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EXPLORATORY DRILLING REPORT RAMAPO HELICOPTER, INC. SMITH ROAD SPRING VALLEY, NEW YORK 10977

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Subsurface Investigations, Inc. (SII) was retained by CASCO Corporation to st pervise and sample necessary borings around the Ramapo Helicopter Site. Test borings were to be continuously split spoon sampled. As required by the CASCO corporation this report has been prepared to document eleven borings of which fifteen borings were actually installed at the Ramapo Helicopter Site located in Spring Valley, Rockland County, New York.

BACKGROUND

Location

The Ramapo Helicopter, Inc. site is located approximately 1.25 miles east of the Village of Spring Valley N.Y. on a parcel of land in a mixed residential and commercial area on Smith Road, midway between Pascack Road to the west, and North Middletown Road to the east. The location of the site is shown in Figure 1.

Ut lities and Underground Structures

All utilities and underground structures in the area of the hanger building were located prior to the drilling operation by SII, who notified the appropriate local utilities. The utility routes within the expected work area were visibly marked as to location and purpose.

GENERAL GEOLOGY AND SUBSURFACE CONDITIONS

The Ramapo Helicopter, Inc. site is located in the Spring Valley region to the west of the lower Hudson Valley, an area characterized by bedrock of undivided sandstone and conglomerate in the Brunswick Formation (Upper Triassic) generally one meter or more from the surface. Soils consist of variable texture poorly sorted diamiet till from deposition beneath glacial ice. The site contains three different soil associations. To the west, beyond the hanger building, fluvial sand and gravel, with occasional lateral lenses of silt predominate in thicknesses from 2 to 20 meters. To the east, beyond the driveway, Kame deposits, or coarse to fine gravel and/or sand with lateral variability in sorting, coarseness, and thickness predominates. Locally, areas are firmly cemented with calcareous cement. Th.cknesses vary from 10 to 30 meters. The overall site soils tend towards the relatively impermeable loam with variable clast content ranging from well rounded diverse lithologies to relatively angular more limited lithologies in upland till.

The elevation at the site is about 410 feet. The site is bordered by residential and light commercial development to the north and east, and commercial development to the west and south. There are no public wells within 1000 feet of the site.

EXPLORATORY DRILLING

Exploratory drilling was performed by Boyd Drilling, Carmel, NY on September 11,12,13, and 17, 1990 at the Ramapo Helicopter. Inc. site. Split spoon sampling was conducted on all borings with the exception of the final two borings around the fuel storage tanks which were augered to 10' and 15' respectively. Boring sites were determined by the indications in the recommendations in the <u>Hazardous Materials Survey and Environmental Investigation Report</u> submitted by benzo(a)pyrene and a relatively large concentration of an unknown semi-volatile organic compound (25,000 ppb or 25 ppm) on the surface. The subsurface sample from this boring also indicates a similar concentration of possibly the same compound (19,000 ppb or 19 ppm).

The surface at boring #5 contains low levels of benzene and benzene related compounds, as well as 19,000 ppb of an unknown semi-volatile organic compound.

At boring (#6), near the underground fuel oil tank, significant petroleum hydrocarbon contamination was apparent both in the first 18" and at increased depths (229 ppm and 868 ppm respectively). In addition, the surface sample indicated a concentration of an unknown semivolatile organic compound at levels of 14,000 ppb (14 ppm). The subsurface sample contained elevated levels of unkown cyclic hydrocarbons and methyl benzenes, both expected in fuel oil and its weathering products. The subsurface sample also had indications above MDL of napihalene and 2-methylnapthalene.

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Boring #7 indicated petroleum hydrocarbons at the surface of 147ppm, but less than minimum detectable below 18". In addition, the surface showed elevated concentrations of unknown semivolatile organic compounds.

The surface of boring #8 showed very high petroleum hydrocarbons (34400ppm) and elevated semivolatiles, including several high molecular weight alkanes 13,000ppb, 17,000ppb and 15,000ppb), and an unknown compound (14,000ppb). The subsurface sample indicated elevated petroleum hydrocarbons (1040ppm) with 13,000ppb of an unknown organic semivolatile compound.

The surface area around borings #9, #10, and #11 indicate elevated levels of petroleum hydrocarbons (113ppm at boring #9 and 165ppm at #11) no deeper than 18". All other samples for these three borings show no further significant contamination.

The laboratory results for the samples taken during the advance of boring #12 indicate little or no surface contamination, with petroleum hydrocarbons less than the minimum detectable. However, at depths of from 4 to 10 feet there are indications of significant contamination from petroleum hydrocarbons, with signs of napthalene, 2-methylnapthalene, bis(2-ethylhexyl)phthalate, and unknown compounds. At 12' to 13' a reduction of contamination is indicated, however, the depth is in the vadose and possibly below the water table.

SUMMARY

Exploratory borings, made at the Ramapo Helicopter site by request of CASCO Corporation, were performed between the dates of September 11, 1990 and September 17, 1990. Analysis indicates contamination of the soils in excess of NYDEC regulations or standards in several locations, most notably around boring #6 with fuel oil, boring #12 with solvents and oil, and borings 8, 9, 10, and 11 with oil and/or solvents. The areas around borings #3 and #4 showed elevated surface contamination with petroleum hydrocarbons, with #4 indicating solvents. 87

Based on the above findings remediation is determined to be necessary to remove the stockpiled soil and native soil below and downgradient from the stockpile site. Remediation will also be necessary on the west side of the building to remove solvent and petroleum contamination in the vicinity of the previously removed waste oil storage tank.

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Contaminated soil removal will be necessary upon excavation of the fuel oil storage tank located on the south side of the building.

Surficial soil removal will be necessary in the vicinity of the storage trailers located on the entry road to the east of the building.

Surficial stained soil in the vicinity of the northwest side of the building should also be removed.

These laboratory methods and resulting analysis are the mechanisms used to identify contamination at underground sites.