Remedial Investigation Workplan
South Finegayan CB (PWC) Landfill

Public Work Center (PWC)
Apra Harbor, Guam

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EXECUTIVE SUMMARY

This report presents the results of a remedial investigation (RI) conducted by Ogden Environmental and Energy Services Company, Inc. (Ogden) at the South Finegayan Construction Battalion (CB) Landfill located at the Public Works Center on the island of Guam. The CB Landfill Site was officially used from 1944 to approximately 1957, although aerial photographs show that it may have been in use up until 1959. The landfill was used primarily for the disposal of wastes from the CB maintenance shop operating in that area. Some of these wastes were burned, possibly to minimize the volume of waste. No records were available regarding the amount of wastes disposed; however, the Naval Energy and Environmental Support Activity (NEESA) reported that scrap metal, waste oil, and cleaning solvents were disposed at the site (NEESA 1983b). Other potential wastes associated with the maintenance shop include batteries, brake fluid, transmission fluid, lead-based paint, tires and inner tubes, and various vehicle and equipment parts. Also recognized at the site were municipal wastes including glass bottles, burned trash, and rubbish.

An Initial Assessment Study was conducted by NEESA in 1982, the results of which were reported in 1983. The Navy determined that the CB Landfill Site would be further investigated in accordance with site investigation (SI) methodologies. SI field activities were conducted at the CB Landfill Site during the summer of 1990 and detailed in an SI report (ERCE 199 1). SI field activities included a wetlands survey, limited vegetation clearing, a limited geophysical/utilities survey, a soil gas survey, the installation of two monitoring wells into the limestone aquifer system, and collection and analysis of ground-water samples taken from the monitoring wells and a nearby municipal well. Only soil gas and ground-water samples (no soil samples) were collected during the SI.

The results of the SI conducted at the CB Landfill Site are detailed below (ERCE 1991).

· During vegetation clearing, the presence of disposed wastes and burned debris verified the location of the disposal area, as well as the fact that burning had occurred at the landfill.

· The soil gas survey indicated the presence of minor amounts of volatile organic compounds (VOCs) in soil gas. These results included chloroform, which was detected above 1 part per billion (ppb). Additionally, low but consistent levels of trichlorofluoromethane and tetrachloroethene were also present, at concentrations ranging from 0.1 to 0.8 ppb.

· The depth to ground water at the site is approximately 320 feet below ground surface (bgs) and the water table surface elevation is approximately 4 to 6 feet above mean lower low water (MLLW).

· The aquifer system produces fresh water with total dissolved solids contents ranging from approximately 425 to 650 parts per million (ppm).

· Low concentrations of benzene, chloroform, trichloroethene, 1,1-dichloroethene, 2-butanone, toluene, ethyl benzene, and total petroleum hydrocarbons (TPH) were detected in monitoring wells installed at the site.

· With the exception of the detection of dibromochloromethane, no VOCs were identified in South Finegayan Naval Communications Station (NCS) Well No. 2.

Since the results of the SI showed some contamination was present, an RI was conducted at the CB Landfill Site. The overall objectives of the RI were to assess the nature and extent of environmental contamination, and to provide a preliminary screening of potential risks to human health and the environment posed by site contamination.

RI field activities conducted between March 1993 and March 1995 included performance of a biological reconnaissance and preparation of a biological inventory; archaeological monitoring; surface and borehole logging geophysical surveys; collection of biological, surface and subsurface soil, and quarterly ground-water samples; analysis of samples for chemical and geotechnical parameters; assessment of aquifer characteristics; and performance of a land survey to record the locations and elevations of soil borings and monitoring wells. The following includes a brief summary of the results of each part of the RI.

The biological field survey revealed that wildlife is not abundant onsite and that there are no sensitive or endangered species present. Pottery shards and a limited number of additional Chamorro cultural materials were found in isolated areas of the site as a result of archaeological monitoring during vegetation clearing.

Surface water associated with precipitation events flows onto the site from surrounding topographically high areas, and quickly infiltrates the fill and native soil material within the sinkhole. Ground water lies within the underlying limestone bedrock at approximately 320 feet bgs, or approximately 4 to 6 feet above MLLW. The fresh ground water lens floats on denser underlying sea water and is part of the basal lens or Guam Northern Lens aquifer. Ground-water level measurements indicate that the ground-water surface beneath the site fluctuates in response to precipitation events (which provide recharge to the aquifer) and to ocean tides. The predominant direction of ground-water flow is to the southwest. Fluctuations in water levels result in flow periodically occurring to the northeast.

Biological tissue, biological surface soil, and bioassay samples were collected for chemical testing for the purpose of evaluating ecological risk. Twenty-six surface soil samples were collected to obtain data for the human health risk assessment. Nine trenches were excavated to depths of 2 to 9 feet bgs, and nine shallow soil borings were advanced to depths of 2 to 34 feet bgs. A total of 92 subsurface soil samples were collected for chemical analyses and 6 for geotechnical testing.

Four of the shallow soil borings were converted to leachate collection wells. One additional deep monitoring well was installed and five uncased deep boreholes were advanced into the limestone aquifer. During four rounds of ground-water sampling, samples were collected from two municipal wells (NCS Wells No. 2 and No. 5) and the deep monitoring wells and boreholes. Only a limited

number and quantity of leachate samples could be collected from two of the four leachate wells during the first sampling event (October 1993), and only total metals analyses could be conducted. The absence of water in these wells prevented collection of leachate samples during the second (July 1994), third (November 1994), and fourth (March 1995) ground-water sampling events.

Biological, soil, and ground-water samples were analyzed for contract laboratory program (CLP) VOCs and semi-volatile organic compounds (SVOCs), organochlorine pesticides and polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), TPH, and CLP metals. Additionally, pipe fragments and selected soil samples were tested for the presence of asbestos.

The CB Landfill Site RI soil samples contained the pesticide 1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane (DDT), PAHs; PCBs; fuel related compounds; several VOCs; and the metals antimony, arsenic, lead, mercury, and zinc were detected above background metal concentrations. The highest concentrations of these compounds were present in soils located in the center of the landfill or within burn areas.

Federal and territorial standards for ground water include the Guam Water Pollution Control Act standards, RCRA ground-water maximum contaminant levels, and National Drinking Water Standards Primary maximum contaminant levels. Based on these standards, ground-water samples collected from the NCS wells contained only very low levels of VOCs associated with chlorinated drinking water and laboratory contamination; metals exceeding standards were not detected in these samples. However, impacts to ground-water quality due to a source other than the CB Landfill appear to be occurring. Fuel hydrocarbons in the gasoline and diesel range have been detected in NCS Well No. 2. Fuel hydrocarbons were not detected in high concentration in site soils and would be expected to be degraded due to the age of the landfill. In addition, standards for sodium and total dissolved solids were exceeded in NCS ground-water samples.

Impacts to ground water beneath the site are limited to slight elevations in metal concentrations. VOCs and SVOCs detected in ground water samples from onsite monitoring wells were present at very low concentrations and represent laboratory contamination. Heavy fuel hydrocarbons were detected in only one onsite ground water sample collected during the first sampling event; hydrocarbons were not detected in any other onsite ground water samples.

Due to the heavily vegetated site setting, which is situated in a low topographic depression, air transport of soil particulates from the site is not significant. Surface water flow is onto the site; thus, surface water transport of particulates to offsite locations does not occur.

Dissolved contaminant transport to ground water does not appear to be significant, based on the advanced age of the landfill, the rapid infiltration of precipitation and "run-on" into site soils limiting contact with subsurface material, and the lack of leachate present in the leachate wells. For particulate transport to occur, certain threshold velocities are required to transport particulates via unsaturated ground-water flow, such as those produced during heavy rains associated with typhoons. Therefore, particulate transport of soil contaminants to the ground-water system is assumed to be infrequent. Only slight impacts to ground water beneath the site have occurred. Two rounds of ground water sampling data collected during the rainy season indicate that health risks are insignificant. Ground water beneath the site is thought to eventually discharge along the coastline of the Philippine Sea since the site is located approximately one mile from the coast. Flow within the karst terrain is likely to be circuitous such that ground-water flow paths are greater than one mile. Thus, ground water beneath the site does not pose a threat to marine organisms.

The complete exposure pathways for human health risk considered in the preliminary risk assessment (PRA) are the dermal adsorption (skin contact) and ingestion of soil pathways for onsite trespassers contacting surface soil, and dermal adsorption and ingestion of onsite ground water for offsite residents. Because ground water beneath the site lies in the Northern Lens drinking water aquifer, offsite residents were conservatively assumed to ingest onsite ground water. The apparent potential exposure pathway for ecological receptors is via surface soil.

Contaminants of potential concern (COPCs) in the human health risk assessment included organochlorine pesticides, SVOCs, TPH, and metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc). Contaminants of potential ecological concern in the screening ecological risk assessment included: organochlorine pesticides, PCBs, PAHs, and metals (antimony, arsenic, copper, lead, mercury, silver, and zinc).

A potentially significant risk exists for onsite human trespassers via exposure to surface soils. Although the ground-water exposure pathway at the site assumed that receptors would be consuming ground water with onsite concentrations of COPCs, significant risk was not indicated for the ground-water exposure pathway. A potentially significant risk for onsite biological receptors due to soils also exists. Organochlorine pesticides, particularly DDT, and total metals were detected at concentrations which could result in adverse biological effects. Although metals occur due to human activities and as natural constituents on Guam, onsite levels were much higher than at reference or background sample locations.

Based on the significant risk to onsite human and ecological receptors posed by surface soil, non-time-critical removal action will be implemented. A cost-effective removal action alternative that mitigates exposure of human and biota to site surface soil and provides for protection of public health and the environment consistent with the National Contingency Plan will be implemented. To limit the contact of human and biota with site soils, the presumptive remedy recommended for the CB Landfill Site is landfill capping.

An Engineering Evaluation/Cost Analysis (EE/CA) is currently being conducted to evaluate and select appropriate components for the presumptive remedy of landfill capping. As part of the EE/CA, an Action Memorandum substantiating the need for a removal action and documenting the rationale for the selected removal action will be prepared. In the interim, a chain-link fence is being constructed around the perimeter of the site. The fence will be of such a nature as to restrict recreational access by pedestrian traffic, and will be posted with the appropriate restrictions.

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