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Volume 2 Number 6 (December 1991)

The Navy's 'Superfund Six'

The Environmental Protection Agency conducted a review of the Pearl Harbor naval complex in 1990. Its Hazard Ranking System report, nominating Pearl Harbor to the Superfund list, was completed in February 1991 and was released to the public last July.

The HRS considers just six of the several dozen known contaminated sites in the Pearl Harbor area. They were chosen, according to an August 10, 1990 memo from the EPA's contractor on the project, Ecology and Environment, Inc. of San Francisco, because they "reflect the different types of pathways by which contaminants can enter the environment from the Pearl Harbor Naval Complex."

"Contaminants from these six sources are available to release to all four pathways: groundwater, surface water, air and soil exposure," the memo states. Additionally, the potentially exposed populations are "markedly similar" at all sites. Thus, the contractor concluded, even though spreadsheet limitations forced the study to be restricted to just six sites at the complex, the similarity of target populations, and the fact that all pathways have been evaluated with respect to these populations allowed these six sites to be "representative of the eligibility of the Pearl Harbor Naval Complex as a whole for inclusion on the National Priorities List" -- better known as the Superfund list.

The overall score for the complex was 70.82. For inclusion on the National Priorities List, the threshold score is 28.5.

The Landfill

The first site evaluated in the Hazard Ranking Study is an area of 67 acres that was used as a landfill by the Navy from 1965 to 1976. Prior to that, part of the site was used from 1945 to 1965 to burn wastes. The landfill is unlined. Immediately west of the site is the Waiawa unit of the Pearl Harbor National Wildlife Refuge.

Among the materials known to have been dumped at the site are polychlorinated biphenyls, asbestos scrap, paints and solvents, various hazardous materials whose "shelf life" was exceeded, pesticides, dry cleaning fluids, and metal residues from the open burning of ordnance.

Mauka of the parcel is a railroad right-of-way, along which was dumped in 1972 "hundreds of corroded drums containing assorted chemicals such as oils, pesticides, paints and solvents" (as mentioned in the Navy's NEESA report). These had been included in lots sold by the Navy as surplus goods. The purchaser evidently took what he wanted and threw the rest in the general vicinity of the landfill. Besides the chemicals in the drums, the discards included decontaminating agents, car bodies, scrap metal and ovens.

In 1984, the National Campaign Against Toxic Hazards, a group based in Washington, D.C., said that the Pearl City Peninsula landfill was one of the most hazardous areas in the country and was "sufficiently dangerous" to be placed on the Superfund list. The EPA at that time, it said, had given the landfill a ranking of 34.8 out of a possible 100; by comparison, it noted, Love Canal in Niagara Falls, one of the most infamous toxic waste sites in the country, scored 52.2.

The Navy's initial response was to deny there was any hazardous waste at the site, according to the *Honolulu Advertiser* of June 11, 1984. One day later, however, the Navy was reported by the *Advertiser* to have confirmed that some contaminants "may" have been dumped there, although it disputed the reported score of 34.8. "We have never had a rating that high," a public affairs officer was quoted as saying at the time.

Actually, in the 1983 NEESA report, the Navy acknowledged that the landfill had received "items such as paint, solvents, thinners, PCB-contaminated rags, and out-of-date photographic chemicals." The NEESA report concluded that the "primary potable water source, the basalt aquifer, is not threatened by contaminant migration." Still, it recommended further study of the site, "primarily to determine the levels of

chlorinated organic compounds present."

The Gyro Shop

Sites 2, 3 and 4 in the EPA's Hazard Ranking System report are clustered in the Pearl Harbor Naval Shipyard, within a few hundred feet of the waters of the Southeast Loch. The first of these is a gyroscope repair shop that operated from 1941 to 1979 in Building 3A, east of Avenue A and south of Sixth Street. "An estimated 8 ounces of liquid mercury is contained on each side" of a gyroscope, the EPA reported. "The gyro shop inspected and repaired two or three gyros per year for 38 years. The inspections/repairs were conducted over the sink leading to the contaminated storm drain."

According to the NEESA report, "the original wooden block floor, which may have absorbed spilled mercury over the years, was removed about 1954 because of storm damage. The wood blocks were disposed of off Navy property."

"During 1979," the report continues, "the wooden work benches, which had absorbed mercury, were removed and disposed of to the mainland as mercury waste. Building 3A was then decontaminated to 0.01 milligram per cubic meter mercury in air, as per governing Navy directives." (The NEESA study, reporting on this incident, states that the work benches were so heavily contaminated that "mercury spilled from the benches while they were being cut up.")

In 1981, still more mercury contamination was discovered at this site. As the Navy wrote in its report of the incident, "upon digging into the old storm drain system, [an outside contractor] noticed and reported beads of metallic mercury in the trench soil. ... All mercury contaminated soil was packaged in 55-gallon drums for disposal and the site was cleaned... This yielded fifty-six 55-gallon barrels of dirt.

"Investigation of the source of mercury quickly revealed that the spill represented years of mercury disposal into the storm drains ... prior to shipyard control of mercury in 1968. Large amounts of visible mercury droplets were found in storm drain #2 catch basin ... and in the catch basins of storm drains #4, 5, 13, 14 and 15." The Navy cleaned the storm drains as far back "as practical" (nine feet), placed gratings over the storm drains, and posted them with "Do not enter without authorization" signs.

Mercury levels in the shipyard sediment were reported in the EPA's study to be more than three times levels found in sediment samples taken from the East Loch of Pearl

Harbor. However, back in 1982, E&E (consultant to the EPA) found contamination at far higher levels. In an internal E&E memo dated April 16, 1982, there appears this description of the problem:

"The levels of mercury in sediments in the vicinity of the sewer outfall have been reported by the Navy to range from 2.8-8.5 mg/g [micrograms per gram, or parts per million]. These values are 5-20 times higher than typical background levels found in sediments in other parts of Pearl Harbor as well as other Hawaiian aquatic ecosystems....

"Although elemental mercury binds quickly and tightly to mineral sediments, concern arises in that this largely insoluble form will be converted either biologically or chemically to more soluble forms -- principally mercuric salts, methyl mercury, or methyl mercuric chloride... Research on endemic Hawaiian species of marine worms and shrimp have demonstrated their ability to biomagnify mercury 160-310 times. This bioconcentration factor is a primary reason for the comparatively low ambient water quality criteria for protection of saltwater species -- 0.025 mg/l as a 24 hour average."

There are no data cited in the HRS report on levels of mercury in water where the storm sewers drain into the Southeast Loch.

The PCB Drain

The third site in the EPA's Hazard Ranking System report is a drain that leads from a deck on the north side of Building 68, which lies north of Club Road and near Slip B-22. When transformers were repaired at the electrical shop housed in this building, waste oil containing polychlorinated biphenyls was dumped down the deck drain, which led into the storm sewer system that emptied into the harbor from an outfall about 50 yards away from the building. According to the EPA, from 50 to 55 gallons of PCB-contaminated oil were disposed of in this fashion each year from 1950 to 1965.

PCB-contaminated rags, bushings and other solid waste were taken from the electrical shop to the Pearl City Peninsula landfill.

Pickling Waste Site

To clean aluminum plates, the Navy's shipfitter shop employed a so-called "pickling" process involving the use of chromic acid. According to the Hazard Ranking System

report, the chromic acid, rinse water, and a soap solution were stored in separate 3,000-gallon tanks in an unpaved area adjacent to Building 155, which housed the shipfitter shop. From 1950 to 1970, standard practice was to empty the contents of each tank onto the bare ground about twice a year -- resulting in the release of some 1.2 million gallons of pickling acid to the soil. "The disposal area," the EPA notes, "is only 300 feet from the harbor." Hazardous substances include the chromic acid itself as well as hexavalent chromium, which is a constituent of chromic acid.

The Navy removed the contaminated soil in 1982. The EPA is concerned, however, that chromium in the groundwater could migrate to Pearl Harbor waters.

Pesticide Rinseate Pit

For several years in the 1970s, pesticide mixing tanks were rinsed out at a site near the intersection of Nanumea Road and an access road to a Navy Public Works Center parking lot. The rinse water, or rinseate, was then dumped into an unlined pit 20 feet wide, 20 feet long and 5 feet deep. This practice may have started as early as 1973, but in any case was under way in 1974. It stopped sometime between 1978 and 1980. On average, two mixing tanks were rinsed each day, with 25 to 50 gallons of water being used each time. At least 1.875 million pounds of pesticide rinseate were dumped into the pit during the years of its operation.

Among the hazardous substances found in soil samples taken from the area of the pit, which has now been filled, are chlordane, Dieldrin, Bromacil, DDE, DDT, toluene, arsenic, and Diazinon.

The Aiea Laundry

Since about 1950, the Navy has operated a laundry on about four acres of land in Aiea, at the northeast corner of Moanalua Road and Kaimakani Street. Directly to the northwest is St. Elizabeth School. To the north is a residential area. Across Kaimakani Street, to the south and east, is Aiea Elementary School. Across Moanalua Road to the south is Aloha Stadium.

The Hazard Ranking System report states that a 2,000-gallon underground tank at the site "contained spent tetrachloroethene (PCE) for approximately 25 years and spent stoddard solvent [used for dry cleaning] for approximately 15 years." Another underground tank, of 1,000 gallon capacity, "stored unused solvents and appears to have leaked."

A floor drain provided another outlet for hazardous wastes besides the leaking tank. According to the HRS, "wastewater containing spent solvents from the dry cleaning operations were discharged via a floor drain and a pipe to a drainage swale," which ultimately flows into a storm drain on Moanalua Road. The storm drain, in turn, discharges into Pearl Harbor at Aiea Bay, about a quarter mile from the laundry. The floor drain was not closed off until mid-1990.

Soil samples from the drainage swale show elevated levels of PCE and hydrocarbons (from the stoddard solvent).

The Navy entered into a contract with Harding Lawson Associates for a more extensive study of possible hazards at the laundry. Harding Lawson reported its preliminary findings to the Navy in a site inspection report dated October 4, 1989. According to that report, soil samples it took from the site revealed the presence of nine organic chemicals: bromochloromethane, dichloroethene, ethylbenzene, tetrachloroethene (PCE), toluene, trichloroethene, meta xylene, and ortho and para xylenes. "Although we do not believe the site poses an immediate threat to human health or the environment," the study says, "it may pose a long-term threat if PCE should find its way into the drinking water system or Pearl Harbor."

The laundry sits above the Pearl Harbor-Waimalu aquifer, which, the report notes, "is currently used as a drinking water source, fresh ... irreplaceable, and highly vulnerable to contamination."

Following up on that report, the Navy hired PRC Environmental Management, Inc., to prepare a health risk assessment for people living, working or playing in the area of the Aiea laundry. According to PRC's report of January 31, 1991, "Using a worst-case scenario, screening results indicate that the area may pose a potential threat to children via inhalation of volatile organic vapors." For example, inhaling just one contaminant -- tetrachloroethylene, or PCE -- in the soil could cause an additional 1.86 cancers per million exposed people, the study found.

When the consultants calculated the potential overall health risk to children who might play in the area of the drainage swale, the excess cancer risk was found to be 1.1 in 1,000. This was based on what PRC Environmental Management considered to be a worst-case exposure: a child playing in the swale area five days a week, four hours a day, 260 days a year. However, the consultants write, the likelihood that a child would actually play so much in this area was remote. "Therefore," they concluded, "the actual incidence of cancer is likely to be lower than these estimates, and may be zero."

Of course, exposure to these chemicals may damage health in ways other than cancer. "The primary non-carcinogenic health effects are liver and kidney toxicity," the study notes, with acetone, chloroform, and PCE posing the most dangerous threats, in that order.

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