



Draft-Final Engineering Evaluation/ Cost Analysis Report



**Grapevine Former Small Arms Firing Range
Death Valley National Park**

**Prepared by
Professional Environmental Engineers, Inc.**

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Signatories

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List of Abbreviations and Acronyms

°	Degrees
°F	Degrees Fahrenheit
µg	micrograms
‘	Minutes
%	Percent
“	Seconds
ADD	average daily dose
ALM	Adult Lead Model
amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirements
AUF	Area Use Factor
BCF	Bioconcentration Factor
bgs	below ground surface
BERA	baseline ecological risk assessment
BTV	Background Threshold Value
bw	bodyweight
CA	Contaminant Concentration in Air
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEC	Contaminant of Ecological Concern
cf	cubic foot
CFR	Code of Federal Regulations
CHF	Central Hazardous Materials Fund
cm ²	square centimeters
CEC	contaminant of ecological concern
COC	contaminant of concern
COPC	contaminant of potential concern
COPEC	contaminant of potential ecological concern
CSF	cancer slope factor
CSEM	conceptual site exposure model
CTE	central tendency exposure
cy	cubic yard
DEP	Department of Environmental Protection (New Jersey)
DEVA	Death Valley National Park
dL	deciliter
DOT	Department of Transportation
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
DU	Decision Unit



EC	Exposure Concentration
ECM	ECM Consultants
EDR	Environmental Data Resources
EE/CA	Engineering Evaluation/Cost Analysis
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ESV	ecological screening value
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IEUBK	Integrated Exposure Uptake Biokinetic
IRIS	Integrated Risk Information System
ISM	Incremental Sampling Methodology
ITRC	Interstate Technology and Regulatory Council
IUR	inhalation unit risk
Kd	Sorption distribution coefficient
kg	kilogram
L	liter
LANL	Los Alamos National Laboratory
LMSA	Lead-Migration Sink Area
LOAEL	Lowest Observed Adverse Effect Level
LTM	Long-Term Maintenance
m ³	cubic meters
MCL	maximum contaminant level
mg	milligram
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOAEL	No Observed Adverse Effect Level
NPS	National Park Service
NTCRA	Non-Time Critical Removal Action
ORD	Office of Research and Development
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PE	Professional Environmental Engineers, Inc.
pH	potential hydrogen
PPFL	Park Planning, Facilities and Lands
PPRTV	Provisional Peer-Reviewed Toxicity Value
PRG	preliminary removal goal
PRP	potentially responsible party
PRSC	post-removal site control



RAGS	Risk Assessment Guidance for Superfund
RAO	removal action objective
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RG	Removal Goal
RME	reasonable maximum exposure
RSL	Regional Screening Level
SAP	sampling and analysis plan
SCS	Soil Conservation Service
SF	Slope Factor
SI	Site Inspection
SLERA	screening-level ecological risk assessment
SOW	Statement of Work
SPLP	Synthetic Precipitation Leachate Procedure
Sq. ft.	square foot
TBC	to be considered
TCLP	Toxic Characteristic Leachate Procedure
T&E	Threatened and Endangered
TRV	Toxicity Reference Value
UCL	Upper Confidence Limit
UTL	Upper Tolerance Limit
U.S.	United States
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDOl	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
WASO-ECCB	Washington Support Office-Environmental Compliance and Cleanup Branch
XRF	X-Ray Fluorescence



Executive Summary

The purpose of the Engineering Evaluation/Cost Analysis (EE/CA) Executive Summary is to highlight the key information contained in the EE/CA Report. The Executive Summary contains a summary of the site description, including investigation results and an updated conceptual site exposure model (CSEM) based on these results. A summary of the risk assessment and of applicable or relevant and appropriate requirements (ARARs) also is included along with the scope and objectives of the removal action. The final sections of the Executive Summary provide information on the removal action alternatives analyzed and the recommended removal action.

ES 1. Introduction and Purpose

The Grapevine Former Small Arms Firing Range in Grapevine Canyon (the Site) is located within *Death Valley National Park*, which is owned by the United States and managed by the National Park Service (NPS). The Site is being investigated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). NPS is the lead agency under CERCLA at the Site because the Site is under the jurisdiction, custody, or control of NPS. NPS retained Professional Environmental Engineers, Inc. (PE), to characterize the Site and prepare this EE/CA Report.

This EE/CA has been prepared pursuant to the authorities of Section 104(b) of CERCLA and Section 300.415 (b)(4)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan, commonly called the National Contingency Plan (NCP), which authorize NPS to conduct investigations and studies to characterize the nature and extent of contamination at the Site and to evaluate the need for a response to such contamination to protect public health or welfare or the environment.

The purpose of the EE/CA is to document the release, nature, and extent of hazardous substances at the Site, conduct human health and ecological risk assessments, and, if needed, provide a framework for evaluating removal action alternatives. The EE/CA identifies removal action objectives (RAOs) and analyzes the effectiveness, implementability, and cost of removal action alternatives that may be used to satisfy the RAOs.

ES 2. Site Description, Investigation Results, and Conceptual Site Model

The Site is located off an unimproved administrative road heading generally east from the Grapevine Housing Area and Ranger Station compound located off Scotty's Castle Road (also known as North Highway). The Site is on the southern side of the canyon, partially on a rocky hillside and partially within a dry wash (arroyo), approximately 0.75 miles east of the housing area (Figure 1).

According to NPS personnel (Versar, 2008), the shooting range was used approximately two times per year over a 2- to 3-year period in the early 1990s for target practice and to qualify staff for gun permits. The Site has reportedly been inactive since 1992 and is currently closed for use as a firing range.



Previous investigations, including a Preliminary Assessment (PA) (Iverson, 2008) and a Site Inspection (SI) (ECM, 2017) have been conducted at the Site. Results of the PA indicated that bullets and bullet fragments were observed within the soils surrounding the former backstop, firing lines, and other related areas. The SI soil samples were collected in separate decision units (DUs), as illustrated in Figure 2, and lead, antimony and copper were determined to be contaminants of potential concern (COPCs). Potential human receptors include Site workers and recreational users; potential ecological receptors include plants, soil invertebrates, birds, and mammals.

ES 3. Risk Assessment Summary

The risk assessment for this Site includes a baseline human health assessment, a screening level ecological risk assessment, and a baseline ecological risk assessment. Human health and ecological risks exist for lead and antimony, and final risk-based removal goals (RGs) are recommended for the two contaminants. Approximately 77 cubic yards of surface soil/gravel (to a depth of six inches) were above these RGs within DU 2.

ES 4. Identification and Analysis of Applicable or Relevant and Appropriate Requirements

Chemical-, location-, and action-specific ARARs were identified for this Site, including Resource Conservation and Recovery Act (RCRA) hazardous waste transportation and disposal requirements, the NPS Organic Act, NPS Management Policies, and various California state ARARs.

ES 5. Removal Action Objectives and Preliminary Removal Goals

The Removal Action Objectives (RAOs) for this EE/CA are as follows:

- Eliminate, or reduce to the extent practicable, levels of COCs lead and antimony in soil that present unacceptable risk via direct human contact.
- Eliminate, or reduce to the extent practicable, levels of COCs lead and antimony in soil that present unacceptable risk for ecological receptors.
- Eliminate contaminant-related constraints on the full enjoyment and utilization of park resources consistent with NPS mandates.
- Attain all other federal and state ARARs.

ES 6. Identification of Removal Action Alternatives

Removal action alternatives evaluated for the EE/CA at this Site include the following:

1. No action (as required by the NCP),



2. Full excavation and off-site disposal of soil in DU2, and
3. Cover impacted materials in DU2 with clean fill.

Removal action alternative 2 includes options 2A and 2B. Option 2A is excavation and disposal of material into a non-hazardous (special waste) landfill; 2B is excavation and disposal of material into a hazardous waste landfill. Toxicity characteristic leaching procedure (TCLP) tests will need to be conducted on soil samples from the Site to determine whether the material needs to be disposed in a hazardous or non-hazardous (special waste) landfill.

ES 7. Comparative Analysis of Removal Action Alternatives

Each of the three removal action alternatives described above were analyzed using the following evaluation criteria: effectiveness, implementability, and cost. All options are technically feasible. Alternative 1 is not protective of human health and the environment (nor in compliance with ARARs). Alternative 2 is the most effective remedy as a permanent solution; Alternative 3 requires future operation/maintenance, inspection, and reporting activities with potential future liabilities. Costs to implement the removal action alternatives are summarized below.

- Alternative 1 = No Cost
- Alternative 2A = \$52,500 to \$112,500
- Alternative 2B = \$107,000 to \$229,000
- Alternative 3 = \$45,000 to \$97,000 (plus \$5,000 annually)

The estimates above are within -30 to +50 percent of the contractor costs to perform the excavation, transportation/disposal, and/or cover/capping activities. The estimates do not include costs to prepare work plans and specifications, solicit and evaluate contractor bids, oversee contractor's work, administer the contract, and/or prepare a closure report (if required by NPS or state regulators).

ES. 8 Recommended Removal Action Alternative

Assuming that TCLP metals testing indicates on-Site soils are non-hazardous, Alternative 2A (excavation and disposal off site as non-hazardous waste) is the recommended removal action alternative based on results of the comparative analysis, which shows that this alternative provides a permanent remedy for protecting human health and the environment, and is the least expensive option after 2 to 5 years of implementation. If (after conducting TCLP metals testing) the on-Site wastes are determined to be hazardous, Alternative 2B is the recommended removal action based on results of the comparative analysis, which shows this alternative to provide a permanent remedy for protecting human health and the environment, and becomes the least expensive feasible option after 12.5 to 26.5 years of implementation.



Once the EE/CA is finalized, it will be made available for public comment for 30 days to allow for public comment on the EE/CA and the Administrative Record supporting this EE/CA. Following receipt and evaluation of public comments, NPS will prepare an Action Memorandum. The Action Memorandum, as the decision document selecting a NTCRA, summarizes the need for the removal action, identifies the selected action, provides the rationale for the action, and addresses significant comments received from the public and other agencies (e.g., states, tribes, USEPA).