Executive Summary

The purpose of the Executive Summary is to provide in a stand-alone document of the information contained in the Engineering Evaluation/Cost Analysis Report (EE/CA) so that the content and findings of the EE/CA can be understood without having to read the entirety of the document. The Executive Summary contains a summary of the site description including investigation results, and an updated conceptual site model (CSM) based on the investigation results. A summary of the risk assessment and of Applicable or Relevant and Appropriate Requirements (ARARs) is also 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 Cascades Former Creosote Dip Tank Site (the Site) is located within the Yosemite National Park in the state of California, 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, and the investigation is subject to an agreement between the California Department of Toxic Substances Control (DTSC) and the United States Department of the Interior, NPS. The NPS retained CDM Federal Programs Corporation (CDM Smith) to perform an investigation/study at the Site and prepare this EE/CA Report.

Preparation of this EE/CA fulfills the CERCLA requirement of Section 300.415 (b)(4)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan, commonly called the National Contingency Plan or NCP, to evaluate the nature and extent of contamination at the Site and document selection of a recommended response action (in this case a removal action) for a Site where environmental contaminants present a potential risk to human health or ecological receptors but where the removal action is non-time-critical.

This document has been prepared in accordance with the Yosemite National Park Agreement (Agreement) (Docket HWCA: P1-99/00-006), effective date March 6, 2001, between the DTSC and the NPS. Pursuant to the terms of the Agreement, this document is intended to comply with the requirements of CERCLA Sections 104 and 120 and of the State of California Hazardous Waste Management Program, which is codified in Chapter 6.5 of Division 20 of the California Health and Safety Code. The DTSC is authorized to administer the state's Hazardous Waste Management Program in lieu of the federal hazardous waste management requirements of the Resource Conservation and Recovery Act (RCRA), 42 United States Code (USC) Section 6901, et. seq.

The purpose of the EE/CA is to document the environmental review and removal action selection process and provide a framework for evaluating and selecting alternative technologies. The EE/CA identifies removal action objectives (RAOs) of the non-time-critical removal action (NTCRA) 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 in the western portion of Yosemite Valley, along Northside Drive, west of El Capitan Meadow in the park. The Site was formerly a Civilian Conservation Corps (CCC) camp where wood was treated with creosote and possibly other wood treatment products. The CCC constructed a wood treatment dip tank sometime between 1938 and 1942, and the park used it through the 1970s to treat wood used for the construction of backcountry bridges. The concrete dip tank was approximately 3 feet wide, 10 feet long, and 3 feet deep. The fate of the tank is not known; however, a recent geophysical investigation did not reveal a tank, suggesting that it has been removed from the Site (Shaw 2011).

The operational history indicates that the Site was used for approximately 30 years, primarily to treat wood with creosote and other wood treatment products. No detailed description of site activities is available; however, it is typical that, after treatment, the treated wood would be loosely stacked and allowed to drip before being used. This process kept a store of treated wood on hand and made the wood less "messy" to handle. It is possible that creosote and other wood treatment products may have been stored on-site; however, no record of a drip or storage area is available. It is reasonable to assume that wood treatment products could have been spilled, burned, dripped, or dumped during the period of operation. The Site is small, and only a portion of the area may be affected by historical use of wood treatment products.

More recently, the Site, formerly known as the Valley Wood Yard, was where firewood was cut and stored, and woody debris was burned. These former operations are likely sources of polycyclic aromatic hydrocarbons (PAHs), metals, and dioxin/furans not related to historical wood-treating activities. The Site has recently been used for stockpiling native soil from various areas in the park to use in future projects within the park.

In July 2014, an Approval Memorandum was prepared by the park and signed by the NPS Regional Director for an NTCRA to be conducted at the Site. In September 2014, CDM Smith was hired as the primary environmental consultant for the Site. In coordination with the NPS and the DTSC, a sampling and analysis plan (SAP), site-specific health and safety plan (HASP), and community involvement plan (CIP) were prepared in 2015. The SAP was implemented in November 2015 to answer the principle investigation questions posed by the data quality objectives process within the SAP and provide data of sufficient quality and quantity to prepare an EE/CA report (CDM Smith 2015). Soil trenching and borings were sampled to determine the nature and extent of soil contamination from the source area to soil immediately adjacent and downgradient. Surface soil sampling via incremental sampling methodology (ISM) was conducted to evaluate risk to human health and the environment at five decision units (DUs). The ISM sampling was conducted within the tank footprint (DU-1), western area surrounding the tank footprint (DU-2), eastern area (DU-3), the wood-burning area (DU-7), and a background sampling area (DU-4).

In May 2018, additional soil sampling using ISM was conducted to further investigate dioxin/furan contamination within DU-2, which was previously sampled as part of the 2015 investigation. As part of the investigation, DU-2 was divided into three sampling units (SUs)—SU-1, SU-2, and SU-3. Surface soil

ISM samples were collected at SU-2 and SU-3, and a subsurface soil ISM sample was collected at SU-2 and analyzed for dioxin/furans. No sampling was conducted for SU-1 as part of this investigation, as it was assumed soils in SU-1 were likely to be contaminated to a depth of up to 4 feet due to the proximity to DU-1. Further information regarding the SUs can be found in the SAP Amendment (CDM Smith 2018a).

The results from the soil investigations verify the presence of various organic compounds (semi-volatile organic compounds [SVOCs]), including pentachlorophenol (PCP), bis (2-ethylhexyl) phthalate, and hexachlorobenzene, metals, total petroleum hydrocarbons (TPHs), and dioxin/ furans (2,3,7,8-tetrachlorodibenzo-para-dioxin, toxic equivalent quotient [TEQ]) above project screening levels (CDM Smith 2016a). Chemical concentrations are generally highest within DU-1, but exceedances of project screening levels also were observed in the other site DUs. ISM sampling results for the background DU (DU-4) also exceeded project screening levels for many of the same chemicals.

The results of several rounds of groundwater sampling show several metals and TEQ concentrations above project screening levels. The reported concentration of antimony in one groundwater sample exceeded a federal maximum contaminant level (MCL) for drinking water. The antimony concentration for MW-1 during the winter 2017 groundwater sampling event (8.9 micrograms per liter [µg/L]) exceeded the antimony MCL (6 µg/L) in the duplicate sample. However, this result has higher uncertainty as the original sample for MW-1 was non-detect (below detection limit of 0.35 µg/L), and inspection of the laboratory narrative indicates some sampling issues may have occurred at the time of field collection.

The CSM summarizes the current understanding of how chemical contaminants have been released to the environment, have migrated, and have resulted in exposure to human and ecological receptors. The Site was used for decades to treat wood with creosote and other wood treatment products. Creosote could have been spilled, burned, dripped, and/or dumped during the period of operation. Creosote is a complex mixture of chemicals. Site investigations have shown the presence of PAHs, PCP, and dioxins/furans. The site formerly known as the Valley Wood Yard is where firewood has been cut and woody debris has been burned. Subsequent use of the Site for burning woody debris is the likely source of PAHs, metals, and dioxins/furans that are not related to historical wood-treating activities. The CSM considers several migration pathways (air, ground surface, groundwater transport) and uptake into living organisms that could result in exposure to both human and ecological receptors via inhalation, ingestion, and dermal contact.

ES 3. Risk Assessment Summary

The human health risk assessment (HHRA) was prepared in accordance with United States Environmental Protection Agency (USEPA) guidance on conducting HHRAs in support of the Superfund program (USEPA 1989) and DTSC Office of Human and Ecological Risk (HERO) guidance for conducting risk assessments for human health. The HHRA was conducted using the soil and groundwater data collected during the 2015–2017 site investigation.

Human Health

The HHRA estimates current and future potential risk to different receptor populations. Several human receptors are anticipated to be present at the Site, including a future NPS employee conducting burning activities, a current/future park visitor, and a hypothetical future construction worker. There are multiple media types and exposure pathways by which human receptors may be exposed to contaminants at the Site, as described below:

- Soil – The primary media of concern is soil, both surface (0 to 6 inches below ground surface [bgs]) and subsurface (greater than 6 inches bgs). For most receptors, soil exposures are likely to be primarily surficial in nature (i.e., 0 to 6 inches bgs). For construction workers, soil exposures could occur to depths of up to 6 feet bgs, depending upon the type of future construction activity. The exposure pathways of concern for soil include incidental ingestion, dermal contact, and inhalation.
- Groundwater – Contaminants in the soil may have migrated to underlying groundwater. The absence of domestic wells within 4 miles of the Site indicates that no direct exposure pathways to groundwater exist under current conditions. However, groundwater data from the Site were screened under a hypothetical future drinking water exposure scenario.

For exposures to surface soil, there were no exposure scenarios for any receptor populations that resulted in non-cancer hazards or cancer risks greater than acceptable levels. For construction worker exposures to subsurface soil, non-cancer hazards and cancer risks were slightly above acceptable levels for both DU-1 and DU-2 based on a high-end exposure scenario, primarily due to incidental ingestion of dioxins/furans in subsurface soil.

The Site is currently used as a laydown area for soil and other materials. According to the Final Merced River Final Comprehensive Management Plan and Environmental Impact Statement (MRP), no change in land use of the Site is planned in the future and no construction is planned for the Site (NPS 2014a). Given the extremely unlikely nature of future construction, the low estimated risks, and the conservative exposure parameters used in the risk calculations, this exposure pathway is not retained for further consideration in the EE/CA.

Similar to the construction worker exposures, a drinking water exposure scenario was evaluated only as a hypothetical future exposure scenario. However, according to the MRP, no change in land use of the Site is planned and no construction is planned for the Site (NPS 2014a). In addition, due to the lack of residential land use in the area, it would be highly unlikely that domestic wells would be installed. Therefore, the drinking water exposure pathway is not retained for further consideration in the EE/CA.

Ecological Risk

A screening-level ecological risk assessment (SLERA) is a simplified ecological risk assessment that can be conducted with limited data where site-specific information is lacking and assumed values are used to evaluate potential exposure and effects (USEPA 1997). The goal is to eliminate insignificant hazards while identifying contaminants whose concentrations are sufficiently high to potentially pose risks to ecological receptors.

There are no permanent surface water features at the Site; therefore, no aquatic receptors are present at the Site. However, it is possible that contaminants in soil may migrate to groundwater, which could then discharge to surface water in the Merced River. A screening-level evaluation of groundwater data was performed to determine whether hypothetical groundwater migration from site soils to surface water has the potential to be of concern. Concentrations of several metals in groundwater were above surface water screening levels. However, it is likely that metals in groundwater (if site-related) would be rapidly diluted upon entering the Merced River. In addition, because of the small scale of the Site, it is unlikely site-related impacts would result in unacceptable risks for aquatic receptor populations in the Merced River. For these reasons, no further evaluation of risks to aquatic receptors was performed.

Several terrestrial ecological receptors are anticipated to be present at the Site, including birds, mammals, terrestrial plants, and soil invertebrates. No threatened or endangered species have been identified at the Site. There are multiple media types and exposure pathways by which terrestrial ecological receptors may be exposed to contaminants at the Site, as described below:

- Soil – The primary media of concern is soil, both surface (0 to 6 inches) and subsurface (greater than 6 inches bgs). The primary exposure pathway for birds and mammals is incidental ingestion of soil while feeding or digging, and the primary exposure pathway for terrestrial plants and soil invertebrates is direct contact with soil. Direct contact (i.e., dermal exposure) of birds and mammals to soil may occur in some cases, and inhalation exposure to contaminants in airborne dusts is possible for all birds and mammals, but these exposure pathways (i.e., dermal and inhalation) are usually considered to be minor in comparison to exposures from ingestion (USEPA 2005a). Inhalation of air within burrows is possible for burrowing mammals.
- Terrestrial food items – Ingestion of food items (e.g., plants, invertebrates, prey items) that may have taken up contaminants into their tissues from soil exposure is of potential concern for birds and mammals at the Site.

For plants and invertebrates, the risk estimates support the conclusion that exposures to contaminants of potential ecological concern (COPECs), with exception of chromium, in soil are not likely to result in unacceptable risks.

For mammals and birds exposed to surface soil, no-observed-adverse-effect-level (NOAEL) -based hazard quotients (HQs) for subsurface soil exposures were greater than 1 for antimony, lead, mercury, vanadium, bis(2-ethylhexyl) phthalate, PCP, and dioxins/furans (TEQ). The highest HQs for surface soil were for dioxins/furans (TEQ) and PCP; these were also the only two chemicals with lowest-observed-adverse-effect-level (LOAEL) -based HQs greater than 1. The highest HQs were in DU-1.

Subsurface soil exposures were also calculated for a burrowing mammal exposure scenario. NOAEL-based HQs for subsurface soil exposures were greater than 1 for antimony, PCP, and dioxins/furans (TEQ). LOAEL-based HQs were greater than 1 for TEQ in all DUs and greater than 1 for PCP in DU-1. A comparison of the surface and subsurface HQs shows the subsurface soil values are higher for both PCP and TEQ, which indicates there is greater contamination and exposure at depth.

Dioxins/furans were the primary risk driver for both surface and subsurface soil, and the majority of the exposure was due to ingestion in food. For both mammals and birds, insectivorous receptors tended to have higher HQs than the other two feeding guilds (i.e., herbivores, carnivores). This is expected, as bioaccumulation of contaminants in terrestrial invertebrate (earthworm) tissues tends to be greater than in plants and small mammal tissue. Thus, if risk management decisions are based on this feeding guild, they will be adequately protective of other feeding guilds with lower exposures.

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

The identification of ARARs is a prerequisite to selecting a cleanup action (USEPA 1992b). "Under circumstances where a non-time-critical removal action is expected to be the first and final action at the site, the selected removal action must satisfy all adopted ARARs" (USDOI 2016).

Other factors to be considered (TBCs) are non-promulgated criteria, advisories, guidance, and proposed standards issued by federal or state governments. The TBCs are not enforceable but may be appropriate to consider in certain circumstances; for example, where there are no ARARs that identify particular protective goals.

There are four basic criteria that define ARARs (NPS 2015a; USEPA 1988). The ARARs are (1) substantive rather than administrative, (2) applicable or relevant and appropriate, (3) promulgated state requirements that are more stringent than comparable federal standards, and (4) categorized as chemical-, location-, or action-specific.

The key ARARs and TBCs identified in this EE/CA are as follows:

- Chemical-specific: Key chemical-specific ARARs for the Site focus on permissible exposure limits (in accordance with the requirements of 8 California Code of Regulations [CCR] 5155) and hazardous waste determination (in accordance with the requirements of 22 CCR Division 4.5, Chapter 11, Article 1 Sections 66261.2 through 66261.3; Article 4 Sections 66261.24(a)(1), 66261.24(a)(2), 66261.30 through 66261.32; Article 4.1 Sections 66261.100, 66261.101; Chapter 18, Article 4 Sections 66268.40 66268.48; and 27 CCR Div. 2, Sub-division 1, Chapter 3, Sub-chapter 2, Article 2 Section 20210).

- Location-specific: Key location-specific ARARs for the Site include ARARs specific to national parks such as the National Park Service Organic Act of 1916, the National Park Service General Authorities Act of 1970, and national park regulations pertaining to restrictions on waste disposal sites, the creation of nuisances, and the protection of national park resources. Other key location-specific focus on the protection of animal and plant species that are endangered, threatened, or protected at the federal or state level and the protection of historical and cultural resources.

- Action-specific: Key action-specific ARARs are specific to each individual removal alternative. Further analysis of action-specific ARARs is conducted following the development of removal alternatives.

Pursuant to its delegated CERCLA lead agency authority, NPS has identified ARARs and TBCs for the Cascades Former Creosote Dip Tank EE/CA. Other agencies, including DTSC, were given the opportunity to provide input about ARARs and TBCs for the Site.

ES 5. Removal Action Objectives and Preliminary Removal Goals

The RAOs define what the removal action is intended to accomplish. The RAOs for this EE/CA are as follows:

- Prevent unacceptable risks to human and ecological receptors from exposure to site contaminants in soil.

  This RAO aims to reduce exposure to soil that contains contaminant concentrations that are above target risk goals. The preliminary removal goals (PRGs) developed based on risk are discussed in Section 5.2. Attainment of PRGs may be achieved through a variety of methods. Alternatives that meet this RAO also will meet the following performance standard requirements under the RCRA process: (1) attain media cleanup standards, (2) control the sources of the releases, and (3) protect human health and the environment.

- Eliminate or minimize contaminant-related constraints to the full enjoyment and use of park resources for operational, scientific, and interpretive purposes consistent with NPS mandates.

  Unlike the media-specific RAO, this RAO addresses the Organic Act (16 USC Section 1) directive to conserve and to provide for the enjoyment of the scenery and the natural and historic objects and the wildlife in the park such as to leave them unimpaired for the enjoyment of future generations. This RAO will be used as an overarching guidance for all technology and alternative evaluations.

  Removal alternatives that meet this RAO will meet the following performance standard requirements under the RCRA process: (1) attain media cleanup standards, (2) control the sources of the releases, and (3) protect human health and the environment.

- Satisfy federal and state ARARs and any associated cleanup standards.

  This RAO assesses whether the removal alternatives are able to attain the federal and state ARARs**.** By complying with ARARs, this RAO also would satisfy RCRA requirements to comply with applicable standards.

  Removal alternatives that meet this RAO will meet the following performance standard requirements under the RCRA process: 1) attain media cleanup standards and 2) comply with any applicable federal, state, and local standards for management of wastes.

The recommended removal goals (RGs) are selected by comparing the risk-based PRGs with the ARAR-based PRGs and selecting the most stringent. However, to ensure that cleanup will be technically feasible and cost-effective, the PRGs are also compared to background values for chemicals of concern (COCs) and chemicals of ecological concern (COECs) in all media at the Site. When multiple PRGs exist, the lower (i.e., more protective) value was chosen as the recommended RG unless the background concentration of the contaminant in the medium judged to be representative of unimpacted conditions was greater than the PRGs, in which case the background concentration was selected as the recommended RG. The recommended RGs and the basis for selection are included in Text Table ES 5.

Text Table ES 5 Soil RG Selection						
COC or COEC	**Background [1]**	**Human Health PRG**	**Ecological PRG**	**ARAR-based PRG**	**Basis for RG**	**Recommended RG**
Antimony	*All non-detect*	*None*	*2.4 mg/kg (Mammal)*	*None*	*Ecological PRG*	*2.4 mg/kg*
Lead	*6.2 mg/kg*	*None*	*160 mg/kg (Bird)*	*None*	*Ecological PRG*	*160 mg/kg*
Vanadium	*42 mg/kg*	*None*	*46 mg/kg (Bird)*	*None*	*Ecological PRG*	*46 mg/kg*
Bis(2-ethylhexyl) phthalate	*All non-detect*	*None*	*0.16 mg/kg*	*None*	*Ecological PRG*	*0.16 mg/kg*
PCP	*0.26 mg/kg*	*None*	*5.7 mg/kg (Mammal)*	*None*	*Ecological PRG*	*5.7 mg/kg*
Dioxin/Furan (TEQ)	*1.8E-06 mg/kg*	*None*	*Threshold: 2.6E-06 mg/kg (Mammal)*	*None*	*Ecological PRG*	*1.8E-06 mg/kg*

Note:
[1] See Section 5.2.4 for a discussion of statistical comparisons of site to background

ES 6. Identification and Analysis of Removal Action Alternatives

The removal action alternatives identified as potentially feasible alternatives that could meet the RAOs are listed below:

1. No Action
2. In-Place Capping of Contaminated Soils
3. Excavation and Disposal of Contaminated Soils at Licensed Disposal Facilities
4. In Situ Thermal Treatment of Contaminated Soils

Consistent with the NCP, a No Action alternative is considered to provide an environmental baseline against which impacts of the other alternatives can be compared.

ES 7. Comparative Analysis of Removal Action Alternatives

Text Table ES 7 summarizes the results of the evaluation of the criterion effectiveness, implementability, and cost for each alternative.

Text Table ES 7 Comparison of Alternatives													
Criterion		**Effectiveness**						**Implementability**					**Cost**
Alternative		**Protective of**		**Complies with ARARs?**	**Long Term**	**Reduction of Toxicity, Mobility, or Volume**	**Short Term**	**Feasibility**			**Acceptance**		**Present Value Cost**
		Human Health?	**The Environment?**					**Technical**	**Administrative**	**Availability of Services and Materials**	**State**	**Community**	
1	No Action	*Acceptable*	*Unacceptable*	*Unacceptable*	*None*	*None*	*None*	*None*	*None*	*None*	*NE*	*NE*	*$67,000*
2	In-Place Capping of Contaminated Soils	*Acceptable*	*Acceptable*	*Acceptable*	*Moderate*	*None*	*Moderate to High*	*Moderate to High*	*High*	*Moderate to High*	*NE*	*NE*	*$588,000*
3	Excavation and Disposal of Contaminated Soils at Licensed Disposal Facilities	*Acceptable*	*Acceptable*	*Acceptable*	*Moderate to High*	*Low to Moderate*	*Moderate*	*Moderate*	*Moderate to High*	*Moderate to High*	*NE*	*NE*	*$966,000*
4	In Situ Thermal Treatment of Contaminated Soils	*Acceptable*	*Acceptable*	*Acceptable*	*Moderate to High*	*High*	*Moderate*	*Moderate to Low*	*Moderate to High*	*Moderate*	*NE*	*NE*	*$2,028,000*

Notes

1. Detailed cost spreadsheets (cost summaries, present value analyses, and cost worksheets) for each alternative are presented in Appendix F.
2. Costs are based on a 30-year period of analysis.

Legend for Qualitative Ratings System:

Effectiveness and Implementability

For First Three Criteria	**For Rest of the Criteria**
None	**None**
Unacceptable	**Low**
Acceptable	**Low to Moderate**
	Moderate
	Moderate to High
	High
	NE (Not Evaluated)

ES 8. Recommended Removal Action Alternative

The purpose of Section 8 is to describe the recommended removal action alternative and the reason for the selection. Taking into consideration the evaluation criteria presented in this EE/CA, the recommended removal action alternative for the Site is Alternative 3. Alternative 3 includes excavation of contaminated soil exceeding recommended RGs and disposal at existing licensed solid waste facilities outside the boundaries of the Site. The total present value cost of Alternative 3 is $966,000. Alternative 3 is selected as the recommended removal action alternative based on the results of the comparative analysis completed in Section 7, showing that Alternative 3 would be protective of human health and the environment, would achieve the RAOs, and would be able to comply with ARARs.

Alternative 3 has higher ratings for long-term effectiveness and reduction of toxicity, mobility, or volume than Alternative 2 while not requiring the long-term operations and maintenance required for Alternative 2. While Alternative 2 achieves the RAO to eliminate or minimize contaminant-related constraints to the full enjoyment and use of park resources, Alternative 3 would achieve that RAO to a greater extent by removing soils posing risks from the Site.

Alternative 3 has similar long-term and short-term effectiveness as Alternative 4 but does not have the potential implementability issues of Alternative 4 (i.e., the requirement of high energy demands at the remote Site). Alternative 3 would also be significantly less costly than Alternative 4.

Once the EE/CA is finalized, it will be presented to the public. For NTCRA, the NCP requires a 30-day public comment period on the EE/CA and any supporting documentation (including fact sheets or other documents summarizing the alternatives under consideration). After the public comment period is over, a written response to significant comments received during the comment period is prepared. The response to comments is included in the administrative record supplement, typically as part of the Action Memorandum.

The final phase of the NTCRA selection process is to prepare the Action Memorandum. The Action Memorandum, as a primary decision document, substantiates the need for removal action, identifies the proposed action, provides the rationale for the action, and provides a response to significant comments received from the public, including those received from other jurisdictions (e.g., State).