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NSB NEW LONDON
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NO FURTHER ACTION DECISION DOCUMENT
FOR THE
CONSTRUCTION BATTALION UNIT DRUM STORAGE AREA
AT THE
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CT

JULY 1996

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LIST OF ACRONYMS AND ABBREVIATIONS

BAF	Bioaccumulation Factor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOD	Department of Defense
EPA	United States Environmental Protection Agency
IRP	Installation Restoration Program
MSL	Mean Sea Level
NPL	National Priorities List
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
PQL	Practical Quantitation Limit
RI	Remedial Investigation
SA	Study Area
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation

EXECUTIVE SUMMARY

The Naval Submarine Base New London ("NSB-NLON"), in Groton, Connecticut was placed on the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 *et seq.*, ("CERCLA") on August 30, 1990. In accordance with CERCLA and the overall mission of environmental restoration under the Department of Defense Installation Restoration Program ("IRP"), numerous studies have been conducted to address study areas at NSB-NLON, including the Supplement to Initial Assessment Study (Navy, 1994) and the Phase II Remedial Investigation Report (Brown & Root, 1996).

The former Construction Battalion Unit Drum Storage Area ("CBUDSA") was identified in the Federal Facilities Agreement ("FFA") among the U.S. Environmental Protection Agency ("EPA"), the Connecticut Department of Environmental Protection ("CTDEP"), and the U.S. Navy as a potential site of contamination. The CBUDSA is located on top of the Area A Landfill in the northwestern quadrant of the NSB-NLON. The site was used to store drums for waste oil, lube oil, and paint. The Remedial Investigation of the CBUDSA was completed in 1996 in conjunction with twelve other sites as part of the Phase II Remedial Investigation.

Investigations of the CBUDSA at the NSB-NLON have indicated that no further studies or remediation are required at this site. Extensive contamination was not observed during the investigation. The results of the investigation indicate that contamination in groundwater does not pose an unacceptable risk to human health or the environment. The levels of contaminants detected in soils indicate local areas of low-concentration contamination consistent with the historical use of the CBUDSA. Based on the results of the risk assessment, the levels of these analytes are not likely to pose an unacceptable risk to human health or the environment. Therefore, the Navy has determined, with EPA and CTDEP concurrence, that the CBUDSA does not require further consideration under the IRP process. This decision document has been prepared to support the No Further Action determination.

The foregoing represents the selection of a remedial action by the Department of the Navy and the U.S. Environmental Protection Agency, Region I, with concurrence of the Connecticut Department of Environmental Protection. Concur and recommend for immediate implementation:

By:_____ Date:_____

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1.0 INTRODUCTION

On August 30, 1990, the NSB-NLON was placed on the National Priorities List ("NPL") under CERCLA. The CBUDSA was identified as a potential source of contamination in the FFA. Studies were conducted under the IRP to assess the nature and extent of contamination at the CBUDSA associated with site operations at NSB-NLON. Based on the results of these studies, the Navy has determined that no unacceptable risk is posed by CBUDSA. Consequently, this decision document has been prepared to support a No Further Action decision for the CBUDSA at the NSB-NLON.

2.0 BACKGROUND AND PHYSICAL SETTING

2.1 NSB-NLON Description

NSB-NLON is located in the towns of Ledyard and Groton, Connecticut, along the eastbank of the Thames River. NSB-NLON currently covers approximately 614 acres. Route 12 borders the eastern boundary of the NSB-NLON (*see* Figure 1). The terrain surrounding NSB-NLON includes rolling hills and wooded areas.

NSB-NLON lies within the Thames River drainage basin. The Thames River flows north to south, and is the eventual discharge locus for all surface water and groundwater flow at the NSB-NLON. The groundwater at the NSB-NLON has been designated as Class GA under CTDEP regulations. Class GA groundwater is used or has potential to be used for individual supply wells, generally without treatment. However, the CTDEP has indicated that the groundwater at NSB-NLON is currently not used as a drinking water supply nor will it be in the future. The NSB-NLON is supplied by a municipal water supply.

2.2 Construction Battalion Unit Drum Storage Area Description

The CBUDSA is an unpaved area located in the northern section of NSB-NLON adjacent to the deployed personnel parking lot and within the boundary of the Area A Landfill (*see* Figure 2).[1] The site is situated on a flat, open area at the base of a wooded hillside that slopes to the northeast. The site is approximately 15 feet by 30 feet.

2.2.1 Geology and Site Description

The ground surface of the CBUDSA generally slopes to the northeast. Bedrock outcrops are prevalent along the hillside southwest of the site. The hillside ground surface slopes

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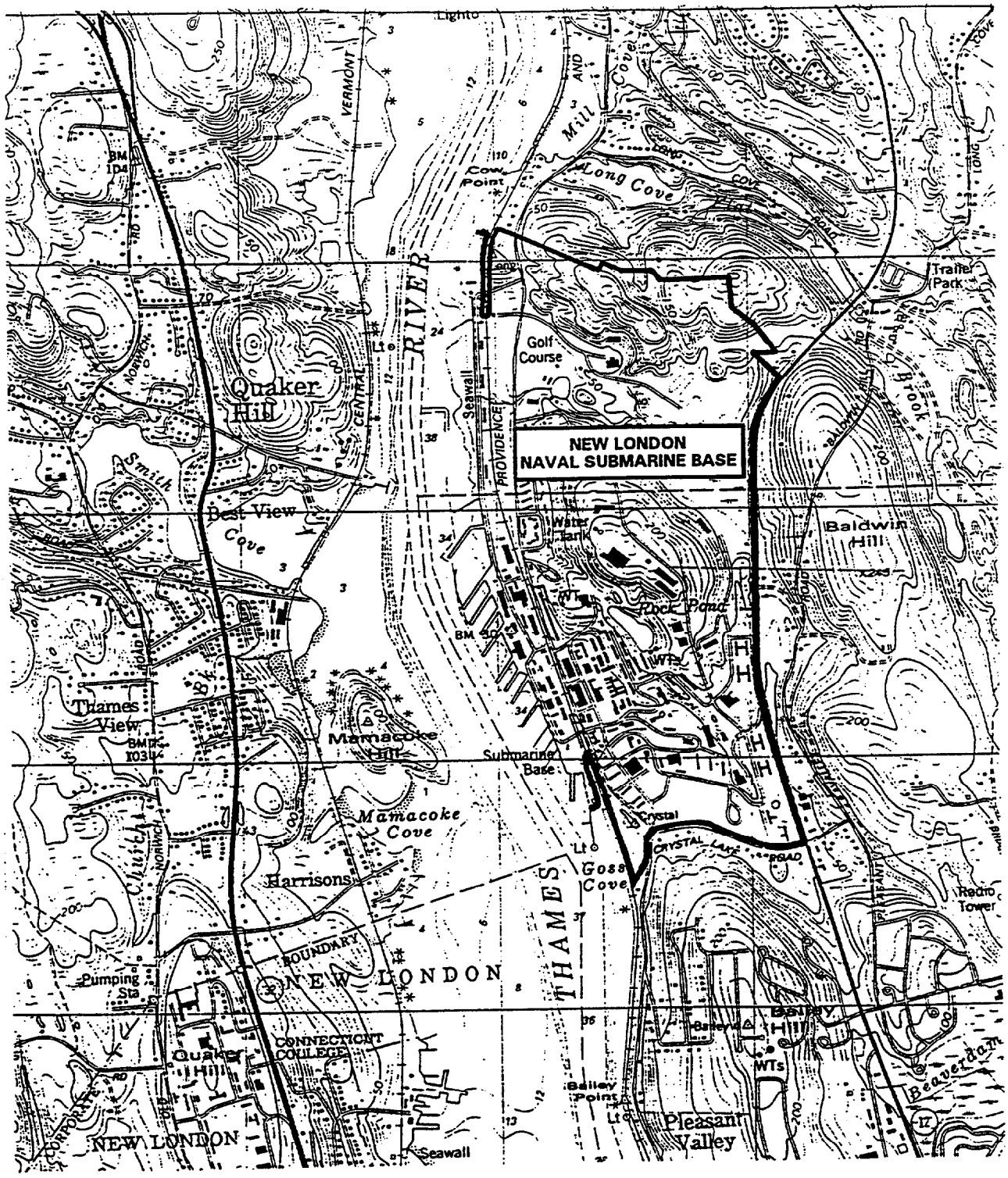
[1]Because the CBU Drum Storage Area is located on top of the Area A Landfill, it will be capped as part of the Area A Landfill remedy described in the September 1995 Record of Decision.

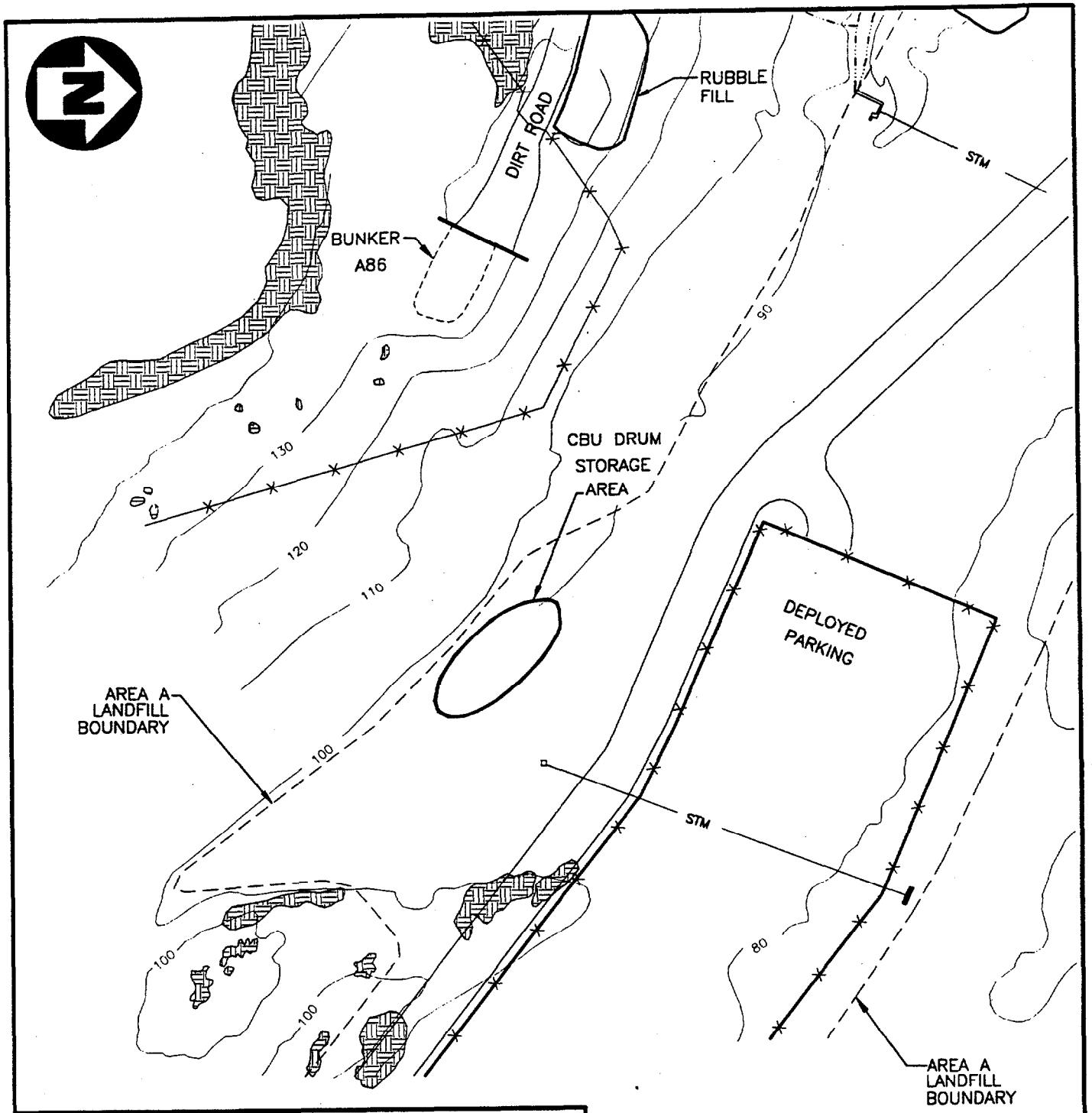


DECISION SUMMARY
AREA "A" LANDFILL
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CT

SOURCE: Uncasville, CT
U.S.G.S. Topographic Map
1984

N

FIGURE 1
NSB-NLON LOCATION



NOTES:
1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE.
2. BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN.

VIEW=PLOT CBUSITE.LAY
ACAD: O:\DATA\CADD\9594\CBU-REV.DWG 02/02/96 MF

0 80
SCALE IN FEET

LEGEND

10 EXISTING CONTOUR
WATERCOURSE
STM STORM SEWER AND CATCH BASIN
EXPOSED BEDROCK
FENCE

FIGURE 2
GENERAL SITE ARRANGEMENT
CBU DRUM STORAGE AREA

relatively uniformly at a grade of approximately 25% across the site. Across and northeast of the site, the ground slope flattens across the Area A Landfill. The ground surface elevation at the CBUDSA is approximately 85 feet above MSL. The CBUDSA is unpaved and there are no buildings or structures on the site. The SCS Soils Map (SCS, 1983) classifies the soil at the CBUDSA as the Hollis-Charlton-Rock complex. This soil is associated with the central bedrock high where the CBUDSA is located. The soil is defined as stones and boulders intermingled with a dark, fine, sandy loam. Bedrock outcrops are prevalent.

Although bedrock was not encountered in any of the borings, the bedrock geology map (USGS, 1967) depicts the bedrock as the Mamacoke Formation. The bedrock surface is expected to slope toward the northeast. The depth to bedrock is estimated to be approximately 15 to 30 feet in the vicinity of the CBUDSA. Adjacent to the site, there appears to be a local bedrock depression to a depth of 42 feet.

The overburden consists of silty sand to a depth of 12 feet underlain by sand and gravel. Fill material (wood fragments, bullets, aluminum foil, gravel, brick, and plastic) was encountered during drilling as documented in the boring log. At one test boring, a fuel odor and oily sheen were noted on soils to a depth of 14 feet. At another boring, a clayey silt layer was encountered beneath the silty sand. This material is similar to the dredged material beneath the Area A Landfill and within the Area A Wetland.

2.2.2 Hydrogeology

Surface drainage from the CBUDSA flows northeast across the unpaved Deployed Parking Lot (which covers a portion of the Area A Landfill) and into the Area A Wetland. A downgradient catch basin is located approximately 40 feet northeast of the site, and the associated storm sewer discharges into the Area A Wetland.

Groundwater is present in the overburden materials underlying the site. Depth to groundwater ranged from 1 to 9 feet during the three comprehensive water level rounds. Based on the projected groundwater contours and ground surface topography, shallow groundwater flow across and downgradient from the CBUDSA is expected to be to the northeast. Groundwater discharges from the bedrock into the overburden in this area.

2.2.3 Construction Battalion Unit Drum Storage Area History

Twenty-six 55-gallon drums of waste oil, lube oil, and paint materials were observed at the site during a 1982 investigation (Navy, 1983). Some of the drums were reportedly leaking at that time. The report concluded that the site had not been used for several years. The drums were reportedly removed and disposed by the Navy. Atlantic personnel inspected the site on October 20, 1988 and observed two 55-gallon drums labeled as engine oil. No surface soil staining or stressed vegetation was evident. The two drums observed in 1988 were subsequently removed.

3.0 REMEDIAL INVESTIGATIONS

3.1 Record Searches & Data Collection Efforts

The investigations at the CBUDSA area included the following:

- Review of records and historical aerial photos
- Interviews with Navy personnel
- Two Remedial Investigations

  Phase I - As part of the 1990 Phase I RI of the CBUDSA, three surface (0 to 6 inch depth) and three shallow subsurface (12 to 18 inch depth) soil samples were collected from three locations at the site. A seventh sample was a composite of 0 to 6 inch depth samples from the three locations. The samples were located in the central part of the CBUDSA. These samples were collected to screen for potential releases associated with past drum storage. Table 1 contains a summary of the sampling data deemed relevant to the risk assessment (contaminants of concern) from the Phase I RI.

  Phase II - One monitoring well (1MW2S) was installed during this phase of the investigation in a location presumed (based on topography) to be downgradient of the CBUDSA. One groundwater sample was collected from this well during each of two sampling rounds. Two additional surface and three subsurface soil samples were collected from the monitoring well boring and two test borings located at the perimeter and downslope of the storage area. The first boring (1TB1) was sampled at depths of 0 to 2 feet and 6 to 8 feet. The second boring (1TB2), at the location of monitoring well 1MW2S, was sampled at a depth of 12 to 14 feet. The third boring (1TB3), located downslope of the site, was sampled at depths of 0 to 2 feet and 5 to 7 feet. Table 1 contains a summary of the sampling data deemed relevant to the risk assessment (contaminants of concern) from the Phase II RI.

A more comprehensive list of the Phase I and Phase II data is included in the Phase II RI (Brown & Root, 1996).

Table 1: Contaminants of Concern and Exposure Concentrations at the CBUDSA

Contaminant of Concern	Exposure Concentration[1]		
	Surface Soil[4] (mg/kg)	All Soil[5] (mg/kg)	Groundwater (mg/l)
Chlorobenzene	NA[2]	NA	0.012[3]
Benzo(a)anthracene	NA	1.1/2.3	NA
Benzo(b)fluoranthene	NA	1.2/2.2	NA
Benzo(a)pyrene	0.32/0.38	0.65/1.1	NA
Carbazole	NA	NA	0.019[3]
Indeno(1,2,3-cd)pyrene	NA	0.41/0.95	NA
4,4'-DDD	2.0/3.9	1.5/3.9	NA
Aroclors	0.30/0.42	0.51/0.78	NA
Aluminum	8610/10100	11000/18900	NA
Antimony	6.1/6.8	10.3/17.4	NA
Arsenic	3.1/4.8	4.9/10.2	0.0030[3]
Beryllium	0.68/1.0	0.96/1.6	NA
Chromium	NA	31.6/42.9	NA
Iron	15600/19100	19500/31200	20.5[3]
Manganese	191/215	216/290	0.468[3]
Vanadium	103/186	71.6/186	NA

[1]Average/maximum concentrations unless otherwise indicated
[2]NA - Not applicable. Contaminant is not a contaminant of concern for this medium.
[3]Maximum concentration
[4]Soils 0 to 2 feet in depth
[5]Soils 0 to 10 feet in depth

4.0 CONTAMINATION ASSESSMENT

4.1 Soil Sampling

Table 1 presents a summary of the analytical results for soil samples. Various organic and inorganic contaminants were detected in soil samples collected at the CBUDSA site. Most of the concentrations encountered were relatively low. For example, although various volatile organics were detected in the soil, the concentrations were all less than 400 μg/kg. Other contaminants detected in the soil matrix included relatively immobile compounds such as 4,4'-DDD (3,900 μg/kg), Aroclor-1248 (420 μg/kg), and Aroclor-1254 (360 μg/kg). Inorganic contaminants were detected in the soil samples in excess of NSB-NLON background levels.

4.2 Groundwater

Groundwater data are presented in Table 1. One monitoring well was sampled twice at the site. This well is located on the side/downgradient edge of the site. Both Round 1 (March 1994) and Round 2 (June 1994) sampling data for contaminants of concern are included in Table 1.

The number and concentration of volatile organic compounds found in the groundwater samples were low. For instance, chlorobenzene was detected only in Round 1 of the Phase II RI at a maximum concentration of 12 μg/L. No volatile organics were detected in Round 2 of the Phase II RI. No pesticides or PCBs were detected in the groundwater samples during either round of the Phase II RI.

Several semivolatile organic compounds were also detected in the Phase II RI groundwater samples. In the Round 1 sample, carbazole was found at the highest concentration (7 μg/L). In the Round 2 sample, carbazole was detected at a concentration of 19 μg/L. The maximum concentration of all other semivolatiles was 13 μg/L.

All of the metals detected were found at roughly similar concentrations in the total versus dissolved samples during both Phase II RI rounds. These results indicate that there was a minimal amount of suspended sediment in the samples (*i.e.*, the water was not turbid). This may be because of the low-flow sampling techniques. Concentrations of most metals increased slightly from Round 1 to Round 2.

5.0 RISK EVALUATION

The risk assessment performed for the CBUDSA is summarized below. A complete description of criteria and guideline values used in the RI is presented in the Phase II RI Report (Brown & Root, 1996). Uncertainties associated with the risk evaluation methodologies are also discussed in the Phase II RI Report.

5.1 Human Health Risk Assessment

The CBUDSA is a relatively isolated site and the baseline human health risk assessment focused on exposure scenarios for an older child trespasser and a construction worker. Groundwater at the NSB-NLON is not used for drinking water nor is it deemed likely to be used in the future as a drinking water supply. Accordingly, ingestion of groundwater from the CBUDSA was not evaluated in the risk assessment. Exposure scenarios deemed relevant for the child tresspasser included incidental ingestion and dermal contact with surface soils. Exposure scenarios deemed relevant for the construction worker scenario included incidental ingestion, dermal contact with soils to a maximum depth of ten feet, and dermal contact with groundwater. Both the central tendency exposure (CTE) and the reasonable maximum exposure (RME) were evaluated for each receptor type.

> *Noncarcinogenic potential:* Cumulative Hazard Indices (HIs) for the trespasser and construction worker range from 0.014 (CTE, trespasser) to 1.2 (RME, construction worker). Although the cumulative HI slightly exceeded unity for the construction worker, all chemical-and route-specific Hazard Quotients (HQs) were less than 1.0 for the RME scenario. All other cumulative HIs and HQs evaluated were less than unity, indicating that no toxic effects are anticipated for these receptors under the defined exposure scenarios.
>
> *Carcinogenic Risks:* Estimated carcinogenic risks are minimal for the older child trespasser exposed to surface soil and the construction worker exposed to "all soil" (soil from depth of 0 to 10 feet) and groundwater. Cumulative incremental cancer risks for the construction worker under both scenarios were less than 1E-6. The cumulative carcinogenic risk for the older child trespasser under the RME (2.7E-6) was within the USEPA's target risk range (1E-4 to 1E-6), and the cumulative incremental cancer risk for this receptor was less than 1E-6 for the CTE (5.1E-8).

Overall, all of the noncarcinogenic evaluations for the older child trespasser and construction worker were below unity, indicating that adverse noncarcinogenic effects are unlikely. Although the cumulative HI for the RME construction worker slightly exceeded 1.0, no adverse effects are anticipated since contaminants contributing to the cumulative HI do not affect the same target organs or exhibit similar critical effects. Incremental lifetime cancer risks did not exceed USEPA's target acceptable risk range. Consequently, the CBUDSA does not pose an unacceptable risk to human health under the defined exposure scenarios.

5.2 Ecological Risk Assessment

The CBUDSA is currently characterized by compacted soil that supports limited vegetation and provides no habitat for ecological receptors. Maximum concentrations of contaminants detected in site surface soils were compared to benchmark values protective of various terrestrial ecological receptors. In general, the results of these comparisons indicate that contaminants associated with this site could adversely impact terrestrial vegetation, soil

invertebrates (earthworms), and terrestrial vertebrates (short-tailed shrew and the red-tailed hawk). When the risks associated with the average surface soil concentrations were evaluated, risks to these receptors were reduced but still exceeded 1.0. Since organisms are more likely to forage at other nearby areas, actual risks to ecological receptors are likely to be much less than those calculated for this area.

The ecological risk assessment conducted within this area and the food chain models developed for the red-tailed hawk and short-tailed shrew as potential receptor species are very conservative in nature. The area of the CBUDSA has been estimated as 15 by 30 feet or 450 square feet. Using the minimum home range value for the red-tailed hawk, this area is approximately 15,000 times smaller than its actual home range. This clearly indicates that risk from 4,4'-DDD, with a HI of 1.1×10^3, which represents 97.2% of the risk to the hawk, would be reduced to acceptable levels of a HI less than 1.

Use of the shrew as a representative receptor species is conservative because of its constant need for food and the unlikelihood that all of its food supply would be located in this area. As described above, this area would provide minimal habitat for prey, and the shrew would likely forage elsewhere because of its high metabolism requirements.

Areas bordering the CBUDSA (*e.g.*, the wooded hillside), however, may comprise desirable habitat for wildlife. While organisms inhabiting this area could come in contact with soil contaminants while moving through the area to forage in the nearby Area A Wetland or Area A Downstream watercourses, it is expected that due to the relatively small aerial extent and compacted soil, the potential for contact is minimal. When the current and future site conditions are factored into this evaluation, it is concluded that the CBUDSA poses no unacceptable risk to ecological receptors.

6.0 CONCLUSIONS

The CBUDSA is being considered for no further action because of the following information:

- The source of contamination was discovered during the 1983 Initial Assessment Study (twenty-six 55-gallon drums containing waste oil, lube oil, and paint materials) has been removed and no visual evidence of contamination remains at the site.

- Soil and groundwater samples collected in the vicinity of the site yielded relatively low concentrations of contaminants. Volatile organic compounds were detected in soil samples at concentrations less than or equal to 380 μg/kg. Only two volatile organic compounds (chlorobenzene and total xylenes) were detected in groundwater at concentrations of 12 and 24 μg/L, respectively. All semivolatile organics compounds in groundwater were detected at concentrations less than or equal to 31 μg/L.

- The human health risk assessment concluded that calculated risks for the stated exposure scenarios did not exceed the USEPA acceptable risk range of 1E-6 to 1E-4 for incremental lifetime cancer risk. The evaluation of noncarcinogenic potential revealed that for the stated exposure scenarios, adverse effects were unlikely.

- The potential for this site to impact ecological receptors is low. Although the ecological risk assessment concluded that contaminants associated with this site could adversely impact terrestrial vegetation, soil invertebrates, and terrestrial vertebrates; the calculations were performed using highly conservative estimates. Furthermore, the site is relatively small in aerial extent and is characterized by compacted soil that supports limited vegetation and terrestrial species. Therefore, the CBUDSA does not provide a significant habitat for ecological receptors.

7.0 DECISION

On the basis of investigations at the CBUDSA, there is no evidence to conclude that the CBUDSA poses a threat to human health or the environment. The decision has been made to remove CBUDSA from further consideration in the IRP process. In accordance with CERCLA Section 120(h)(3), all necessary remedial actions have been taken with respect to the CBUDSA and the USEPA and CTDEP signatures constitute concurrence with this determination.

8.0 REFERENCES

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