Update on the Orote Landfill
Phase II Groundwater Investigation

FACT SHEET NO. 3 **AUGUST 2004**

INTRODUCTION

The Orote Landfill is located in COMNAV-MARIANAS, Guam along the southwest side of the Orote Peninsula (Figure 1). The landfill was stabilized in 2001 with a seawall and cap. These efforts may have reduced any chemicals from the landfill seeping into the ocean. Levels of landfill chemicals such as PCBs were found in fish near the seawall and a seafood advisory was issued by the Guam Department of Public Health and Social Services (DPHSS) in September 2001. The Navy, along with Guam EPA and other regulatory agencies, developed the following four-phase approach to address the impacts in fish near the landfill:

Phase I: Refine the boundaries of the seafood advisory area (completed in May 2002).
Phase II: Identify specifically where chemicals in the advisory area are coming from and if they present a threat to human health and sea ecology.
Phase III: Further refine the information on the source(s) if they are found to be a threat to humans and ecology.
Phase IV: Clean up or monitoring if needed.

After the Phase I field investigation in 2002, the Navy, Guam Environmental Protection Agency (EPA), and U.S. EPA recommended that the area from Rizal Beach to Nimitz Beach be removed from the seafood advisory area. DPHSS concurred with this recommendation and the seafood advisory area was reduced in May 2002. The results of the Phase II mid-deep water fish sampling conducted during 2003 also indicated that the Orote Landfill may be a source of PCBs and other chemicals, because the fish caught furthest from the seawall had the lowest concentration of PCBs. Groundwater flowing beneath the landfill is one of the suspected transporters of contamination from the landfill to the sea. Consequently, a groundwater investigation was initiated in and around the landfill as part of Phase II. This field investigation was conducted from May-June 2004.

OROTE LANDFILL GROUNDWATER STUDY OBJECTIVES

The objectives of the Phase II groundwater investigation were to:

Figure 1. Orote Landfill location map.

- Assess where chemicals occur in the groundwater under the landfill
- Monitor where the chemicals are going and where they are seeping into the nearby sea.
- Evaluate the effects of tidal fluctuation and rainfall on chemical levels near the seawall.
- Continue to assess impacts to nearby marine life.

MONITORING WELL INSTALLATION

Seven new monitoring wells and three piezometers (monitoring wells for measuring water level readings only) were installed and sampled in May 2004.

Figure 2. Excavating manually to protect the landfill cap liner during well installation.

After well installation (Figure 2), water samples were collected and analyzed for PCBs, pesticides, metals, and other chemicals. Preliminary results indicated that low levels of PCBs, pesticides, and metals were in the groundwater.

GROUNDWATER MOVEMENT

Data gathered from water levels help the Navy evaluate how the groundwater is moving, and how tides and weather conditions affect its movement. A tidal study was initiated in May 2004 after the monitoring well network was installed. Sensors were installed in seven new wells, three piezometers and two existing wells. Water level data was recorded automatically and manually during the May-June 2004 study. The data will be used to evaluate the effects of tidal changes on water levels in the monitoring wells.

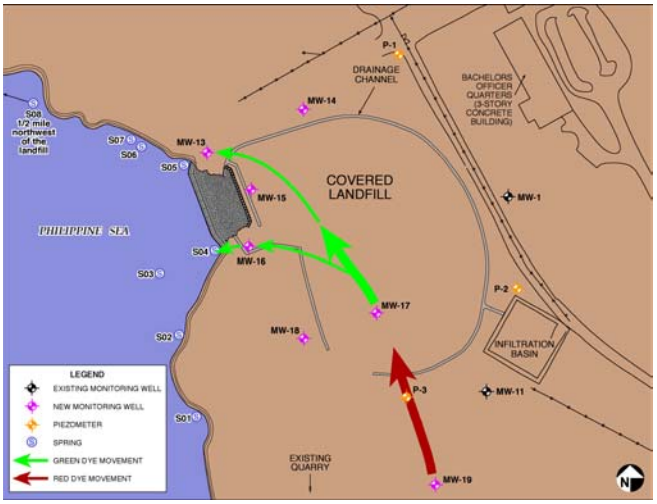

Figure 4. General direction of groundwater flow was plotted (see arrows above) by measuring the concentration of dye moving from the injection wells to neighboring wells.

Stormy weather occurred on June 21, 22, and 27, 2004. The Navy used this opportunity to study weather effects on water levels by collecting data manually after each storm event (Figure 3).

DYE TRACE STUDY

Harmless dyes were injected into two wells (MW-17 and MW-19) to trace the flow of groundwater. It would also demonstrate that water from the monitoring wells is representative of groundwater moving beneath the landfill.

Water samples were collected for 12 days after dye injection. Preliminary results are depicted in Figure 4. Stormy weather prevented the safe collection of water

Figure 3. Monitoring the groundwater level during storm event.

samples for dye analysis from all spring locations except for S-04. An elaborate system of PVC piping was used to collect samples from S-04 (Figure 5). Monitoring for dye is ongoing.

FUTURE ACTIVITIES

These findings will be used to assess whether further action is appropriate to address the effects of landfill contaminant transport into the sea. A draft report documenting the initial Phase II groundwater investigation results will be completed in October 2004. Groundwater study field activities will continue for three additional quarters of groundwater sampling. The Navy is committed to pursuing cleanup and monitoring of the site as required to ensure public safety.

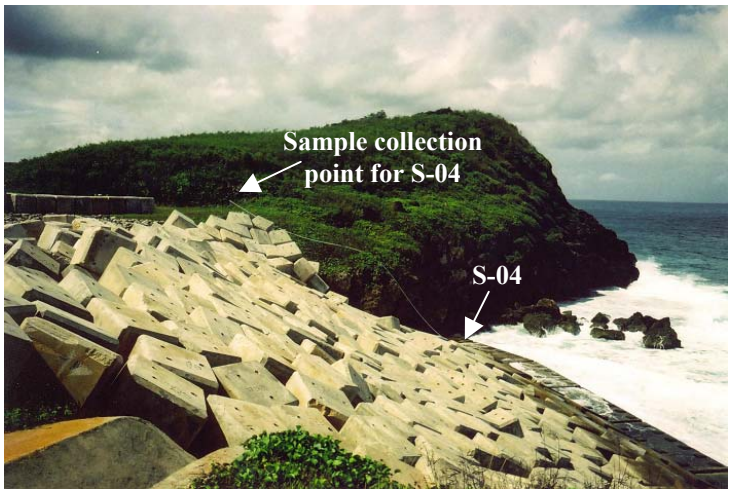

Figure 5. Collection of dye trace water samples from spring S-04 required over 100 feet of PVC pipe.

FOR MORE INFORMATION

Contact the Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) at (671) 339-5207 or Guam EPA at (671) 475-1658. Past studies and reports on Orote Landfill are currently available at Nieves M. Flores Library in Hagatna.