Comprehensive Long-Term Environmental Action Navy (CLEAN) II
Contract No. N62742-94-D-0048
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Basis of Design for Thermal Desorption Treatment Site

Former Naval Air Station Barbers Point, Oahu, Hawaii

Prepared for

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CO	carbon monoxide
CTO	Contract Task Order
Cy	cubic yard
GAC	granular activated carbon
Hr	hour
$\mu g/m^3$	micrograms per cubic meter
mg/kg	milligrams per kilogram
ml	milliliters
NAS	Naval Air Station
NCTAMS PAC	Naval Computer and Telecommunications Area Master Station Pacific
NO_2	nitrogen dioxide
NRTF	Naval Radio Transmitting Facility
PACNAVFACENGCOM	Pacific Division, Naval Facilities Engineering Command
PCB	polychlorinated biphenyl
PHNC	Pearl Harbor Naval Complex
PM	particulate matter
ppb	part per billion
ppm	part per million
PWC	Public Works Center
RA	removal action
RAC	Remedial Action Contract
SO_2	sulfur dioxide
tbd	to be determined
TCDD	tetrachlorodibenzodioxin
TPH	total petroleum hydrocarbon

1. INTRODUCTION

This report discusses the basis for design of the treatment site for the thermal desorption system that will treat primarily polychlorinated biphenyl (PCB)-contaminated soil from the Naval Computer and Telecommunications Area Master Station Pacific (NCTAMS PAC), former Naval Air Station (NAS) Barbers Point, and Pearl Harbor Naval Complex (PHNC) on the island of Oahu, Hawaii. This report has been prepared for the Pacific Division, Naval Facilities Engineering Command (PACNAVFACENGCOM), under Comprehensive Long-Term Environmental Action Navy (CLEAN) II Contract No. N62742-94-D-0048, Contract Task Order (CTO) 0004. This report provides the rationale that was used to develop the drawings and performance specifications for the treatment site (see Attachments 1 and 2).

The Navy has conducted several removal actions and other field activities (RAs) at various sites that involved the soil to be treated. These activities are described in the engineering evaluation/cost analysis (Earth Tech 2000) of treatment and disposal alternatives for contaminated soil. Soil contaminated with PCBs, polynuclear aromatic hydrocarbons, and chlordane has been excavated from various sites within the three Naval facilities. A portion of the soil also contains total petroleum hydrocarbons (TPH) as diesel and motor oil at concentrations exceeding the treatment criteria identified for the treatment system. The excavated soil from NCTAMS PAC is currently stored in a soil stockpile adjacent to Building 81 at Naval Radio Transmitting Facility (NRTF) Lualualei. The excavated soil from former NAS Barbers Point and PHNC is currently stored separately at two temporary stockpile facilities in the western part of former NAS Barbers Point (see design drawings).

The scope of the RA will be to treat contaminated soil to specific treatment criteria using a thermal desorption process. Any concrete or asphalt mixed with the soil will also be treated. The thermal desorption process will heat the soil to transfer the organic contaminants to the gas phase. Organic vapors will then be treated by a granular activated carbon (GAC) adsorption system. Treatment by thermal desorption will allow for reuse of the soil.

The work will include furnishing all labor, materials, and equipment for the following:

- Clear and grub brush and debris at the designated work areas and the coral pit located to the south of the treatment area.
- Verify the location and status of subsurface utilities that may be affected by construction.
- Backfill an existing abandoned concrete utility trench at the site.
- Grade the site and establish drainage control measures that will remain in place throughout the duration of construction and treatment.
- Install a temporary fence.
- Construct areas for preparation, treatment, and interim staging of treated soil.
- Construct access roadways and entrances.
- Construct temporary stockpile laydown areas (segregated into daily batches) for treated soil that is pending confirmational analysis.
- Mobilize treatment equipment to the site.
- Set up the treatment system.
- Connect the treatment unit to utilities.

- Start up, shakedown, and test the treatment system.
- Conduct a 3-day demonstration test of the system.
- Treat the contaminated soil using thermal desorption.
- Stage treated soil in temporary stockpiles.
- After analytical results confirm that the soil has been treated to cleanup criteria, place soil in adjacent coral pit located south of the treatment area.
- If treated soil does not meet the cleanup criteria for any of the known contaminants, retreat the soil batch using thermal desorption.
- After all contaminated soils have been treated, sample and analyze underlying soil at all former stockpile locations, and underlying sand and base course at the soil preparation area and the interim stockpile area; treat contaminated soils by thermal desorption if contaminants are detected.
- Place treated soil in the coral pit south of the treatment area.
- Sample and decontaminate (if required) the treatment system pad; decontaminate and all equipment.
- Dispose of all treatment waste products at appropriate disposal facilities.
- Demobilize equipment and conduct final site cleanup.
- Remove temporary fencing.
- Perform incidental related work.

This report discusses the design basis for the treatment site, the necessary preparation activities, the general site layout and grading plan, and general requirements for the air monitoring program, soil sampling, and waste disposal. Specific information regarding the transportation of soil to the treatment site, operation of the treatment equipment, sampling and analysis, and waste disposal will be included in the Remedial Action Contract (RAC) contractor's final work plan.

2. LAYOUT OF TREATMENT SITE

The area directly south of the former NAS Barbers Point temporary stockpile facility was chosen as the site for treatment of PCB-contaminated soils based on (1) the minimal effort required for site preparation, (2) the availability of water service, (3) the accessibility of the site, (4) the minimal impact on facility operations and surrounding communities, and (5) site security (Earth Tech 2000). The available area is approximately 480 feet by 550 feet and is bounded on the north by the existing temporary stockpiles, on the west by kiawe brush, on the east by a dirt road, and on the south by kiawe brush and an open coral pit (see the design drawings).

The area chosen for the treatment site has been partially cleared. The cleared portion currently contains some piles of brush and debris, a 7-foot-deep concrete utility box approximately 190 feet long, and piles of uncontaminated fill. The ground slopes toward the western end of the site. Water is available on site from two risers on a centrally located water main.

The treatment site will include locations for (1) delivery and preparation of contaminated soil, (2) the treatment system, and (3) interim staging for treated soil pending confirmation that treatment criteria have been met. Parking, temporary office, lunchroom, and maintenance facilities will be

located northeast of the former NAS Barbers Point temporary stockpile facility (see the design drawings).

2.1 THERMAL DESORPTION TREATMENT SYSTEM

This design documents are intended to guide the RAC contractor in the basis for the treatment site, necessary preparation activities, general site grading and layout, and general requirements for sampling. The RAC contractor will provide specifics for the treatment system and system operation. The information contained in this report concerning the specific installation and operation of the treatment system has been obtained from the draft RAC contractor work plan and is provided for reference only. The thermal desorption treatment system will be located south of the former NAS Barbers Point temporary stockpile facility and north of the concrete utility trench near the center of the site. The thermal desorption system will consist of an indirectly heated rotary kiln to heat the soil and transfer organic contaminants to a vapor-phase stream. The vapor will be drawn through the system and treated by GAC adsorption units. The GAC adsorption system will include vapor-phase units that contain 16,000 pounds of carbon and liquid-phase units that contain 8,000 pounds of carbon. The GAC beds will be arranged in series, and although it is anticipated that they will not experience breakthrough, the GAC beds will be situated so that they are easily accessible by semitrailer to facilitate a potential carbon changeout. The GAC beds will be placed on a foundation that will support their weight. The areas underlying the existing soil stockpiles awaiting treatment are lined and bermed. Compacted base course and an impermeable liner with surrounding berms will be installed in the areas of the soil delivery and preparation area, and the post-treatment stockpiles. A curbed concrete pad will be constructed for operation of the treatment system. Details of the treatment site layout are included in the design drawings. After all of the contaminated soil has been treated, the concrete will be sampled and, upon verification that the treatment criteria are not exceeded, will be demolished and placed in the coral pit located south of the treatment area. If concentrations exceed the treatment criteria, the concrete will be cleaned, demolished, and then placed in the coral pit. The soil underlying the existing stockpiles, and the base course and sand at the soil delivery and preparation area, and post-treatment stockpile areas, will be sampled and analyzed to determine if the area has been contaminated as a result of operations. If sampling indicates that soil has been contaminated, that area will be removed and treated by the thermal desorption system. The liners will also be removed and disposed of off-site at an approved facility. Any soil that is found to be contaminated and cannot be treated by the thermal desorption system will be disposed of off-island; however, this outcome is not anticipated. In addition, the base course and sand in the area of the post-treatment stockpiles will only require testing if any treated soil stockpile exceeds the treatment criteria.

Treated soil, sand, base course, and concrete rubble will be placed in the coral pit south of the treatment area once laboratory analysis confirms all criteria have been met. The thermal desorption system is expected to treat approximately 7 tons of contaminated soil per hour and will operate 24 hours per day. The system will use approximately 3,500 to 6,000 gallons per day of No. 2 diesel fuel. Fuel will be stored in double-walled tanks or fuel trailers on the treatment system pad. A road will be constructed to the treatment system pad to provide access for a semitrailer for carbon changeout and fuel trucks for fuel delivery or fuel trailer changeout. The treatment system requires 8 gallons per minute of cooling water that will be evaporated. This water will be piped from the existing water main, located centrally on site, to temporary storage tanks. Electricity will be provided by a primary 2000 kilovolt-amp, diesel-powered generator with an emergency backup generator available.

2.2 SOIL PREPARATION AREA

The soil preparation area, including a crusher and screen, a blended stockpile of a week's quantity of contaminated soil, a delivery truck decontamination area, and space for equipment to unload and transfer soil, will be located west of the treatment system and south of the soil delivery access road. Federal regulations (40 Code of Federal Regulations [CFR] 761.65 (c)(9)) require that temporary stockpiles of contaminated soil be established on an impermeable barrier. Because contaminated soil will be piled, transported, crushed, and blended in the preparation area, the entire preparation area will be constructed on an impermeable barrier and layers of compacted base course and sand. An impermeable, chemical resistant liner will be laid over a 3-inch-thick layer of sand. A second 3-inch-thick layer of sand will then be placed over the liner, followed by a geotextile liner and completed with a 6-inch thick layer of base course. Potentially contaminated base course and sand will be removed, tested, and treated if necessary by the thermal desorption system at the end of the treatment program.

Haul trucks bringing contaminated soil to the preparation area will be routed and emptied to avoid cross contamination of truck tires and to minimize decontamination requirements. The decontamination area will be graded so that decontamination water drains to a lined collection sump. If decontamination water accumulates, it will be used to control dust from the stockpiles of contaminated soil.

Soil will be crushed to 1-inch minus diameter with a coral crusher. Soil to be treated will be blended in weekly portions of approximately 1,000 tons (700 cubic yards [cy]) in the blending area. Blending the soil will minimize differences in concentrations of PCB contamination and will enable the treatment equipment to operate at a uniform throughput. Field test kits will be used to verity that feed soil concentrations are between 1 part per million (ppm) and 100 ppm. The weekly blended stockpile will be approximately 60 feet wide, 110 feet long, and 8 feet tall and situated such that the loaders can mix soil along all four sides of the stockpile.

The preparation area will be bermed to prevent contaminated soil or water from migrating from the preparation area. A run-on control system will be constructed to collect and control the volume of water that results from a 24-hour, 25-year storm, preventing the flow of water onto the blending area. Data from the National Weather Service indicate that rainfall for a 25-year storm at former NAS Barbers Point is 10 inches in 24 hours. The peak rate of runoff was calculated using the Rational Method. The calculations are shown below:

$Q = CC_fiA$
$Q = 0.4 * 1.1 * 0.417 * 6.06$
$Q = 1.1$ cubic feet per second (cfs)

Q = peak rate of runoff
C = runoff coefficient (0.4 for a flat, residential area with impervious soil)
C_f = Frequency factor (1.1 for 25-year storm)
i = intensity (10 inches/24 hours)
A = acres (6.06 acres)

The runoff coefficient selected is comparable for the surface of the treatment site of compacted base course with no vegetation. Measures to control fugitive dust, such as watering the soil and covering the weekly stockpile with a liner as much as feasible, will be used to control airborne particulates.

2.3 INTERIM STAGING AREA FOR TREATED SOIL

Each day's quantity of treated soil will be held in an individual temporary stockpile where the soil will be sampled for laboratory analysis. Soil will be staged in daily stockpiles to minimize the amount that would require retreatment if treatment criteria are not met. Treated soil will remain in the interim staging area until laboratory analysis confirms that all treatment criteria have been met; then it will be transported and placed in the coral pit located to the south of the treatment area.

The interim staging area for the treated soil will be located south of the treatment system and west of the Navy Public Work Center's (PWCs) road. Ten daily stockpiles will be constructed. Ten days will allow for sample shipping time, a 5-workday turnaround for analytical results from the laboratory, and time to transport and place treated soil in the coral pit. Each daily stockpile will have a capacity of about 150 tons (100 cy) of soil. Stockpiles will be about 50 feet long, 30 feet wide, and 2 feet deep with precast concrete traffic barriers on three sides. The entire lined interim staging area will be approximately 150 by 140 feet. A liner will be constructed throughout the entire interim storage area; the liner will be constructed in the same manner as the soil preparation area. An impermeable, chemical resistant liner will be laid over a 3-inch-thick layer of sand. A second 3-inch-thick layer of sand will then be placed over the liner, followed by a geotextile liner and completed with a 6-inch thick layer of base course. Berms will be installed around the areas to divert off-site runoff and to capture runoff from the contaminated soil. Stockpiles will be covered with 10-mil polyethylene sheeting to control fugitive dust. Run-on will be diverted around the stockpile area. The open end of the stockpiles will be at the lowest elevation and will drain to lined collection sumps to prevent potentially contaminated water from washing off site.

2.4 TEMPORARY FACILITIES AREA

The parking, administrative, lunchroom, and maintenance trailers will be located northeast of the former NAS Barbers Point temporary stockpile facility, outside of the fenced treatment site. A pedestrian gate will provide access to the site for foot traffic.

3. SITE PREPARATION

The site will be prepared before treatment equipment is mobilized to the site. Preparation will include clearing and grubbing of treatment site, clearing, and grubbing of the coral pit and preparing the pit for receipt of treated soil, disposing of rubble and debris at a municipal landfill, disposing of green waste at the PWC composting operation adjacent to the treatment site (if approval is granted by PWC), verifying the location and status of subsurface utilities, building access entrances and roads, backfilling the concrete utility trench located on the site, placing compacted base course or compacted rock on portions of the site, constructing the feed soil and soil preparation areas, constructing a concrete treatment pad, building an interim staging area, grading the site, constructing a drainage system for the site, and fencing the site.

3.1 CLEARING AND GRUBBING

The RAC contractor will verify the location and status of all subsurface utilities before site work begins. A majority of the site south of the concrete utility trench has already been cleared of brush and is covered with piles of uncontaminated fill provided by PWC. The area between the utility trench and the former NAS Barbers Point temporary stockpile facility contains live brush and several piles of brush and debris. To prepare the site for use, the concrete utility trench will be filled with uncontaminated fill, and the area between the trench and the former NAS Barbers Point temporary stockpile facility will be cleared of brush and debris. In addition, brush and trees will be cleared from all other portions of the treatment site that have not already been cleared, including the

coral pit. Rubble and debris will be disposed of at the local municipal landfill. Green waste will be taken to the PWC composting operation located adjacent to the treatment site (provided that approval is granted by PWC).

3.2 SUBGRADE PREPARATION

Piles of uncontaminated fill currently located at the site and not used to fill the concrete utility trench will be used to grade the site. The grading pattern was designed to utilize the existing grade, thereby minimizing cuts and fills. Imported fill will be used if the quantity of fill on site is insufficient. The truck decontamination, pretreatment, preparation, and interim staging areas will be lined. A concrete treatment pad will be constructed for the treatment system.

3.3 STOCKPILE AREAS

Two areas will require stockpile preparation: the weekly blending area, and the interim staging area where treated soil will be stored pending laboratory analysis. The weekly blending area and the temporary stockpiles in the interim staging area for treated soil will be placed on a foundation of sand, base course, and an impermeable barrier as described in Section 2.1 and as required by 40 CFR 761.65 (c)(9). Stockpiles will be covered as much as feasible to prevent soil from becoming airborne and will drain to sumps to prevent spreading of contaminants to other areas of the site. Berms will be constructed around the areas to divert offsite flow and to route runoff from the stockpiles to the sumps.

3.4 DRAINAGE SYSTEM

The drainage system is designed based on a 24-hour, 25-year storm (see calculations provided in Section 2.2) to capture runoff from the stockpiles and treatment area and to prevent run-on of offsite drainage. The treatment site slopes to the west. To prevent possible contamination of treated soil, uncontaminated fill will be used to grade the site. A run-on control system will be constructed to prevent the flow of water onto stockpiles and to divert the volume of water that results from the design storm.

3.5 ACCESS ROAD AND ENTRANCES

The road east of the former NAS Barbers Point temporary stockpile facility is accessible for use for the following purposes:

- Initial setup of the thermal desorption system (receipt of equipment and material)
- Delivery of diesel fuel (estimated once a day)
- Delivery of material and supplies (as needed)

An entrance to the site will be built at the northeast corner of the treatment site to allow for delivery of diesel fuel and supplies. This road will connect the road east of the site with the treatment area. Two additional entrances to the site will be built northwest of the proposed treatment system area, just north of the former NAS Barbers Point stockpile area, and will connect the treatment site with the road on the north side of the site via an access road that forms a loop traveling through the existing stockpiles area and then running parallel to the west side of the former NAS Barbers Point temporary stockpile facility. Haul trucks will enter at one entrance and exit at the other to facilitate traffic control. The access road will be a minimum of 18 feet wide and will be designed with an adequate surface for all-weather service. A drainage culvert will be installed where needed. The entrance and exit to the main road will be designed such that haul trucks can easily turn onto and off

of the main road. Water or chemicals will be used to control dust on haul roads, and haul truck beds will be covered for control of fugitive dust. Any spills will be removed promptly from the roads.

3.6 FENCING

An 8-foot-high temporary chain-link fence will surround the entire treatment and stockpiles area for the duration of treatment. The fence will prevent the public from entering the area during treatment. An 8-foot-high chain-link fence currently surrounds the former NAS Barbers Point temporary stockpile facility. As shown on the design drawings, additional fencing will be attached to the existing fence and will surround the area to be used for treatment and stockpiles. Truck and equipment gates will be located at access entrances, and a pedestrian gate will be located between the treatment site and the administration area, which will be outside of the fenced area.

3.7 SITE RESTORATION

Soil underlying all former stockpile areas, including those at NRTF Lualualei, will be sampled following removal of the stockpiles. The underlying soil will be treated by thermal desorption if test results indicate that it is contaminated. After all the contaminated soil is treated, all potentially contaminated compacted base course and sand from the preparation area will be sampled and, if necessary, treated by thermal desorption. The concrete treatment pad will be sampled, cleaned if necessary, and then demolished. The compacted base course and sand in the interim staging area for treated soil will be sampled and treated by thermal desorption if any treated soil did not meet cleanup criteria. Any compacted base course that cannot be treated by the thermal desorption system will be disposed of off island; however this outcome is not anticipated. The treated base course, sand, and concrete rubble will be placed in the coral pit south of the treatment area after laboratory results confirm that all treatment criteria have been met. The liner will be disposed at an approved off-site facility. All equipment will be demobilized and the site will be cleaned up. All temporary facilities and fencing will be removed. Revegetation will not be required.

4. TREATMENT CRITERIA

Table 4-1 presents the treatment criteria for the contaminants found in the soil. The stated treatment criterion for each contaminant in the soil must be met, or the soil will be retreated.

Table 4-1: Contaminated Soil Treatment Criteria

Contaminant	Treatment Criterion (mg/kg)
PCBs	1.0
Dioxins/furans	0.001
TPH as diesel and motor oil	60
Benzo(a)pyrene	0.062
Benzo(b)fluoranthene	0.62
Chlordane	1.6

Notes:
PCBs = polychlorinated biphenyls
TBD = to be determined
TPH = total petroleum hydrocarbons
mg/kg = milligrams per kilogram

During system startup, a 3-day demonstration test will be conducted to verify that all applicable or relevant and appropriate requirements are achieved. Submittal of a demonstration test plan is

required with the RAC contractor's final work plan. The feed soil will be tested for the applicable contaminants and to determine the removal efficiency of the treatment unit. During the actual treatment, the blended stockpiles of contaminated soil will be tested daily with a PCB field testing kit to assess the approximate concentration of PCBs in soil to be treated each day, to ensure the desired amount of blending has occurred and for the purpose of establishing corresponding required residence times in the treatment unit. Treated soil will be sampled to ensure the treatment criteria are met. Sampling of the treated soil will be based on the known pretreatment contaminants of the soil. Feed soil shall be catalogued and tracked to ensure pretreatment contaminant levels are known.

Treated soil and vapor streams will be tested for formation of dioxins (2,3,7,8-tetrachlorodibenzodioxin [TCDD]) and furans during the 3-day demonstration test. The soil will be tested after treatment during the 3-day demonstration test to ensure that no dioxins or furans are present in the soil at concentrations greater than 1 part per billion (ppb) as provided by the U.S. Environmental Protection Agency (EPA) memorandum signed on April 13, 1998 (EPA 1998). The vapor stream will be tested after it is drawn through the GAC adsorption system during the 3-day demonstration test to ensure that no dioxins or furans are emitted during the treatment process. Specific information regarding testing requirements or submittals will be included in the RAC contractor's final work plan.

5. AIR MONITORING FOR PARTICULATES AND CONTAMINANTS

The State of Hawaii Department of Health limits particulates in ambient air to a mean of 50 micrograms per cubic meter ($\mu g/m^3$) per 12-month period and 150 $\mu g/m^3$ per 24-hour period. Air monitoring for dust will be conducted at the perimeter of the site and at worker locations to ensure that levels of particulates and the concentration of PCBs in air do not exceed regulatory standards. Three stationary air monitors will be installed at perimeter locations, one upwind and two downwind. These air monitors will be sampled for particulates in 24-hour increments throughout site preparation and treatment. The upwind monitor will be used to establish baseline dust levels in the air. In addition, handheld dust monitors will be used to monitor real-time fugitive emissions of dust at work locations for the duration of site preparation and treatment.

During the 3-day demonstration test, air samples will be collected from the discharge stack of the thermal desorption treatment system. Air modeling will then be used to estimate the ambient air levels for specific contaminants and determine whether applicable air criteria are met. Modeling will include emissions created from four distinct sources: (1) treated off-gas from the thermal desorption process, (2) diesel exhaust from the thermal desorption unit, (3) diesel exhaust from the main generator, and (4) diesel exhaust from the emergency generator. The diesel fuel used to heat the treatment unit contains sulfur, so the heating system will be monitored for sulfur emissions. Emission rates of carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulates will be estimated with air modeling using manufacturer's information. Detailed discussion on the air sampling and modeling will be included in the RAC contractor's final work plan. The modeling will be used to establish, if possible, the appropriate input parameters for the treatment system to ensure that applicable air emission criteria are met. Table 5-1 presents the State of Hawaii ambient air quality standards.

Table 5-1: State of Hawaii Regulatory Standards

Contaminant	Ambient Air ($\mu g/m^3$)
[1]CO	10,000 (1-hr average); 5,000 (8-hr average)
[1]NO_2	70 (12-month average)
[1]SO_2	1,300 (3-hr average); 365 (24-hr average); 80 (12-month average)
[1]Particulates (PM10)	150 (24-hr average); 50 (12-month average)
[1]Dioxin (2,3,7,8-TCDD)	4.5×10^{-7} (12-month average)
[1]PCBs	0.034 (12-month average)
[2]Chlordane	0.19 (12-month average)
[2]DDE	0.2 (12-month average)
[2]1,1,2,2-Tetrachloroethane	0.33 (12-month average)
[2]1,1,2 – Trichloroethane	1.2 (12-month average)
[2]1,4-Dichlorobenzene	3.1 (12-month average)
[2]2-Butanone	1,400 (12-month average)
[2]Benzene	2.5 (12-month average)
[2]Bromoform	17 (12-month average)
[2]Carbon disulfide	74 (12-month average)
[2]Carbon tetrachloride	1.3 (12-month average)
[2]Chlorobenzene	110 (12-month average)
[2]Chloroform	0.84 (12-month average)
[2]Ethylbenzene	1,000 (12-month average)
[2]m-Xylene & p-Xylene	1,000 (12-month average)
[2]Methylene chloride	41 (12-month average)
[2]o-Xylene	1,000 (12-month average)
[2]Styrene	200 (12-month average)
[2]Tetrachloroethene	33 (12-month average)
[2]Toluene	450 (12-month average)
[2]trans-1,3-Dichloropropene	4.8 (12-month average)
[2]Vinyl acetate	84 (12-month average)
[2]Vinyl chloride	2.2 (12-month average)
[2]MTBE	340 (12-month average)
[2]1,2,4-Trichlorobenzene	89 (12-month average)
[2]Hexachlorobutadiene	0.86 (12-month average)
[2]cis-1,3-Dichloropropene	4.8 (12-month average)
[2]Di-n-butyl phthalate	5,000 (12-month average)
[2]Dibena(a,h)anthracene	0.022 (12-month average)
[2]Dimethyl phthalate	5,000 (12-month average)
[2]Hexachlorobenzene	0.042 (12-month average)

Table 5-1: State of Hawaii Regulatory Standards (Continued)

Contaminant	Ambient Air ($\mu g/m^3$)
[2]Hexachlorobutadiene	0.86 (12-month average)
[2]Hexachlorocyclopentadiene	0.27 (12-month average)
[2]Hexachloroethane	4.8 (12-month average)
[2]Isophorone	71 (12-month average)
[2]Naphthalene	130 (12-month average)
[2]Nitrobenzene	12 (12-month average)
[2]Pentachlorophenol	0.56 (12-month average)
[2]Phenol	46 (12-month average)
[2]N-Nitrosodimethylamine	0.0014 (12-month average)
[2]2,4,6-Trichlorophenol	6.2 (12-month average)
[2]2,4-Dinitrotoluene	0.099 (12-month average)
[2]3,3'-Dichlorobenzidine	0.15 (12-month average)
[2]Benzo(a)pyrene	0.022 (12-month average)
[2]Benzo(b)fluoranthene	0.22 (12-month average)
[2]Benzo(k)fluoranthene	2.2 (12-month average)
[2]Benzo(a)anthracene	0.22 (12-month average)

Notes
[1] Criteria from Hawaii Administrative Rule 11-60.1
[2] Criteria from Hawaii Administrative Rule 11-60.1-179
CO = carbon monoxide
hr = hour
$\mu g/m^3$ = micrograms per cubic meter
MTBE = methyl tertiary butyl ether
NO_2 = nitrogen dioxide
PM = particulate matter
SO_2 = sulfur dioxide
TCDD = tetrachlorodibenzodioxin

6. SOIL SAMPLING

The blended stockpiles of contaminated soil will be tested daily with a PCB field testing kit to assess the approximate concentration of PCBs in soil to be treated each day, to ensure optimum blending has occurred, and to establish corresponding required residence times in the thermal desorption unit.

One soil sample composited from at least 6 grab samples (one every 4 hours) will be collected from treated soil per 24-hour period if less than 100 cy of soil is treated. If more than 100 cy of soil is treated in a 24-hour period, at least 1 grab sample will be collected for every 25 cy of soil, and grab samples will be composited per 100 cy of soil. The composited samples will be analyzed by a laboratory for the known contaminants in the pretreated soil. If test results confirm that the concentration of any contaminant of concern is above its listed treatment criterion, the soil will be returned to the preparation area and retreated. If test results confirm that all treatment criteria have been met, the soil will be moved to the stockpiles for treated soil.

After all the contaminated soil has been treated, the locations of all temporary stockpiles, including the feed stockpile area (currently storing soil from former NAS Barbers Point), the temporary stockpile location at NRTF Lualualei, and the temporary stockpiles for the PHNC soils, will be

tested for contamination using a square-based grid system that will overlay the entire area to be sampled. The grid axes will be oriented on a magnetic north-south axis centered in the area and an east-west axis perpendicular to the magnetic north-south axis, also centered in the area. A series of sampling points will be marked out 20 feet apart to the grid axes in every direction to completely overlay the sampling area. A sample will be collected at each grid point. All samples will be analyzed according to the compositing schemes provided in 40 CFR 761.289. At each selected sampling location, at least 20 milliliters (ml) of soil will be collected to a maximum of 3 inches depth. If testing shows that any sampling location has been contaminated with PCBs, the top 6 inches of the area will be excavated and treated in the thermal desorption system. The sampling location will then be retested. This process will be repeated as necessary until test results confirm that the soil is clean.

Finally, the stockpile liners for the blending area will be removed, and the compacted base course and sand foundation for the site preparation area will be sampled, and then crushed and treated by thermal desorption as needed. The compacted base course and sand foundation for the interim staging area for treated soil will be sampled if any treated soil failed to meet treatment criteria. If sample results indicate the soil is contaminated, it will be crushed and treated as needed. After post-treatment testing of the compacted base course confirms that all treatment criteria have been met, the treated base course will be placed in the coral pit.

7. WASTE DISPOSAL

All waste streams generated by the thermal desorption and GAC adsorption processes will be characterized according to 40 CFR 262.12 and shipped to the U.S. mainland for incineration or proper disposal at a chemical waste landfill certified to accept Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste. All GAC will be properly disposed of on the U.S. mainland. A detailed discussion on waste handling and disposal will be included in the RAC contractor's work plan.

8. REFERENCES

Earth Tech, Inc. 2000. *Engineering Evaluation/Cost Analysis for Treatment/Disposal Alternatives for Contaminated Soil at NCTAMS PAC, Former NAS Barbers Point, and Pearl Harbor Naval Complex, Oahu, Hawaii.* Contract No. N62742-94-D-0048, Task Order No. 0004. Honolulu.

U.S. Environmental Protection Agency. 1998. Memorandum: Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites, signed April 13, 1998. OSWER Directive 9200.4-26.