Superfund Program
U.S. Environmental Protection Agency
Region 2
Proposed Plan

Pesticide Warehouse I
Operable Units (OUs) 1 and 2
Arecibo, Puerto Rico

July 2020

EPA ANNOUNCES PROPOSED CLEANUP PLAN

This Proposed Plan describes the remedial alternatives developed for the Pesticide Warehouse I Superfund Site (Site), Operable Unit 1 (OU1) that addresses soils and Operable Unit 2 (OU2) that addresses groundwater. The Site is located in Arecibo, Puerto Rico, and the U.S. Environmental Protection Agency (EPA) identifies in this Proposed Plan the preferred alternative for the Site with the rationale for this preference. This document was developed by EPA, the lead agency for Site activities, in consultation with the Puerto Rico Department of Natural and Environmental Recourses (DNER), the support agency. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9617(a) (CERCLA, commonly known as Superfund), and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The nature and extent of the contamination at the Site and the remedial alternatives summarized in this document are described in detail in the Remedial Investigation (RI) and Feasibility Study (FS) reports. As mentioned above, EPA is addressing the Site in two operable units (OUs). OU1 addresses the contamination of the soil media, and OU2 addresses the site-wide groundwater.

EPA's Preferred Alternative for OU1 is Alternative 2 (formerly Alternative 5 in the FS):

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD
July 30, 2020 – August 29, 2020

VIRTUAL PRESENTATION
On August 6, 2020 a Virtual Presentation will be available at the following link: www.epa.gov/superfund/pesticide-warehouse-1

INFORMATION REPOSITORY
The Administrative Record file, which contains copies of the Proposed Plan and supporting documentation, is available online at:

https://www.epa.gov/superfund/pesticide-warehouse-1
and the following locations:

Barceloneta Municipal Library
Hours: Monday – Friday 9:00 am to 3:00 pm

U.S. Environmental Protection Agency
City View Plaza II- Suite 7000
#48 PR-165 Km. 1.2
Guaynabo, PR 00968-8069
(787) 977-5865
Hours: Monday – Friday 9:00 am to 5:00 pm
Office is closed due to the pandemic.

Puerto Rico Department of Natural & Environmental Recourses
Emergency Response and Superfund Program
Edificio de Agencias Ambientales Cruz A. Matos
Urbanización San José Industrial Park
1375 Avenida Ponce de León
San Juan, PR 00926-2604
(787) 767-8181 ext 3207
Hours: Monday – Friday 9:00 am to 3:00 pm
Office is closed due to the pandemic.

U.S. EPA Records Center, Region 2
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9:00 am to 5:00 pm
Office is closed due to the pandemic.

Excavation of Contaminated Soil to 10 feet below ground surface, Onsite Treatment and Offsite Disposal, Covering of Remaining Contaminated Subsurface Soil, and Institutional Controls. Under this Alternative, contaminated soil in the upper 10 feet would be excavated and treated before being transported off-site for disposal. Because unexcavated and deeper soils (below 10 feet) would remain at levels that would not allow for unrestricted (i.e., residential) use, institutional controls would restrict the future use of the Site to nonresidental uses. EPA has determined that no action is necessary for groundwater (OU2).

COMMUNITY ROLE IN SELECTION PROCESS

EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, this Proposed Plan has been made available to the public for a 30-day public comment period, which begins with the issuance of this Proposed Plan and concludes on August 29, 2020.

EPA is providing information regarding the investigation and cleanup of the Site to the public through a public meeting and the public repositories, which contain the administrative record file for this remedial decision. EPA encourages the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

The public meeting held during the comment period is to provide information regarding the Site investigations, the alternatives considered, and the preferred alternative, as well as to receive public comments. Comments received at the public meeting, as well as written comments during the public comment period, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document that formalizes the selection of the remedy.

Written comments on this Proposed Plan should be addressed to:

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SCOPE AND ROLE OF ACTION

Because of the complexity of the Site, EPA is addressing the cleanup of the Site in two phases or OUs. EPA has designated two operable units for this Site.

- OU1, addresses soil contamination
- OU2, groundwater contamination

EPA completed RI/FS studies for both OUs, the results of which are presented in this Proposed Plan. The Preferred Alternative presented here is expected to be the final action for the Site.

SITE BACKGROUND

Site Description

The Site is an inactive pesticide storage warehouse facility located at State Road No. 2, kilometer 59.7, in a rural/residential area of Arecibo, Puerto Rico. The Site occupies approximately one acre and consists of a main warehouse, a smaller secondary warehouse in the rear of the property, and a small storage shed. All onsite buildings are in a dilapidated state. An onsite water supply well (SW) is located about 180 feet east of the main warehouse, north of Route PR-2. The Site property is bounded to the west, north, and east by the Mita Inc. facility and agricultural property. Further to the east, east of the Mita Inc. fields, is a vegetated area. The Site is bounded to the south by State Road No. 2, or PR-2.

A vegetated four-foot deep ditch runs parallel to PR-2, south of the onsite SW and opens into the topographically lower vegetated area. No obvious signs of runoff accumulation have been observed along this drainage ditch.

Site History

The Puerto Rico Land Authority (PRLA) owns the Pesticide Warehouse I property and conducted pesticide mixing and storage operations from 1953 to 2003. PRLA used the Site to store and/or dilute pesticides and fertilizers for agricultural application in pineapple farming. Beginning on October 1, 1999, the property was leased to Agrocampos, Inc., which also used the Site to store and/or dilute pesticides and fertilizers for agricultural application.

Topography

The Site is situated within the Northern Limestone Province of Puerto Rico at an elevation of approximately 95 meters (295 feet) above mean sea level. The areas immediately surrounding the Site to the east, west, and south are relatively flat. North of the Site is an area of steep mogotes (limestone hills). The topography of the land to the south of the Site is dominated by karst features; several sinkholes are present within one mile of the Site.

Regional Site-Specific Geology

The unconsolidated deposits at the Site are derived from the weathering of parent limestone. They consist of hard, stiff, often dry, sandy, and clayey silt, silt, and clay. The Aymamón Limestone is found at depths between 46 feet bgs to 70 feet bgs at the Site. The bedrock has an upper weathered zone up to 10 feet thick. The upper Aymamón Limestone has soft zones, sometimes filled with clay, and the deeper zone has solution features, including cavities and fracture zones.

Regional Site-Specific Hydrogeology

Site groundwater occurs in the Upper aquifer (comprised of the Aymamón Limestone) at depths of about 290 to 310 feet below ground surface (bgs). The Upper aquifer is unconfined and is recharged from surface drainage and precipitation. Regional groundwater flow is to the north toward Caño Tiburones and the Atlantic Ocean. At the Site, groundwater flow has a northeasterly component in the western portion and a northwesterly component in the eastern portion.

Demography

The Site is located approximately eight miles southeast of Arecibo in a sparsely populated rural area along road PR-2. The Site is found within the Sabana Hoyos Ward of Arecibo. The main population nucleus in the area is a residential sector located approximately one mile southwest of the Site. The Sabana Hoyos ward is composed of approximately 10,745 inhabitants according to the 2010 U.S. Census. According to the 2013 Department of Housing and Urban Development reports, median household income is $20,900 dollars.

Land & Groundwater Use

The region has been used for agriculture (primarily pineapple farming) for approximately 100 years. Land use to the south, north, and far east of the Site is mostly agricultural, although a pipe factory is located immediately south of the Site and a former pharmaceutical plant is located about 3,500 feet east of the Site.

The Puerto Rico Planning Board (PRPB) has jurisdiction over land use and zoning in Puerto Rico. Land use, under the Land Use Plans subprogram of the PRPB by means of the approved Land Use Plan (LUP) of 2015, has the responsibility to create physical planning instruments to promote the optimum use of the land use in Puerto Rico, establishing the parameters, guidelines, and rules on how and where specific social and economic activities will be permitted to occur as the basis for decision making and in conformance with development regulations and strategies adopted by the PRPB. The LUP of Puerto Rico is the main planning instrument in Puerto Rico. Zoning establishes the use and intensity of use that is applicable to a parcel of land or sector, as part of a planning process in order to promote development, conservation, building, exploitation, the cultivation, the contemplation of the landscape or the location of the infrastructures and services.

The applicable land use to the Site is Specially Protected Rustic Soil - Agriculture (SREP-A). According to the LUP, the objective of SREP-A is to guide the use of the lands with agricultural or livestock value, with present or potential activities, to be protected in order for the land to be dedicated to agricultural activities. EPA has consulted with municipal authorities and the Commonwealth of Puerto Rico concerning the expected future uses of the property and has concluded that future unrestricted land use (e.g., residential development) is not planned.

The Puerto Rico Aqueduct and Sewer Authority supplies most of the potable water to the Arecibo region; thus, there is no future potable groundwater use expected at the Site.

Surface Water Drainage and Interaction with Groundwater

The Site is located within the Caño Tiburones watershed between the Río Grande de Manatí drainage area to the east and the Río Grande de Arecibo drainage area to the west. No surface water bodies, or wetlands are present onsite; however, a sinkhole pond is located south of the Site on the south side of PR-2. The sinkhole pond primarily receives runoff from adjacent fields to the south and east. A surface water drainage ditch runs from the mixing platform on the south end of the main warehouse to the east-southeast toward PR-2. The ditch discharges to the vegetated area east of the Site. The ditch is dry except during precipitation events.

Groundwater at the Site is not known to discharge in springs or surface water. Groundwater is approximately 300 feet bgs and therefore unlikely to discharge in any of the sinkholes observed near the Site. Sinkholes filled with water are most likely a result of surface water runoff and precipitation.

Previous Study Area Investigations

EPA Site Reconnaissance (March 1996)

EPA conducted a reconnaissance investigation of the Site and observed distressed or missing vegetation at the property but unstressed vegetation immediately outside the property fence. EPA also observed poor housekeeping and onsite disposal of empty pesticide bottles, labels, and bags of product; visible pesticide residue at several locations throughout the property; and a white residue along a surface runoff pathway that began at the mixing platform in front of the main warehouse and continued along a drainage ditch paralleling PR-2, passing a water supply well on the Site property and entering a vegetated area.

EPA Site Inspection (May 1996)

In May 1996, EPA conducted a Site Inspection (SI) sampling event that included collection of surface soil samples throughout the property and two groundwater samples from the onsite well. Surface soil results indicated the presence of several pesticides. Groundwater results also showed the presence of pesticides. In December 2001, EPA conducted follow-up reconnaissance and again observed poor housekeeping throughout the property.

Administrative Order (May 2007)

EPA issued two Administrative Orders on Consent (Consent Orders), which became effective on May 9, 2007. The Consent Orders required the Respondents to perform an RI/FS for each operable unit at the Pesticide Warehouse I Site, OU1 (Soils) and OU2 (Groundwater). PRLA did not comply with the Consent Orders; therefore, EPA decided to take over both OUs and consolidate them into one RI/FS.

Study Area Remedial Investigations

The RI field investigation activities included the following primary activities:

OU1

- Surface soil (0 to 2-feet bgs) screening with pesticide field test kits
- Surface and subsurface soil sampling and analyses for target compound list (TCL) pesticides, dioxin/furans, diuron, and target analyte list (TAL) metals (including cyanide and mercury)
- Background soil sampling and analyses for TCL pesticides, dioxin/furans, diuron, and TAL metals (including cyanide and mercury)
- Concrete chip sampling and analyses for TCL pesticides, toxicity characteristic leaching procedure (TCLP) pesticides, TAL metals (including cyanide and mercury) and TCLP metals and wipe sampling for TCL pesticides and TAL metals
- Surface and subsurface soil sampling and analyses at the former underground storage tank (UST) for total petroleum hydrocarbons (TPH) diesel-range organics (DRO) and gasoline range organics (GRO)
- Surface water and sediment sampling and analyses for TCL pesticides and TAL metals (including mercury and cyanide)

OU2

- Video borehole logging
- Well installation and development
- Long-term water level monitoring
- Synoptic water level measurements
- Groundwater well sampling and analyses for TCL pesticides, diuron, dioxins/furans, and TAL metals (including cyanide and mercury). Samples were also analyzed for water quality parameters: total suspended solids (TSS), total dissolved solids (TDS), total organic carbon (TOC), major anions (nitrate, chloride, bicarbonate, sulfate, and phosphate), major cations (calcium, magnesium, sodium, and potassium) and alkalinity

Nature and Extent of Contamination

The nature and extent of contamination was determined by comparing analytical results for pesticides and dioxins/furans in soil, groundwater, sediment, and surface water to Site screening criteria. Soil data were compared to the Preliminary Remedial Goals (PRGs) developed for the environmentally similar Pesticide Warehouse III OU1 Site. Analytical results for arsenic were compared to calculated site-specific background levels.

Selection of Site-Related Contaminants

To focus the evaluation of contaminant data, site-related contaminants (SRCs) were selected, based on the history of Site use and the frequency of detection in Site media, particularly in soil. The pesticide dieldrin was detected the most frequently at concentrations above screening criteria. The pesticide most frequently detected in soil was toxaphene; it is also the fourth most frequently detected pesticide above screening criteria. Aldrin was the second most frequently detected pesticide above screening criteria. Dioxin/furans, expressed as the toxic equivalent (dioxin TEQ) of 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD), is a highly toxic by-product of some pesticides and was detected in Site soils. Arsenic, a component of certain pesticides, frequently exceeded its screening criterion and frequently exceeded its calculated site-specific soil background level.

Therefore, dieldrin, toxaphene, aldrin, dioxin, and arsenic were selected as SRCs and were used to evaluate contaminant distribution in all site media.

Extent of Soil Contamination

Figures 2-8, 2-9 and 4-6 show contamination at concentrations above the preliminary remediation goals (PRGs). Pesticide contamination was found throughout the site in the following general areas:

- the northwest corner (near the disposal pit);

- the northeast corner (near staining and drum storage);
- the west side of the main warehouse (where floor drainage discharged to soil);
- south and east of the former mixing platform
- in the drainage ditch north of PR-2.

The vertical extent of pesticide contamination in soils varied from 0–2 feet bgs to 18–20 feet bgs. The deep contamination occurred in the northwest and southeast corners of the site. In other locations, the pesticide concentrations decreased with depth. Toxaphene had the highest maximum concentration of the pesticide SRCs.

The distribution of dioxin-contaminated soil, as defined by the PRG criterion (18 ng/kg) (Figure 2-8), is very similar to the pesticide contamination. Dioxin-contaminated soil is also found in surface soils (0 to 2 feet bgs) in the area along the northern property boundary.

Deeper dioxin soil contamination above the PRG extends to at least 6 feet bgs in four areas of the Site: the northwest corner (near the disposal pit), along the northwest side of the main warehouse, at the property line east of the mixing area, and in the drainage ditch north of PR-2. Although still above the screening criterion at these locations, the concentration of dioxin decreases significantly with depth.

The lateral distribution of arsenic in soil, as defined by the site-specific background value of 41.5 mg/kg, is similar to the lateral distribution of pesticide contamination; however, the vertical distribution is much different. Areas with consistently elevated arsenic concentrations greater than site-specific background include:

- the northwest corner (in the disposal pit and the soil pile area);
- south and east of the former mixing platform; and
- in the drainage pathway north of PR-2.

Unlike pesticides, arsenic contamination in surface soils (0 to 2 feet bgs) was mostly limited to the soils in the northwest corner of the Site near the waste disposal pit and soil pile area. At most areas of the Site, the highest arsenic concentrations were present in the subsurface soils, generally most elevated in the 8 to 10 feet bgs interval. The deeper contamination was found primarily in the northwest corner (the disposal pit and soil pile area), near the former mixing platform (south of the platform, and east along the "spillage" pathway), and within the eastern half of the drainage pathway north of PR-2.

A majority of the contamination exceeding the PRGs (90 percent) is in the top ten feet of soil.

Extent of Groundwater Contamination

Pesticide contamination in groundwater was found only in one of three sampling events and only in the shallower zone of one well (SW). Groundwater at this location may also include a component of regional contamination, as pesticides were found in current and former supply wells at sidegradient locations not considered to be impacted from the Site.

Dioxin contamination in groundwater at the onsite SW and the Site monitoring wells is considered to be related to Site activities but may also include regional contributions. Dioxin in groundwater did not exceed the National Primary Drinking Water Standard, or MCL, of 3 ng/L.

Arsenic and chromium were not detected above drinking water standards in any groundwater samples.

Extent of Sediment and Surface Water Contamination

Site-related pesticide contamination in sediment (dieldrin) and surface water (dieldrin and toxaphene) is restricted to the area on the Site of ponded surface water near the former mixing platform (SE-1/SW-1).

Arsenic was detected in all sediment samples at concentrations above its sediment screening criterion but well below the site-specific background soil level.

Arsenic was only detected above the surface water criteria at location SW-4. This location found elevated concentrations of nearly every inorganic analyte due to its elevated turbidity.

Extent of Concrete Chip and Wipe Sample Contamination

Eighteen pesticides were detected in concrete chips from the main warehouse; 12 pesticides were detected in the wipe samples. Arsenic was detected in all chip samples. Mercury was detected in one sample and cyanide was detected in all but two samples.

Eight pesticides and four metals were detected in the leachate (TCLP) analyses, but not at concentrations that exceeded the Resource Conservation and Recovery Act (RCRA) regulatory limits for hazardous waste.

Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The “"principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. Pesticides in soil samples were not observed at concentrations that present significant risk (e.g., generally greater than $1x10^{-3}$). Additionally, contaminated soils appear to have little impact on groundwater. Based on the relatively low risk and limited mobility, contaminated soil at the Site is not considered to be a principal threat waste, but rather a low-level threat waste.

SUMMARY OF SITE RISKS

The purpose of the risk assessment is to identify potential cancer risks and noncancer health hazards at the Site assuming that no further remedial action is taken. A baseline human health risk assessment was performed to evaluate current and future cancer risks and noncancer health hazards based on the results of the RI.

A screening-level ecological risk assessment (SLERA) was also conducted to assess the risk posed to ecological receptors due to site-related contamination.

Human Health Risk Assessment

The HHRA characterized potential human health risks associated with the Site in the absence of any remedial action. Potential exposure pathways are defined based on potential source areas, release mechanisms, and current and potential future uses of the Site. Based on the current zoning and potential future use, the risk assessment focused on several potential receptors to soil. These receptors include a current/future trespasser, future resident, future worker and future construction worker. There are no current users of untreated groundwater from the Site; however, the risk assessment evaluated potential resident and worker exposure to groundwater should it be used for potable purposes in the future.

To characterize potential noncancer health effects, comparisons are made between estimated intakes of substances and toxicity thresholds. Potential cancer effects are evaluated by calculating probabilities that an individual will develop cancer over a lifetime exposure based on projected intakes and chemical-specific dose-response information. In general, EPA recommends a cancer risk range of 1×10^{-6} (1 in 1 million) to 1×10^{-4} (1 in 10,000) and noncancer

WHAT IS RISK AND HOW IS IT CALCULATED?

Human Health Risk Assessment:
A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk;" or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a threshold (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

health hazard index (HI) of unity (1) as threshold values for potential human health impacts.

The total estimated cancer risks for the future resident ($1x10^{-3}$) exceed EPA's risk range under a reasonable maximum exposure (RME), when all exposure routes were considered. However, when broken out by media, the risk from groundwater alone is at $4x10^{-4}$, or just at the upper end of the risk range, assuming (conservatively) that chromium is one hundred percent hexavalent. It is more likely that a majority of the chromium is in the trivalent form, which would result in risks that would be well within the risk range. The risk from soil alone was $7x10^{-4}$, primarily from exposure to dioxin, dieldrin and chromium. Estimated cancer risks for future workers (2×10^{-4}) were at the upper bound of EPA's risk range, primarily due to dieldrin, arsenic and chromium in groundwater and dieldrin, dioxin, arsenic and chromium in surface soil. However, when broken out by media, the risk from groundwater alone is $1x10^{-4}$, or just at the upper end of the risk range. The risk from soil alone was $9x10^{-5}$, which is within the cancer risk range. Estimated RME cancer risks for current/future trespassers and future construction workers exposure to soil at the Site, are within EPA's cancer risk range.

The total noncancer HIs were evaluated for both adult and child residents. The total noncancer HI for the future resident is above EPA's threshold of unity (1) under the RME scenario and is driven primarily by potential exposure to dioxin and dieldrin in soil. For the child resident under the RME scenario, the total noncancer HI (20) is a above EPAs threshold of unity due to potential exposures to dieldrin and dioxin in soil. The total noncancer HI for workers is above EPAs threshold of unity; however, individual target organ/effect HIs are less than or equal to 1. The total RME noncancer HIs for the current/future trespasser and future construction worker are below EPA's threshold of 1, indicating that noncancer effects would not be expected to occur for those receptors due to exposure to soil at the site. Noncancer hazards from exposure to groundwater were below EPA's threshold of 1 for all receptors for site-related contaminants.

Ecological Risk Assessment

Screening Level Ecological Risk Assessment (SLERA)

A screening-level ecological risk assessment (SLERA) was conducted to evaluate the potential for ecological risks from the presence of contaminants in surface soil, sediment and surface water. The SLERA focused on evaluating the potential for impacts to sensitive ecological receptors to site-related constituents of concern through exposure to soil on the Pesticide Warehouse I property. Surface soil concentrations were compared to ecological screening values as an indicator of the potential for adverse effects to ecological receptors. A complete summary of all exposure scenarios can be found in the SLERA.

Surface Soil: There is a potential for adverse effects to ecological receptors (invertebrates, reptiles, amphibians, birds, and mammals) from exposure to contaminated surface soil. The surface soil screening criteria were exceeded for pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-chlordane, diazinon, dieldrin, diuron, endosulfan I, endosulfan II, endrin aldehyde, gamma-BHC (lindane), gamma-chlordane, heptachlor, methoxychlor, and toxaphene), dioxin/furan congeners, and metals (antimony, arsenic, cadmium, chromium, lead, manganese, mercury, selenium, vanadium, and zinc), which resulted in HIs greater than the acceptable value of 1. The primary risk drivers were identified as pesticides and dioxin/furans. Several metals (arsenic, chromium, mercury, selenium, and vanadium) are likely site-related compounds that also were associated with unacceptable ecological risk.

Sediment: There is a potential for adverse effects to ecological receptors from pesticides (dieldrin and gamma-chlordane) and metals (arsenic, cadmium, chromium, copper, cyanide, iron, lead, mercury, and zinc) in sediment. Given that the majority of the sediment samples were collected off-site, the inorganic COPECs found in sediment are potentially related to soil erosion and runoff from the site, as all of the sediment COPECs were also identified as soil COPECs. The sediment samples collected were from areas that hold water after rainfall and from drainage swales and not true sediment samples.

Surface Water: There is a potential for adverse effects to ecological receptors from metals in aluminum, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, manganese, nickel, vanadium, and zinc. All the COPECs had maximum detected concentrations detected off-site, but due to so many inorganics being detected in soils on-site, it is likely that these inorganics are also site-related COPECs. The surface water samples, collected were from areas that hold water after rainfall and from drainage swales, are not true surface water samples.

Overall the SLERA results indicate risk to ecological receptors from exposure to site soils. Primary risk drivers consist of pesticides, followed by dioxin/furans, and metals based on detected levels consistently exceeding ecological screening level (ESLs) in soil, sediment, and surface water. In addition to elevated HQs for both pesticides and dioxins, the quantity of detected contaminants was also notable. A total of 20 pesticides were detected in soil, with 13 exceeding ESLs. Seventeen dioxin/furan congeners were detected in soil, and all but one exceeded ESLs.

There is greater potential for exposure by terrestrial receptors than aquatic receptors on and adjacent to the Site. The drainage ditch to the southeast flows to a sinkhole pond, but there does not appear to be substantial surface water connections to nearby streams and rivers. There is more suitable terrestrial habitat north of the Site, in the Cambalache State Forest (Bosque Estatal de Cambalache), and the greater mobility and site access of terrestrial receptors would increase the potential for exposure of receptors traveling to the site from that nearby habitat to contaminated soil, sediment, and surface water;

however, the terrain would limit exposure to less mobile terrestrial receptors (i.e., reptiles, small mammals). Limited on-site vegetation could facilitate surface soil loss via erosion during high wind or rain events, thereby spreading contamination to nearby terrestrial and aquatic habitats.

Although there is little suitable habitat for ecological receptors at the Site, there is suitable habitat for mammals, birds, herpetofauna, and invertebrates surrounding the Site. Receptors with limited or no mobility, such as plants and soil invertebrates, are more at risk than more mobile species such as mammalian and avian receptors. The quantity of COPECs, the magnitude of their ESL exceedances and detection frequency, and the proximity to the state forest suggest that ecological risks due to site-related contamination are potentially substantial at the population and community level. Given this potential, a remedial action for soil contaminants to reduce or limit exposure of ecological receptors to site soils to protect the environment from actual or threatened releases of hazardous substances is warranted.

Based on the results of the human health and ecological risk assessments, it is EPA's current judgement that the Preferred Alternative identified in the Proposed Plan for soil, is necessary to protect public health, welfare or the environment from actual or threatened releases of hazardous substances. It is EPA's current judgement that no action is necessary for groundwater to ensure protection of public health and the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance and site-specific risk-based levels.

Unacceptable human health risks were associated with exposure to soil. Ecological risks from exposure to contaminated soil have been determined to be unacceptable. It is assumed that risks to ecological receptors would be mitigated through implementation of remedial alternatives for human receptors. The future land use of the site would also be industrial and not likely conducive to ecological habitat.

The impact to groundwater pathway was evaluated and there is insufficient evidence that site soils are currently acting as an ongoing source of groundwater contamination. The water table, between 290 to 310 feet bgs, is separated from the areas of soil contamination by more than 290 feet of unsaturated soils. Given that soil contamination has been present at the Site for as many as 60 years, there is little evidence of contaminant transport to deeper soils through rain percolation during that time. In addition, the pesticides and dioxin/furan compounds that have been identified as COCs in soil have very low water solubility, adsorb strongly to soils and, therefore, are not very mobile.

Risks from ingestion of groundwater were just at the upper end of EPA's risk range, assuming (conservatively) that chromium is one hundred percent hexavalent. It is more likely that a majority of the chromium is in the trivalent form, which would result in risks that would be well within the risk range. Groundwater results in monitoring and supply wells from field investigations were below federal MCLs and often nondetect. Onsite wells are not currently used. Pesticides found in offsite supply wells are not considered to be related to Site activities, indicating regional impacts from pesticide use. Therefore, no action is proposed for groundwater.

The following preliminary RAOs were identified for soil contamination based on human health (future worker) risks associated with future land use conditions:

- Prevent exposures to human receptors to contaminants in soil resulting in cancer and noncancer health hazard in excess of EPA's acceptable risk range; and

- Manage the Site in a manner to minimize exposure of ecological receptors to COCs that would result in a HQ greater than 1.

Preliminary Remediation Goals

The development of PRGs is a requirement of the NCP (40 CFR 300.430(e)(2)(i)). Identification and selection of the PRGs are typically based on RAOs, the current and anticipated future land uses, and the tentatively identified ARARs. The PRGs are typically presented as chemical- and media-specific values that directly address the RAOs. These values are typically used as a preliminary value in the FS to guide evaluations of remedial alternatives.

There are no promulgated federal or commonwealth, chemical-specific ARARs for soil. Therefore, risk-based soil PRGs were calculated for the industrial exposure scenario based on a $1x10^{-6}$ cancer risk and for a noncancer target hazard quotient of 1 taking into account the anticipated future land use. For arsenic, the statistical calculation of the concentrations of arsenic in non-Site (background) soil has been adapted as the PRG.

PRGs for Contaminants of Concern in Soil (all concentrations in mg/kg)	
Contaminants of Concern	**Remediation Goal**
Dieldrin	0.14
2,3,7,8-TCDD TEQ	2.2×10^{-5}
Arsenic	41.5

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA § 121(d), 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4).

The timeframes presented below for each alternative reflect only the time required to construct or implement the remedy and do not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

The cost estimates, which are based on available information, are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual cost of the project.

Based on a screening of alternatives developed in the FS, several alternatives (FS Alternatives 2, 3, 4 and 7) were not carried forward to the Proposed Plan. Please refer to the FS report for more information on these alternatives.

The following alternatives are considered in this Proposed Plan:

Alternative 1: No Action

Capital Cost	$ 0
Present Worth O&M Cost	$ 0
Total Present Worth Cost	$ 0
Construction Time Frame	N/A
Timeframe to meet RAOs	N/A

Alternative 1 is required by the NCP to provide an environmental baseline against which impacts of various other remedial alternatives can be compared. No removal and/or remedial activities would be initiated at the Site to address contaminated soil above PRGs or otherwise mitigate the associated risks to human health from exposure to soil contamination above PRGs.

Alternative 2 (former 5 in the FS): Excavation of Contaminated Soil to 10 feet bgs, Onsite Treatment and Offsite Disposal, Covering of Remaining Contaminated Subsurface Soil, and Institutional Controls

Capital Cost	$17,265,000
Present Worth O&M Cost	$316,000
Total Present Worth Cost	$17,581,000
Construction Time Frame	One year
Timeframe to meet RAOs	One year

Under Alternative 2, contaminated soil in concentrations exceeding PRGs in the upper 10 feet would be excavated and excavated contaminated soil containing RCRA characteristic hazardous waste would be stockpiled on Site and thermally treated ex situ prior to disposal at a RCRA Subtitle D landfill on the island.

Ex situ thermal desorption uses heat and vacuum extraction to mobilize and remove contaminants from soil. Thermal conducting heating wells would be placed in a grid-like pattern within the soil stockpile. The TCH wells heat the soil to the target temperature as measured by thermocouples placed throughout the stockpile. At the target temperature, the contaminant's vapor pressure and diffusivity increase, and its viscosity decreases. As a result, the evaporation rate and mobility of the contaminant is increased, and contaminants and water contained in the soil are vaporized. Soil vapor extraction wells placed in the stockpile would be used to remove the soil vapor steam. The extracted off-gas and water are treated through vapor and liquid treatment systems.

The total targeted volume of contaminated soil to be excavated under Alternative 2 is approximately 14,100 cubic yards (CY). The footprint of the excavation would require that the remaining dilapidated buildings onsite be demolished. Additionally, Site data suggests that contamination is likely beneath the building slab. Based on the RI sample results, an estimated 3,900 CY of the excavated material contains pesticide and dioxin contaminant concentrations, requiring treatment to meet land disposal requirements prior to disposal at a RCRA Subtitle D landfill on the island. An estimated 1,410 CY of the excavated material could contain chromium contaminant concentrations requiring treatment and disposal as a RCRA characteristic hazardous waste at a facility in the continental United States. Additional sampling in the design will confirm this.

Contaminant concentrations that exceed PRGs at depth would be covered with a wire mesh, permeable plastic barrier would be installed as a warning that digging lower would result in possible exposure to contaminated soils. The total area of contaminated soil remaining after excavation to 10 feet bgs under this alternative is approximately 5,300 square feet. Clean fill and 6-inch topsoil would be used to replace soil removed after excavation. After the topsoil is placed, the area would be seeded to establish vegetation to restore the area.

This alternative is expected to remove ninety percent of the contamination exceeding PRGs. Because unexcavated and deeper soils (below 10 feet) would remain at levels that would not allow for unrestricted (i.e., residential) use, institutional controls would restrict the future use of the soil at the Site to nonresidential uses.

The wells at the Site will be protected and repaired during construction, as well as sampled, if necessary, to prevent impacts to groundwater.

Alternative 2 would require five-year reviews as required by CERCLA since contaminated soil at concentrations exceeding an unlimited use/unrestricted exposure scenario would remain on Site. Five-year site reviews would evaluate whether adequate protection of human health is provided since contaminated soil would remain above PRGs at depth at the Site.

Alternative 3 (former 6 in the FS): Onsite Consolidation with Engineered Cover, Institutional Controls, and Monitoring

Capital Cost	$2,599,000
Present Worth O&M Cost	$316,000

Total Present Worth Cost	$2,915,000
Construction Time Frame	One year
Timeframe to meet RAOs	One year

Alternative 3 provides protection of human health through institutional controls (administrative and access controls) coupled with remedial action (excavation, consolidation, multi-layer geosynthetic cover construction, and vegetative cover) to limit exposure to contaminants. Under this alternative, all contaminated soil in concentrations greater than PRGs outside the boundaries of the consolidation area would be excavated for consolidation and covering.

Excavated areas would be backfilled with clean fill. The total targeted volume of contaminated soil to be excavated and consolidated at the Site under Alternative 3 is approximately 9,800 CY.

The existing structures and concrete slabs at the Site would be demolished and removed to enable construction of the consolidation area. Additionally, Site data suggests that contamination is likely beneath the building slab. A multi-layer geosynthetic cover would be constructed over the consolidated material to mitigate unacceptable exposure risks to humans. The estimated extent for the consolidation area under Alternative 3 is approximately 61,900 square feet, which is slightly smaller than the Site property area because the consolidation area is not in the excavation area. The consolidated mound would be roughly 10 feet in height. The wells at the Site will be protected and repaired during construction, as well as sampled, if necessary, to prevent impacts to groundwater.

Institutional controls would involve administrative and legal measures (e.g., land use restrictions) and/or informational measures (e.g., community awareness activities) intended to inform the public of risks and control activities or uses of contaminated soil at the Site that could pose a risk to human receptors above PRGs and to safeguard the integrity of this alternative.

A long-term inspection and maintenance program would be developed to ensure the engineered cover would provide continued protection to human health. Inspections may be scheduled annually and following each severe storm event. Inspections would monitor the vegetation, erosion, and any damage by animals. If erosion or damage to the engineered cover is observed, actions would be taken to repair the damage and maintain the integrity of the engineered cover.

Alternative 3 would require five-year reviews as required by CERCLA since contaminated soil at concentrations exceeding an unlimited use/unrestricted exposure scenario would remain on site. Five-year site reviews would evaluate whether adequate protection of human health is provided since contaminated soil would remain above PRGs at the Site. Site monitoring (consisting solely of non-intrusive visual inspections) also would be conducted only as necessary to complete the five-year site reviews.

Alternative 4 (former 8 in the FS): Excavation of Contaminated Soil, Onsite Treatment, and Offsite Disposal

Capital Cost	$18,217,000
Present Worth O&M Cost	$230,000
Total Present Worth Cost	$18,447,000
Construction Time Frame	One year
Timeframe to meet RAOs	One year

Alternative 4 is similar to Alternative 2, with the exception that contaminated soil would be excavated to a depth of 20 feet bgs. Alternative 4 assumes that excavated contaminated soil containing pesticide-containing RCRA characteristic hazardous waste would be stockpiled on site and thermally treated to be "de-characterized" prior to disposal at a RCRA Subtitle D landfill on the island. Additional sampling in the design will confirm this.

The total targeted volume of contaminated soil to be excavated under Alternative 4 is approximately 15,200 CY. An estimated 3,900 CY of the excavated material contains pesticide and dioxin contaminant concentrations requiring treatment to meet land disposal requirements prior to disposal at a RCRA Subtitle D landfill on the island. Based on the RI sample results, an estimated 1,520 CY of the excavated material would contain chromium contaminant concentrations requiring treatment and disposal as a RCRA characteristic hazardous waste at a facility in the continental United States. The footprint of the excavation would require that the remaining dilapidated buildings onsite be demolished. Additionally, Site data suggests that contamination is likely beneath the building slab.

The wells at the Site will be protected and repaired during construction, as well as sampled, if necessary, to prevent impacts to groundwater.

Alternative 4 would require five-year reviews as required by CERCLA since contaminated soil at concentrations exceeding an unlimited use/unrestricted exposure scenario would remain on site. Five-year site reviews would evaluate whether adequate protection of human health is provided since nonresidential PRGs are being applied to the Site.

NINE EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall protection of human health and the environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative would meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes and other requirements that pertain to the site, or provide grounds for invoking a waiver.
Long-term effectiveness and permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies an alternative may employ.
Short-term effectiveness considers the period of time needed to implement an alternative and the risks the alternative may pose to workers, residents, and the environment during implementation.
Implementability is the technical and administrative feasibility of implementing the alternative, including the availability of materials and services.
Cost includes estimated capital and annual operation and maintenance costs, as well as present-worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Commonwealth acceptance considers whether the Commonwealth (the support agency) concurs with, opposes, or has no comments on the preferred alternative.
Community acceptance will be assessed in the ROD and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Comments received on the Proposed Plan are an important indicator of community acceptance.

EVALUATION OF REMEDIAL ALTERNATIVES

These criteria were developed to address statutory requirements and considerations for remedial actions per the NCP and additional technical and policy considerations that have proven to be important for selecting among remedial alternatives (EPA 1988). The following subsections describe the nine alternative evaluation criteria used in the detailed analysis of remedial alternatives and the priority in which the criteria are considered.

Overall Protection of Human Health and the Environment

Of the four retained alternatives, only the no action alternative (i.e., Alternative 1) would fail to provide protection for human health (future resident or worker) and would not address the RAOs for contaminated soil.

Alternatives 2, 3, and 4 would be protective of human health and the environment. Alternative 2 achieves the soil RAOs through excavation of contaminated soil exceeding PRGs to a depth of 10 feet, treatment of excavated soil as needed, and backfilling with a demarcation barrier, clean fill and topsoil over the remaining contaminated soil. Alternative 3 achieves soil RAOs through consolidation and containment (capping) of contaminated soil. The cap would provide a barrier that would break the exposure pathway to human receptors. Alternative 4 achieves soil RAOs through excavation, treatment as needed, and off-site disposal of contaminated soil exceeding PRGs to a depth of 20 feet.

Compliance with ARARs

Key location- and action-specific ARARs apply to the management and disposal of wastes generated from remediation of contaminated soil at the Site. ARARs pertaining to waste management and disposal focuses on characteristic hazardous waste that may be present in contaminated soils generated (i.e., excavated or extracted) during remediation of soil contamination.

Alternative 1 would not achieve the ARARs since no remedial action would be taken to remove or treat the contaminated soil. The remaining alternatives, Alternatives 2, 3, and 4, would achieve PRGs by removal, containment, or treatment of contaminated soil. Alternatives 2, 3, and 4 would be implemented to comply with action- and location-specific ARARs.

Long-Term Effectiveness and Permanence

Alternative 1 fails to provide long-term effectiveness and permanence since no remedial action is taken. Alternative 3 provides protection by preventing human exposure to contaminated soil through an engineered cover. However, under this alternative, soil contamination is left in place and the remedy would require long-term maintenance to ensure protectiveness. Additionally, this alternative would result in a 10-foot mound being created in a generally flat area, which could result in drainage concerns. Contaminated soil left on-site beneath the cap and could pose an exposure risk to human receptors if the covers were compromised. Institutional controls would be implemented to protect the covers and restrict future land uses and provide awareness of risks from potential exposure to contaminated soil above site-specific levels of concern.

Alternative 2 includes excavation of contaminated soil exceeding PRGs to a depth of 10 feet and covering of remaining contaminated soil. Alternative 4 would excavate contaminated soil to a depth of 20 feet and would not require any cover of remaining contaminated soil. Under Alternatives 2 and 4, pesticide-related RCRA characteristic hazardous waste would be thermally treated on-site before being transported to the RCRA Subtitle D landfill on the island of Puerto Rico for disposal. Disposal of contaminated soil exceeding PRGs but not containing RCRA characteristic hazardous waste could be disposed of at the RCRA Subtitle D landfill on the island of Puerto Rico. Contaminated soil and thermally treated soil with chromium concentrations considered a RCRA characteristic hazardous waste would be disposed of at a permitted treatment and disposal facility in the continental United States.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 1 fails to provide a reduction of toxicity, mobility, or volume through treatment since treatment is not a component of these alternatives.

Alternative 3 does not satisfy the statutory preference for treatment as a principal element of the remedial action, as no active treatment remedy would be performed.

Alternatives 2 and 4 include thermal treatment of excavated contaminated soil considered characteristic hazardous waste to meet land disposal requirements prior to disposal in a RCRA Subtitle D landfill on the island of Puerto Rico. However, contaminated soil and thermally treated soil with chromium concentrations considered a RCRA characteristic hazardous waste would be containerized and shipped to the continental United States for treatment (solidification/ stabilization) and disposal. Since Alternative 2 leaves some contamination below ten feet. Therefore, this alternative only partially meet a reduction of toxicity, mobility, or volume through treatment.

Short-Term Effectiveness

Alternative 1 would not pose short-term risks to the community, and there would be no adverse environmental impacts; however, protection in a reasonable time frame would not be achieved under this alternative.

Alternatives 2, 3, and 4 would involve surface disturbance of contaminated soil and transport of clean soil for backfill or construction of covers. Alternatives 2 and 4 would include transportation of excavated contamination for off-site disposal. Unlike Alternative 3, Alternatives 2 and 4 would require installation of power lines and high energy usage, which could pose additional short-term impacts to the environment.

Under all three alternatives, site workers would follow approved health and safety plans and would wear appropriate personal protective equipment to minimize exposure to contamination and as protection from physical hazards. There would also be the potential for increased local traffic. The dust-related impacts would be mitigated through the implementation of decontamination measures and dust suppression practices. A traffic control plan would be implemented to reduce the potential for traffic accidents.

Implementability

Since no remedial action is taken under Alternative 1, this alternative would be the easiest to implement, both technically and administratively.

Alternative 3 uses standard construction techniques, practices, and materials for cap construction; would not require management of RCRA characteristic hazardous waste; and would not require installation and operation of a thermal treatment system.

Alternatives 2 and 4 would require mobilization of a thermal remediation treatment system to the island of Puerto Rico. These alternatives would include excavation, stockpiling and treating hazardous waste, and disposal of treated and nonhazardous contaminated soil at the RCRA Subtitle D landfill. However, contaminated soil and thermally treated soil with chromium concentrations considered a RCRA characteristic hazardous waste would be containerized and shipped to the continental United States for treatment (solidification/stabilization) and disposal.

Cost

Present value costs for all alternatives were evaluated over a 30-year period using a seven percent discount rate. The costs for these alternatives are summarized in following table:

Alt	Capital Cost / $	Present Worth O&M Cost / $	Total Present Worth Cost / $
1	0	0	0
2	$17,265,000	$ 316,000	$17,581,000
3	$ 2,599,000	$ 316,000	$ 2,915,000
4	$18,217,000	$ 230,000	$18,447,000

Commonwealth/Support Agency Acceptance

The PRDNER concurs with the Preferred Alternative.

Community Acceptance

Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Responsiveness Summary section of the ROD for this Site. The ROD is the document that formalizes the selection of the remedy for a site.

PREFERRED ALTERNATIVE

EPA's Preferred Alternative is Alternative 2: excavation of contaminated soil to 10 feet bgs, onsite treatment and offsite disposal, covering of remaining contaminated subsurface soil with a demarcation barrier, clean fill and topsoil, and Institutional Controls.

The Preferred Alternative would treat soil with RCRA hazardous characteristics using thermal treatment, using a temporary treatment unit brought to the Site. The total targeted volume of contaminated soil to be excavated under this Alternative is approximately 14,100 CY. Based on the RI sample results, an estimated 3,900 CY of the excavated material contains pesticide and dioxin contaminant concentrations requiring treatment to meet land disposal requirements prior to disposal at a RCRA Subtitle D landfill on the island. An estimated 1,410 CY of the excavated material would contain chromium contaminant concentrations requiring treatment and disposal as a RCRA characteristic hazardous waste at a facility in the continental United States.

Because unexcavated soils and those below 10 feet bgs would remain covered at levels that would not allow for unrestricted (i.e., residential) use, institutional controls would restrict the future use of the soil at the Site to nonresidential uses. The estimated present-worth cost of the preferred alternative is $17,581,000.

This remedy also includes reviews every five years to assure the long-term protectiveness of the remedy.

Basis for Remedy Preference

The Preferred Alternative is believed to provide the best balance of tradeoffs among the alternatives based on the information available to EPA at this time. EPA and PRDNER believe that the Preferred Alternative would be protective of human health and the environment, comply with ARARs, be cost-effective and utilize permanent solutions and alternative treatment technologies. It will require less long-term maintenance than Alternative 3 and will not result in a 10-foot mound being placed in a generally flat area, which could result in drainage concerns. Additionally, Alternative 2 will allow the Site to be returned to commercial use at a lower cost than Alternative 4.

The environmental benefits of the preferred alternative may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy.[1] This would include consideration of green remediation technologies and practices.

The EPA and PRDNER expect the preferred alternative to satisfy the following statutory requirements of CERCLA Section 121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element. EPA will assess the modifying criteria of community acceptance in the ROD following the close of the public comment period.

[1]https://www.epa.gov/greenercleanups/epa-region-2-clean-and-green-policy

COMMUNITY PARTICIPATION

EPA and PRDNER provide information regarding the cleanup of the site to the public through meetings, the Administrative Record file for the site, and announcements published in the local newspaper. EPA and PRDNER encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted there.

EPA, in consultation with PRDNER, will select the final remedy for the site after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with PRDNER, may modify the preferred alternative or select another action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all alternatives presented in this document.

The dates for the public comment period; the date, location, and time of the public meeting; and the locations of the Administrative Record files are provided on the front page of this Proposed Plan.

For further information on the Pesticide Warehouse I Superfund Site, please contact:

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Written comments on this Proposed Plan should be submitted on or before August 29, 2020 to Mr. Luis Santos at the address or email below.

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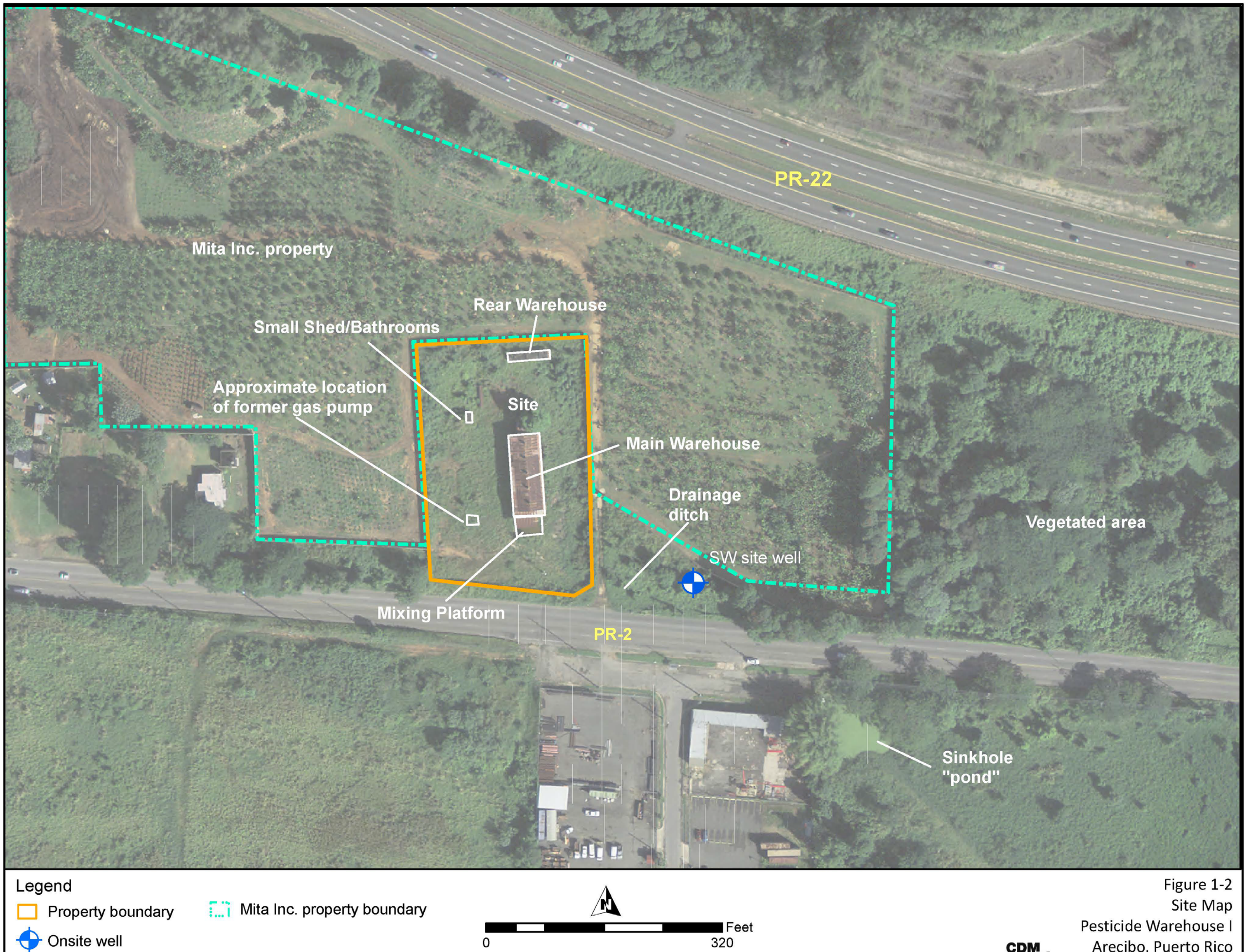
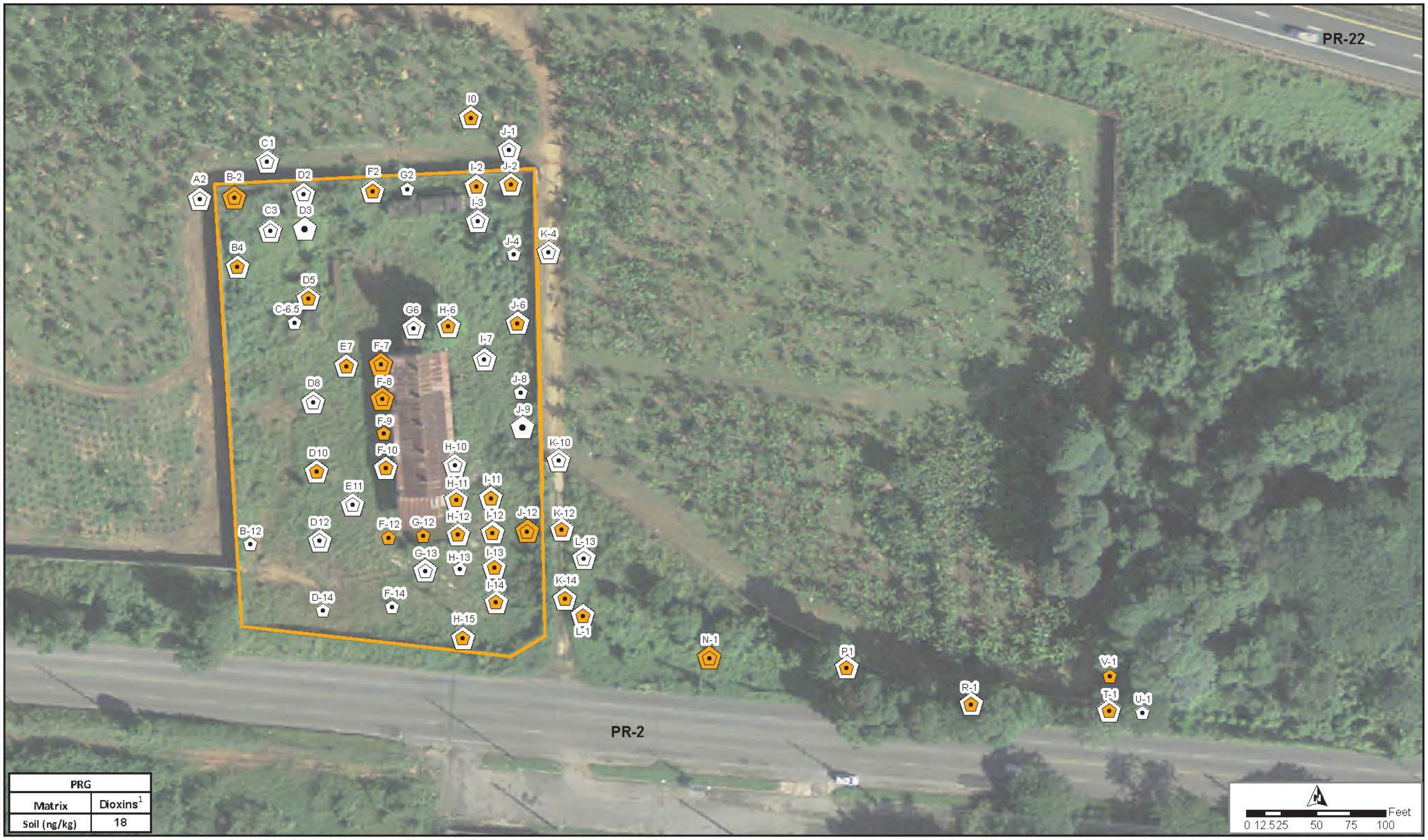


Figure 1-2
Site Map
Pesticide Warehouse I
Arecibo, Puerto Rico



Legend

Surface sample (0-2 ft bgs) location

Subsurface sample (4-6 ft bgs) location

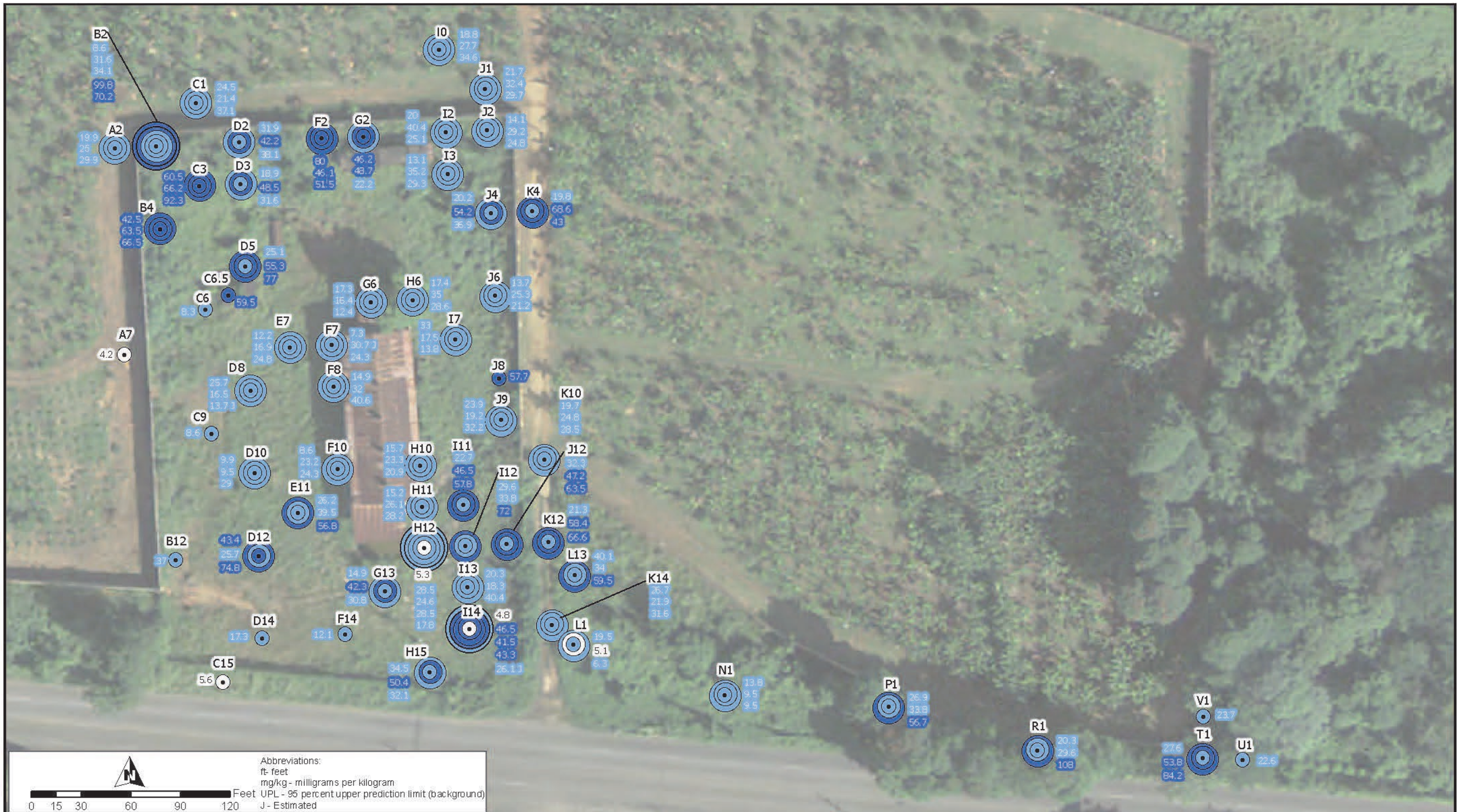
TEQ does not exceed the preliminary remediation goal (PRG)

TEQ exceeds PRG

Notes:
1 - Dioxin/furans toxic equivalent quotient (TEQ) value
all concentrations are in nanogram per kilogram (ng/kg)

Figure 2-8
Dioxin/Furans TEQs Distribution in Soils (PRG)
Pesticide Warehouse I
Arecibo, Puerto Rico

CDM Smith



Legend

- Arsenic was either not detected or below screening 5.8 mg/kg criteria
- Arsenic screening criteria was exceeded at any interval
- Arsenic UPL of 41.5 mg/kg was exceeded at any interval

- Sampling location from 0-2 feet (ft)
- Sampling location from 4-6 ft
- Sampling location from 8-10 ft
- Sampling location from 12-14 ft
- Sampling location from 18-20 ft

I14 Analytical results in mg/kg
4.8 at 0-2 ft
46.5 at 4-6 ft
41.5 at 8-10
43.3 at 12-14
26.1 J at 18-20 ft

Note:
Regional Screening Levels for Arsenic for residential soil, based on a cancer risk of $1x10^{-6}$ (0.68 mg/Kg) is not shown because all detections exceed this value.

Figure 2-9
Arsenic Soil Results
Pesticide Warehouse I
Arecibo, Puerto Rico

CDM Smith

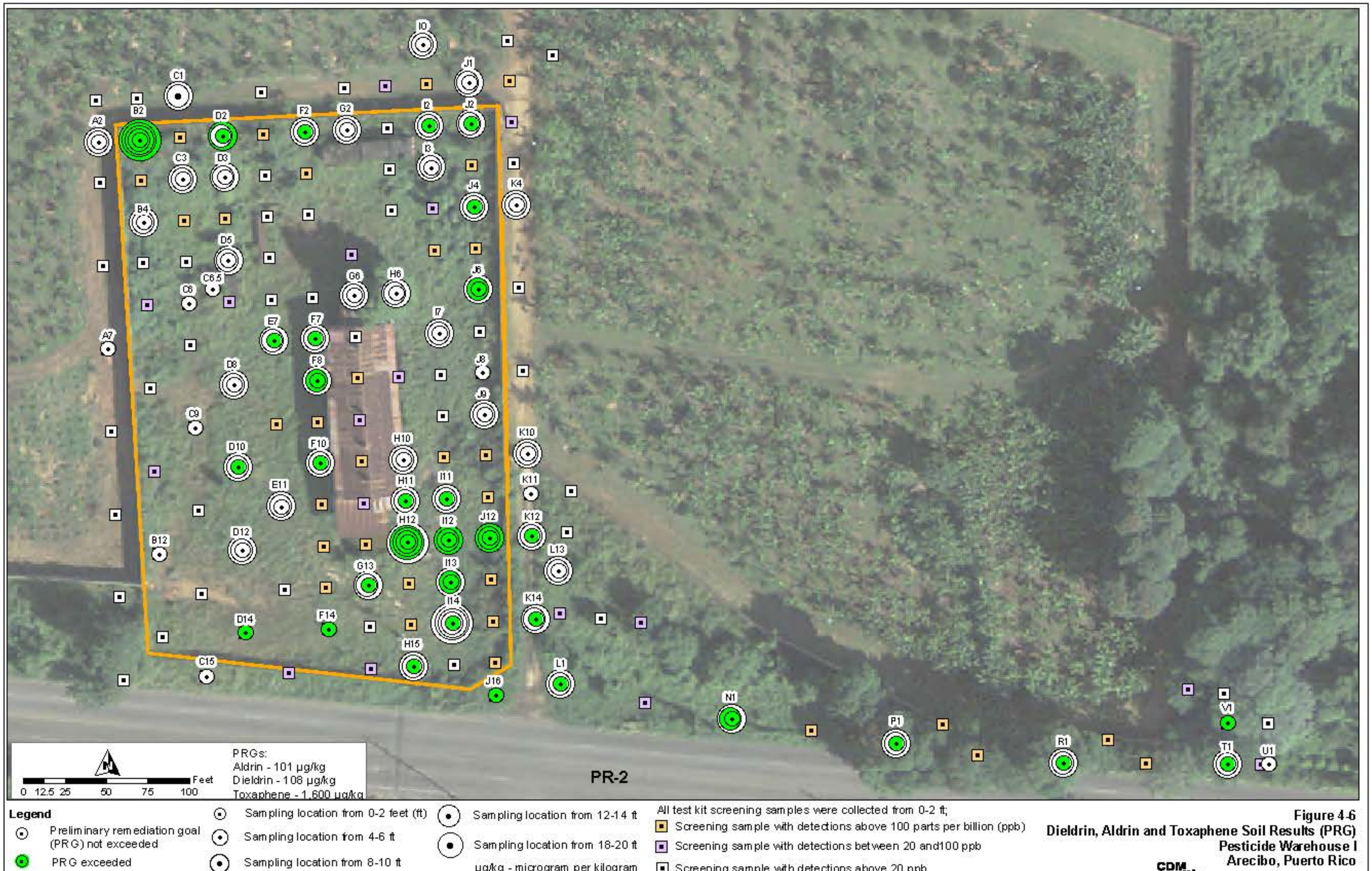


Figure 4-6
Dieldrin, Aldrin and Toxaphene Soil Results (PRG)
Pesticide Warehouse I
Arecibo, Puerto Rico