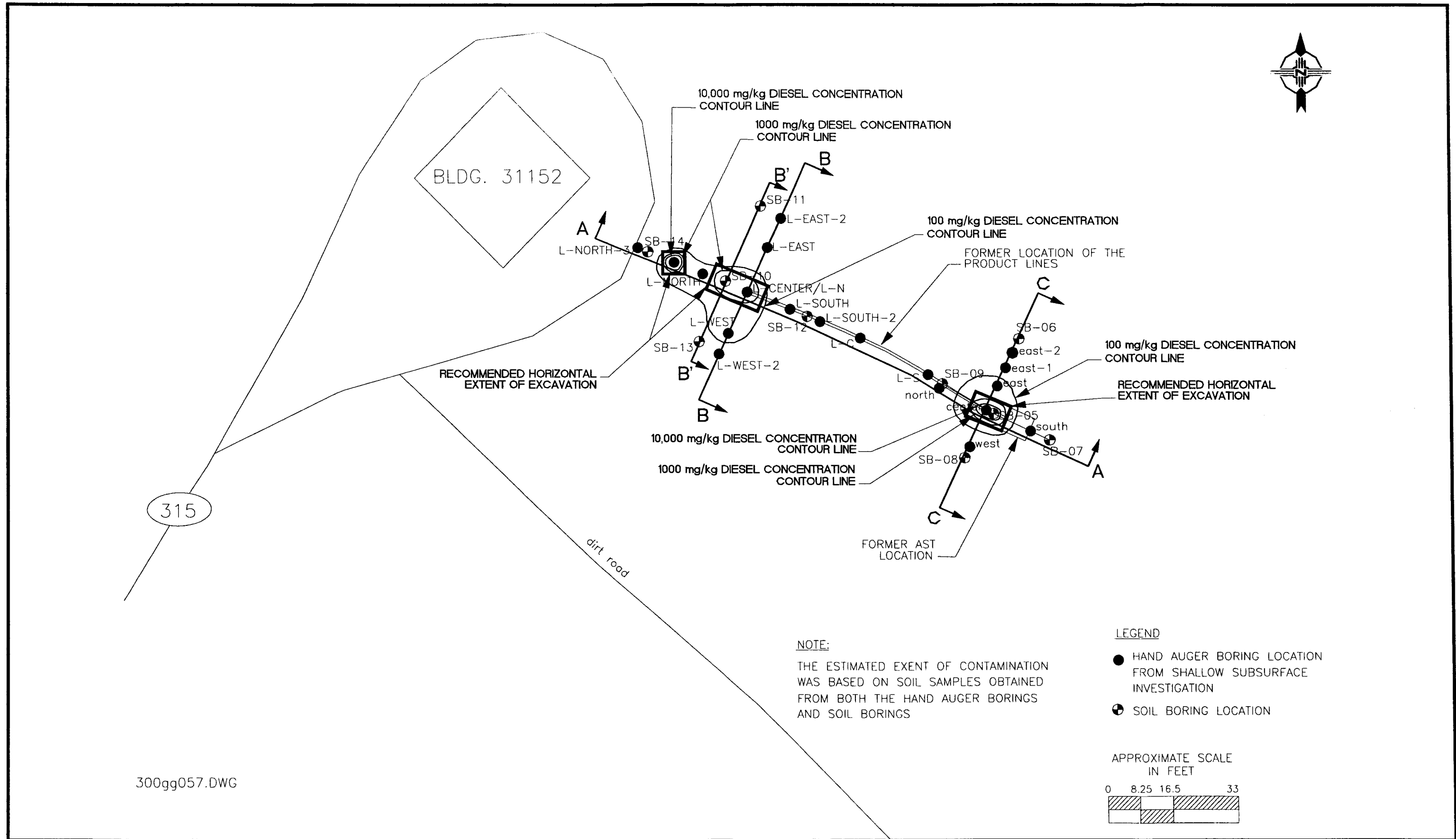


Figure 8-1. Recommended Horizontal Extent of Excavation

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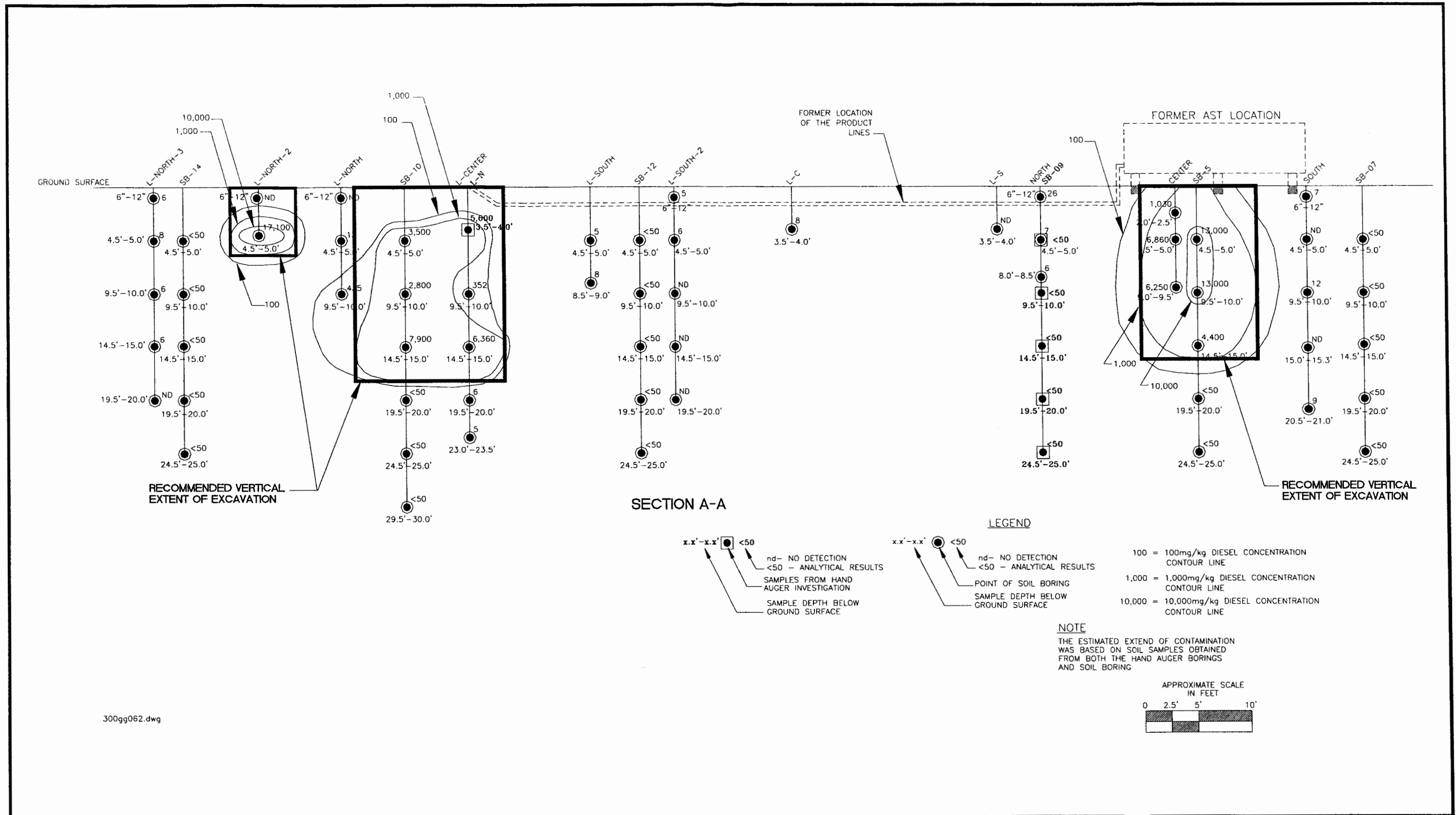


Figure 8-2. Recommended Vertical Extent of Excavation at Cross Section A-A

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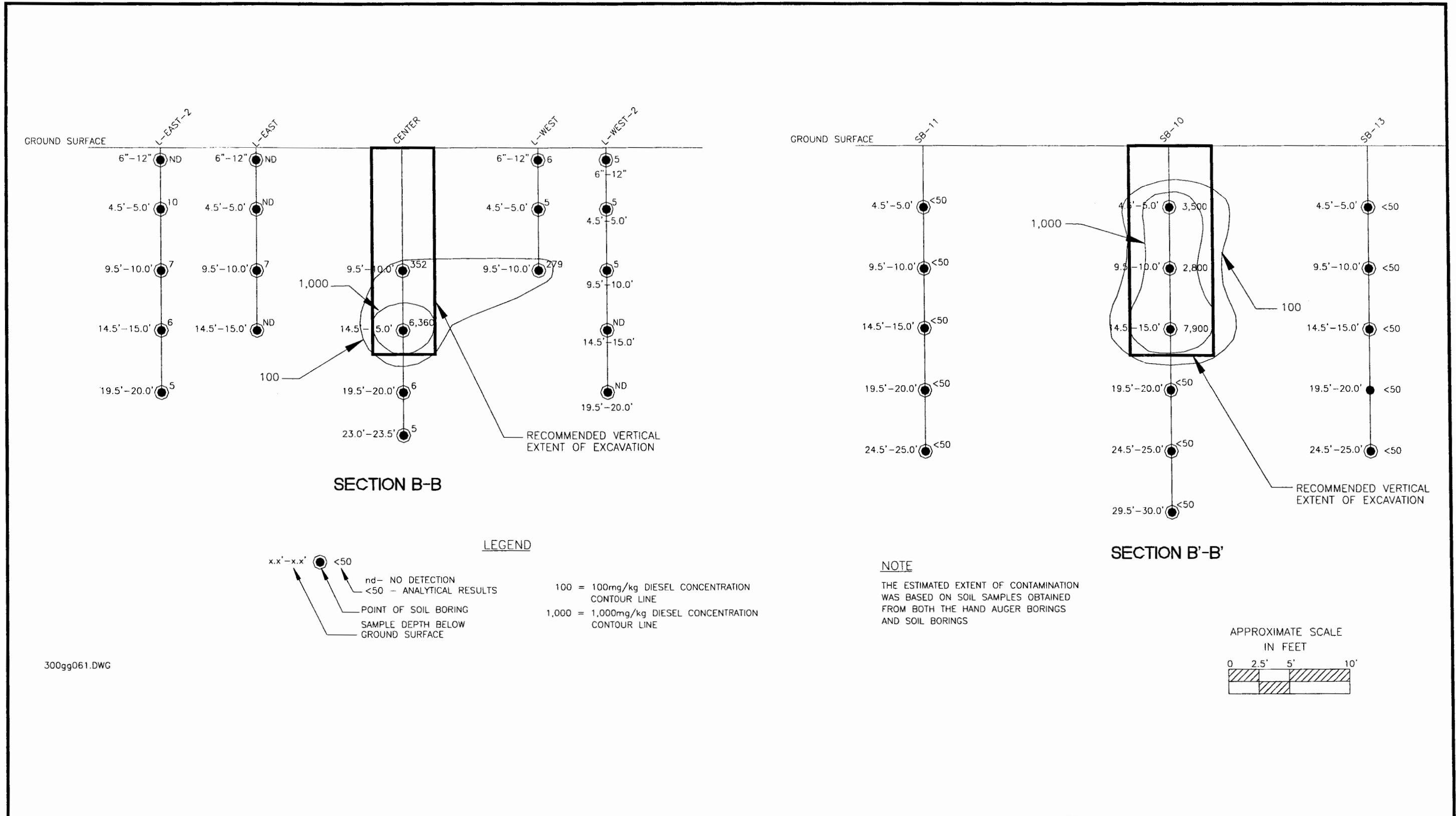


Figure 8-3. Recommended Vertical Extent of Excavation at Cross Sections B-B and B'-B'

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