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FINAL PROPOSED PLAN LIGHTER AMPHIBIOUS RESUPPLY CARGO (LARC) 60 MAINTENANCE AREA FORT STORY VA

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Draft Final Proposed Plan LARC 60 Maintenance Area

Fort Story, Virginia

August 2007

PUBLIC COMMENT PERIOD

September 1, 2007 – September 30, 2007

During the comment period, interested parties may submit written comments on the Proposed Plan.

Public Meeting:	Site Documents locations:	For additional information contact:
September 17, 2007 **7:00 p.m.** **Christopher Newport University (CNU)** **1 University Place** **Student Center** **Room 205 (2nd floor)** **Newport News, VA 23606**	**Groninger Library** - (757) 878-5017 Building 1313 Fort Eustis, VA 23604 **Fort Story Library** - (757) 422-7525 Building 530 Fort Story, VA 23459 **Central Library** – (757) 385-0150 4100 Virginia Beach Blvd., VA 23452	Ms. Joanna Bateman Remedial Project Manager Directorate of Public Works IMNE-EUS-PW-E, 1407 Washington Blvd. Fort Eustis, VA 23604-5306 Phone: (757) 878-4123 ext. 303 Fax: (757) 878-4589 Email: joanna.g.bateman@us.army.mil

1.0 INTRODUCTION

This Proposed Plan identifies the preferred remedy – No Further Action – and provides the rationale for this preference for the Lighter Amphibious Resupply Cargo (LARC) 60 Maintenance Area Site. This Proposed Plan summarizes information that is described in detail in the Remedial Investigation (RI) Report, RI Addendum Report, and other documents for this site.

The U.S. Army (Army) is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan is issued by the Army, the lead agency for site activities, in consultation with the Virginia Department of Environmental Quality (VDEQ), the supporting agency.

This Proposed Plan informs the public of the remedy preferred by the Army, in consultation with VDEQ, and acts as a mechanism to solicit public comments pertaining to the preferred alternative. The Army, in consultation with VDEQ, will select a final remedy for the site following review and consideration of all information received during the 30-day public comment period. The public is, therefore, encouraged to review the available records to gain a better understanding of the site and cleanup activities that have been conducted to date.

2.0 SITE BACKGROUND

This Proposed Plan provides a brief description of the site, an overview of the site history, as well as a summary of previous investigations, and is divided into the following sections:

- Introduction (1.0)
- Site Background (Section 2.0)
- Site Characteristics (Section 3.0)
- Scope and Role (Section 4.0)
- Summary of Site Risks (Section 5.0)

- Remedial Action Objectives (Section 6.0)
- Summary of Alternatives (Section 7.0)
- Evaluation of Alternatives (Section 8.0).
- Preferred Alternative (Section 9.0)
- Community Participation (Section 10.0)
- Glossary – Provides definitions of terms.

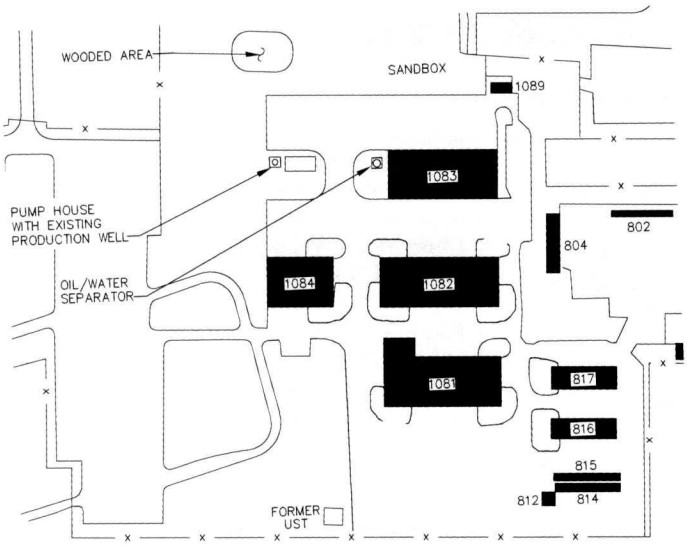

Figure 1 – Site Layout

As shown on **Figure 1**, the LARC 60 area, which was the maintenance and wash rack area for LARC 60 vehicles, is located in the sand flat area that lies between the coastal dune complex to the north and the central sand ridge to the south. The LARC 60 area includes Buildings 1081, 1082, 1083 and 1084. During the 1950s, the wash rack area was first used as the barge amphibious resupply cargo (BARC) motor pool and maintenance facility. In 1964, the BARC vehicle was phased out and the LARC 60 vehicle was prototyped. In 1982, the LARC 60 facility was modified with the construction of a concrete wash rack pad. Approximately 39 catch basins are located throughout the LARC 60 site, which are used for collection of storm and wash water. The LARC 60's were phased out of the Army inventory in 2003. Heavy transportation equipment (not watercraft) is currently stored and operated on the concrete wash rack and Sandbox Area.

A former 10,000-gallon underground storage tank (UST) was located at the north gate of the LARC 60 vehicle motor pool approximately 600 feet south of the wash rack area. This UST, installed in 1983 wasused for storing used oil and degreasers. Although James M. Montgomery, Inc.'s (JMM) April 1990 field visits to this area identified soil-stained zones around the UST, there are no reports of tanks failing or leaking. These soil-stained areas may have been caused by overfilling or spillage during use. In 1987, the U.S. Army Environmental Hygiene Agency sampled the UST and found it contained oil, water, 1,1,1-trichloroethane and chromium. In September 1992, the Environmental Restoration Company (ERC) removed the used oil UST and excavated a large volume of petroleum-stained soils.

The previous investigations at the site have included the following:

- U.S. Army Environmental Hygiene Agency Risk Assessment, June 1987.
- James M. Montgomery Preliminary Assessment/Site Investigation (PA/SI), January 1992.
- ERC Initial Abatement, September 1992.
- IT Corporation Removal Action, November 1994.
- Environmental Technology UST Investigation, February 1995.
- Earth Technology Soil Sampling Event, April 1995.
- Malcolm Pirnie RI, December 2002
- Malcolm Pirnie Groundwater Pilot Scale Study, May 2004.
- Malcolm Pirnie RI Addendum, August 2007.

A summary of the previous investigations that focus on contaminant assessment is presented as follows:

U.S. Army Environmental Hygiene Agency Risk Assessment, June 1987

The U.S. Army Environmental Hygiene Agency (USAEHA) conducted a Health Risk Assessment in June 1987 at the LARC 60 site to determine if an unacceptable health threat existed to workers at the site. For the contaminants detected (lead, chromium petroleum hydrocarbons), the excess, upper bound, lifetime cancer risk estimate calculated was within the range considered acceptable to the U.S. Environmental

Protection Agency (EPA). In addition, the hazard index derived was less than one, indicating that non-carcinogenic health effects would not be expected. Based on the quantitative risk assessment, USAEHA concluded that an unacceptable human health threat did not exist to workers at the site.

James M. Montgomery, Inc. (JMM) PA/SI, January 1992

JMM conducted the PA/SI to determine the presence of significant contamination at eight sites including the LARC 60 site. The site has two main areas of possible environmental concern: the wash rack area, which has an oil/water separator (OWS), and the former UST area. Total fuel hydrocarbons, copper, zinc, and lead were detected above trigger levels at the site. As with soil samples, numerous analytes were detected in groundwater above trigger levels at the wash rack and UST areas. Benzene, vinyl chloride, total fuel hydrocarbons, and 1,1-dichloroethene (1,1-DCE) were detected above trigger levels. A Remedial Investigation/Feasibility Study (RI/FS) was recommended at the LARC 60 site.

ERC Initial Abatement Measures Study, September 1992

On September 28, 1992, ERC removed one 10,000 gallon UST that contained used oil from Building 1081. Based on the report, the removal of the UST resulted in an excavation depth of approximately 12.5 feet below land surface (BLS). The initial excavation was reported to be to a depth of 9.5 feet BLS with an additional three feet of petroleum-contaminated soil removed. According to the report, the stained soils were placed back into the excavation. Total petroleum hydrocarbons (TPH) concentrations in the samples from the bottom of the excavation ranged from 36,353 to 62,823 milligrams per kilogram (mg/kg) while the composite samples from the stage soil pile had a TPH concentration of 12,173 mg/kg.

IT Corporation Removal Action, November 1994

IT Corporation conducted several rapid response removal actions at Fort Story in 1994, including the LARC 60 site. IT reported that the following activities were performed at the site:

- Disposal off-site of two piles of soil believed to contain waste solvents.
- Designed and installed an in situ bioremediation system (utilization of microorganisms to digest petroleum hydrocarbons) for the treatment of TPH-contaminated soils.
- Excavated the soils within the LARC 60 Sandbox. The soils were transferred to the bioremediation system for treatment to a TPH level of less than 50 parts per million (ppm).
- Placed remediated soils back in the excavated area. However, due to the presence of heavy oils and greases in the soils, the 50 ppm treatment goal could not be reached with the bioremediation process. TPH concentrations remaining in treated soils ranged from non-detect to 4,800 ppm with an average concentration of 229 ppm (by EPA Method 8015) and 751 ppm (by EPA Method 418.1) remaining in soils.

Environmental Technology of North America, Inc., (ETI), UST Investigation, February 1995

In February 1995, ETI collected soil and groundwater samples by direct push technology from the former UST pit at the southern end of the site. TPH, toluene, ethylbenzene and xylene were detected in soils from the pit and from stockpiled soils. Numerous chlorinated organics were detected in the groundwater sample including TPH (180 mg/l), tetrachloroethene (PCE) (2,700 micrograms per liter (µg/l)), trichloroethene (TCE) (8,800 µg/l), and cis 1,2-dichloroethene (cis 1,2-DCE) (5,200 µg/l).

Earth Technology Soil Sampling, April 1995

Based on information provided in ERC's report, VDEQ requested sampling of the backfill soils. Upon performance of the field activities, Earth Tech made the following observations:

- The excavated pit had been backfilled with clean sand, lithologically different from the native material.
- The depth of the excavation did not extend beyond 9.5 feet BLS.

- Soil from the original excavation activities were stockpiled adjacent to the excavation and not placed back into the excavation.

Earth Tech collected soil samples from the backfill material and the native soils underlying the backfilled soils. Field observations of the underlying soil material indicated higher photoionization detector (PID) readings than those in the backfill material, but showed no evidence of fuel-saturated soils or free product. Based on the data collection effort, no additional excavation of material was warranted from the former UST excavation area.

Malcolm Pirnie Remedial Investigation, December 2002

Malcolm Pirnie completed a RI in 2002 with submission of the Final RI report in December 2002. A summary of the nature and extent of contaminant and the risk assessment is presented in Section 3.0.

Malcolm Pirnie Groundwater Pilot Scale Study, May 2004

Malcolm Pirnie contracted with In-Situ Oxidative Technologies, Inc. (ISOTEC) to perform sodium permanganate ($NaMnO_4$) injections throughout the course of the Pilot Study. Liquid concentrate was used for both injection events at the site. The zone of treatment included an interval from 10 feet to 30 feet BLS with the groundwater table present at a depth of approximately 10 feet BLS. Five injection points located upgradient of monitoring well MW-117 (well with highest contaminant concentrations on-site) were utilized for delivery of the permanganate. Based on the thickness of the treatment zone (20 feet), each injection point was divided into five 4-foot intervals (10 to 14 feet BLS, 14 to 18 feet BLS, 18 to 22 feet BLS, 22 to 26 feet BLS, and 26 to 30 feet BLS), with each interval receiving permanganate.

During the 1st injection event of the Pilot Study, approximately 2,125 gallons of a 1% solution of $NaMnO_4$ were injected at five injection points (425 gallons per point) on August 12 and 13, 2003. The volume of 2,125 gallons of the 1% $NaMnO_4$ solution equals approximately 550 lbs of permanganate delivered to the subsurface during the 1st injection event. The zone of treatment for the 2nd injection event was the same as the zone described for the 1st injection event. The 2nd injection event consisted of the injection of approximately 55 gallons of reagents into each injection point interval. During the 2nd injection event of the Pilot Study, approximately 1,375 gallons of an 8% solution of $NaMnO_4$ were injected at five injection points (275 gallons per point) on May 13, 2004. The volume of 1,375 gallons of the 8% $NaMnO_4$ solution equals approximately 2,750 lbs of permanganate delivered to the subsurface during the 2nd injection event.

Based on the results of the chloride, iron, and volatile organic compound (VOC) analysis, it was determined that injection of an 8% solution of sodium permanganate was sufficient to oxidize the groundwater contaminants at the site. However, a higher concentration of permanganate was deemed necessary to destroy the residual VOCs at the site due to their relatively low concentration (less than 100 µg/L).

Malcolm Pirnie RI Addendum, August 2007

Malcolm Pirnie completed a RI Addendum in August 2007 to address a revised risk assessment and to summarize groundwater monitoring data collected in May 2007. A summary of the groundwater results and the revised risk assessment conclusions is presented in Section 3.0.

3.0 SITE CHARACTERISTICS

Surface Topography and Hydrology

The LARC 60 area is located in the sand flat area that lies between the coastal dune complex to the north and the central sand ridge to the south. The majority of the site is a paved maintenance area with no significant topographic relief.

Surface runoff and wash water from the majority of the site is controlled by a storm drain system. A system of 39 catch basins and an oil/water separator is used to collect storm and wash water from the site. The water flows into a drainage outfall line and then into the Chesapeake Bay at Outfall 001. Surface runoff from the Sandbox Area drains into a drainage ditch located along the northern boundary of the Sandbox. The ditch

is a storm water collection area with no discharge point.

Geology and Hydrogeology

The site lithology was established based on borings conducted during the PA/SI and RI field activities. Borehole logs provided lithologic data for five permanent monitoring wells and two piezocone borings from the current investigation. The sediments underlying the LARC area consist of sand deposits of the Kennon and Columbia Group that are of Holocene and Pleistocene Age respectfully. Drilling penetrated the upper forty feet of sediments and these were described with respect to lithology and sedimentary features by the site geologist.

The measured depth to groundwater at the site ranged from 2.80 to 9.91 feet BLS. Water level data from on-site wells indicates that the water table elevation ranges from approximately 4.81 to 6.33 feet National Geodetic Vertical Datum (NGVD). Though locally variable in magnitude and direction, the prevailing hydraulic gradient for the site is in a northward direction toward the coastline. Estimated hydraulic conductivity values range from 1.99×10^{-3} to 1.84×10^{-2} centimeters per second (cm/sec) with an average value of 7.42×10^{-2} cm/sec as established by the PA/SI.

Nature and Extent of Contamination

Soil

A summary of the nature and extent of soil contamination is provided as follows:

- Acetone, methylene chloride, methyl ethyl ketone (MEK) PCE, styrene, TCE, and toluene were detected in several surface and subsurface soil samples collected at the site. Concentrations of the VOCs varied from surface to deeper depths with no apparent trends.

- TPH as Heavy Oils was detected in numerous surface and subsurface soil samples across the site. The source of the TPH includes the former UST, past wash rack, operations and maintenance activities in this area and from past LARC vehicle operation and storage activities (i.e., leaks from heavy equipment).

- Numerous metals were detected in soils in this area with concentrations typically decreased with depth. The lateral extent of metal contamination was not defined; however, metal concentrations were at least one order of magnitude lower than the EPA screening criteria across the site.

Groundwater

Groundwater samples have been collected from monitoring wells across the site in numerous monitoring events since 1995. The locations of these wells are presented on **Figure 2**.

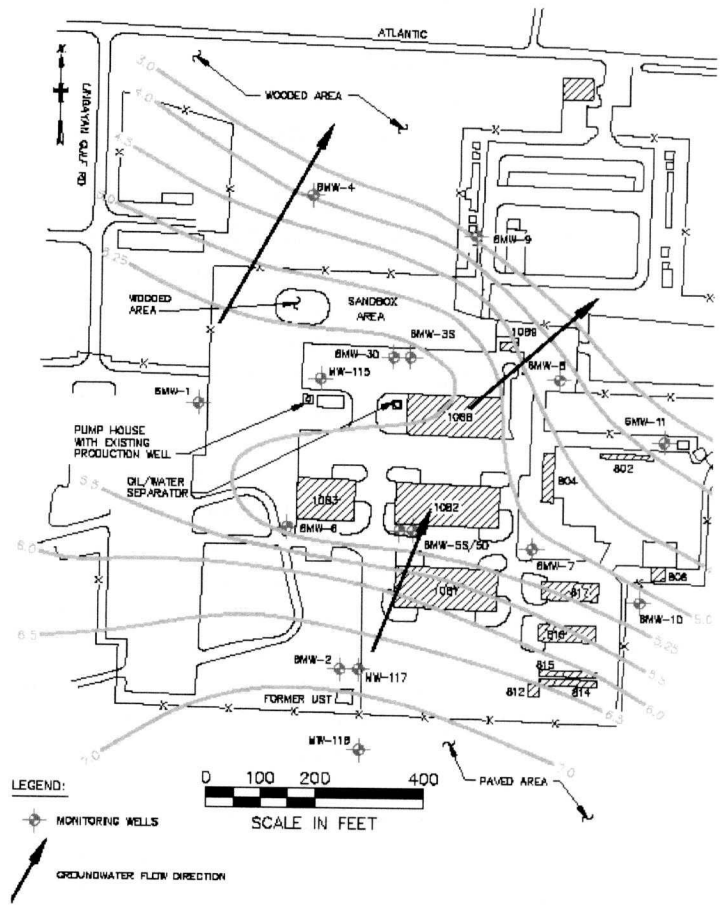

Figure 2 – Groundwater Map

Numerous VOCs, as well as two PAHs (naphthalene and 2-methylnaphthalene), have been detected in wells at the site over the 12-year monitoring period. However, historically VOCs have only exceeded the Maximum Contaminant Level (MCL) (or Risk Based Concentration (RBC) when an MCL was not available) in four wells (MW-117, 6MW-3S, 6MW-7, and 6MW-9) at the site. It should be noted that the 1 µg/L detect for 1,4-

dichlorobenzene appears to be the result of cross-contamination since it also was detected in the associated method blank for that sample.

The effects of the sodium permanganate injections on groundwater quality in the former source area is evident by the continued decrease in VOC concentrations in MW-117 which is located directly downgradient of the former source area where the injections took place. It should be noted that there was a downtrend in VOC concentrations in MW-117 prior to the injections as noted in the 2003 groundwater data from MW-117. Based on data from the 1995, 2000, and 2003 monitoring events, concentrations of cis 1,2-DCE, ethylbenzene, PCE, toluene, TCE xylenes and vinyl chloride decreased. The post-injection data for MW-117 (2004 to 2007) suggests a continued downward trend with cis 1,2-DCE concentrations decreasing from 24 to 2 µg/L, PCE from 0.67 µg/L to non-detect, and xylenes from 65 to 13 µg/L.

Historically, the most impacted downgradient well has been 6MW-3S with cis 1,2-DCE, PCE, TCE, and vinyl chloride exceeding the MCLs in the 2004 monitoring data. Although still detected in 2007, none of these compounds exceed their respective MCL. Monitoring well 6MW-9 is located directly downgradient of 6MW-3S but none of these compounds were detected in 2007.

Due to the noted presence of naphthalene and 2-methylnaphthalene above the EPA RBCs for tap water during the RI sampling event, PAHs were analyzed as well during the May 2007 monitoring event. Naphthalene and 2-methylnaphthalene were only detected in one well (MW-117) during this monitoring event at concentrations of 5.1 and 5.3 µg/L, respectively. Although no EPA MCL has been established for these two compounds, their concentrations are below the EPA RBCs for tap water of 24 µg/L for 2-methylnaphthalene and 6.5 µg/L for naphthalene. The naphthalene detect of 5.3 µg/L is also less than the EPA lifetime health advisory of 100 µg/L. No such advisory has been established for 2-methylnaphthalene.

There are several reasons for the decreasing trends downgradient including: (1) impact of the sodium permanganate injections upgradient have greatly decreased the concentrations of these VOCs at the source area thereby reducing the mass of VOCs present that can continually leach into groundwater or be transported downgradient, (2) with the reduction of source mass concentrations, infiltration which is high because of the sandy soils and shallow groundwater present reduces concentrations throughout the site, and (3) albeit slow because of the relatively flat groundwater gradient, dispersion of contaminants will have somewhat of an affect on VOC concentrations.

Sediment

A summary of the nature and extent of sediment contamination is provided as follows:

- TPH as Heavy Oils is present in the ditch north of the Sandbox due to surface transport of soil from the Sandbox during heavy precipitation events. Due to stagnant conditions, an accumulation of TPH-contaminated sediment occurs in the ditch with no transport occurring.

- Metals are present in sediment in the ditch but as previously discussed, with concentrations lower than EPA screening criteria.

Surface Water

A summary of the nature and extent of surface water contamination is provided as follows:

- Based on vertical elevations established for the two surface water locations in the ditch, the ditch intersects the shallow water table. The elevations were consistent with the groundwater elevations in that area.

- During dry weather conditions, the water (if any) present in the drainage ditch will be groundwater that has seeped into the ditch. Surface water results were also consistent with contaminant concentrations detected in DPT points in the Sandbox and in monitoring well 6MW-3S. Acetone and total metals are present in the ditch but, as previously discussed, with the exception of manganese which was greater than the EPA RBC for tap water, with concentrations lower than EPA screening criteria. It should be noted that the comparison of surface water data to EPA RBCs for tap water is highly conservative.

4.0 SCOPE & ROLE OF RESPONSE

No additional response action is necessary at the

LARC 60 site. This is based on the following conclusions:

- No MCLs were exceeded during the May 2007 sampling event.
- The trends indicate that contaminants of concern (COCs) concentrations in groundwater are decreasing due to numerous fate mechanisms.
- The effectiveness of the $NaMnO_4$ injections.
- The results of the baseline risk assessment that did not identify receptors and potentially exposed populations.

5.0 SUMMARY OF SITE RISKS

Human Health Risk Assessment

Identification of Chemicals of Potential Concern (COPCs)

COPC identified during the hazard identification of the LARC 60 site media because of their exceedences of EPA screening criteria (e.g., MCLs or RBCs) include the following:

Surface and Subsurface Soils: Arsenic

Groundwater: cis 1,2-DCE, methyl isobutyl ketone (MIBK), toluene, vinyl chloride, 2-methylnaphthalene, naphthalene, antimony, arsenic, iron, and manganese

Surface Water: Iron and Manganese

Exposure Assessment Summary

This section describes the complete exposure pathways by which the potential receptors may be exposed to the COPCs in the soil, surface water, and groundwater via a specific exposure route.

Potential Receptors and Exposure Pathways Summary

Because no contaminants in soils or sediment exceeded EPA RBCs for industrial soils, and because groundwater is not utilized at the site, no risk-based limits would be exceeded for the current situation. In the original RI Report, the potential exposure pathways for future land use at the LARC 60 site included:

- Residential exposure (adults and children) to **contaminated groundwater** through ingestion of drinking water, dermal contact with and inhalation of volatilized chemicals while bathing or showering.

- Residential exposure (adults and children) to **contaminated soil** through ingestion of and dermal contact with chemicals.

However, based on master planning for Fort Story which does not include base closure (most recent BRAC did not include Fort Story as a potential candidate), as well as its unique location and subsequent training environs, the facility is expected to remain government property. The potential for future development of the land as commercial, residential, or recreational properties is not expected as the installation will remain open and the area will continue as industrial usage; therefore, the future land use will be the same as the current land use. If land use conditions change in the future, possible exposure scenarios (e.g., residential exposure to soils and groundwater if residential development were planned) will be re-evaluated. This conclusion is a revision from the text provided in the baseline human health risk assessment presented in the Final RI Report for the site. It should also be noted that groundwater contaminant concentrations, based on the May 2007 monitoring event, are below the EPA drinking water standards.

Although initially identified as the only COPC in soil due to its exceedence of the residential soil RBC value, arsenic was detected in site soils at concentrations consistent with the background soils; therefore, the risk associated with it is not related to site-specific activities such as spills, leaks, or industrial activities. Accordingly, no land use issues (industrial or residential) as they relate to human health risk would be associated with site soils.

Ecological Risk Assessment (ERA)

Identification of COPCs

This section presents lists of chemicals detected in the site surface soil and sediment samples that are considered COPCs. Groundwater was not addressed in this assessment, as it does not have a complete exposure pathway at the site. The compounds

identified as COPCs are considered to be those with the greatest potential significance to aquatic and wildlife receptors.

Soil

Acetone was detected in one sample and lacked screening criteria; however, due to the low frequency and the low level at which it was detected, it was not considered to be of concern. TPH was detected in 19 of the 22 samples. These samples were taken from the former UST area, the wash rack, the Sandbox and the adjacent wooded area. However, no PAHs were measured above detection limits. Total TPH was not retained as a COPC, since the more toxic components of TPH were not detected.

Several metals were detected with high frequency at concentrations that exceeded EPA Region III BTAG screening criteria. Chromium, iron, and lead concentrations exceeded screening criteria. In addition, aluminum, arsenic, copper, and zinc lacked faunal screening criteria. Of these compounds, aluminum, arsenic, iron and vanadium concentrations fell within site specific and U.S. Geological Survey (USGS) regional background concentrations; therefore, these compounds were not considered to be potentially of concern. Chromium, lead, and zinc concentrations fell within regional background but exceeded measured site-specific concentrations; therefore, these compounds were retained as COPCs for surface soils. Copper concentrations exceeded both site-specific and regional background concentrations and were retained as a COPC.

Sediment

A total of 2 sediment samples were taken from the small drainage ditch adjacent to the site and analyzed for VOCs, semi-volatile organic compounds (SVOCs), TPH and metal concentrations. VOC and SVOCs were not detected in the samples. Total TPH was detected in both samples. Because PAHs were not detected in the samples, TPH was not considered to be of potential concern. No metals detected exceeded EPA Region III BTAG screening criteria. Several metals detected lacked screening criteria. No background values were available for sediment. All contaminants that lacked screening criteria were retained as COPCs.

Surface Water

Two surface water samples were taken from the adjacent drainage ditch. Acetone was detected in both samples at levels below screening criteria. SVOCs and TPHs were not detected in either sample. No metals were detected at levels which exceeded available screening criteria. Calcium, magnesium, manganese, potassium, and sodium do not have screening criteria. These constituents are naturally occurring in water and were found at low levels in the samples taken; therefore, they were not considered to be of concern. No COPCs were selected for surface water at the LARC 60 Site.

COPC Summary

The COPCs for the LARC 60 site include the following:

- **Surface Soil** - chromium, copper, lead, and zinc
- **Sediment** - aluminum, barium, iron, manganese, and vanadium
- **Surface Water** - none

Exposure Assessment

The following summarizes the ecological setting, target receptors, and potential exposure pathways.

Ecological Setting and Species Summary

Following is a brief description of the habitat requirements and diet of the terrestrial endpoint species selected for the LARC 60 site. In addition, the reasons for selection of these species are discussed.

- **Herbaceous Vegetation.** Plants that occur in pine/oak woodland and disturbed areas of the northeastern United States are likely to occur at the Site. These plants include herbaceous species that serve as an important food source for songbirds, small mammals, and larger herbivores.

- **Soil/Sediment Invertebrates.** Invertebrates that are common in sandy soils in Southeastern Virginia are likely to occur within and adjacent to the site. In addition, sediment invertebrates that favor intermittent streams and pools or damp soils are likely to occur within the drainage area adjacent to the site. These invertebrates are an important food

source for ground gleaning birds and small mammals.

- **White-footed Mouse**. The White-footed Mouse has been selected to represent the small mammal community at the LARC 60 site. As a receptor with an omnivorous diet, the mouse is representative of herbivorous and insectivorous small mammals present within the boundaries of the site.

- **Northern Bobwhite (*Coilnus virginianus*).** The Northern Bobwhite was selected to represent the ground-gleaning avian community at the site. Their habit of dust bathing makes them a more likely candidate for exposure to contaminants in the Sandbox, in addition to exposure realized through habits such as foraging and nesting.

- **Gray Fox (*Urocyon cinereoargenteus).*** The Gray Fox has been selected to represent the terrestrial carnivore community at the Site. Although the Merlin and Red-tailed Hawk may also represent other potential endpoint species in the carnivore category, their home ranges are typically much larger than that of the fox, and their use of the LARC 60 site is likely to be restricted.

Exposure Pathways

Several ecologically relevant migration pathways for contaminants exist at the site. Wildlife may have incidental contact with or ingestion of contaminants while foraging, nesting, or engaging in other activities in the site. Chemical contaminants can also adversely affect plants and animals in surrounding habitats via the food chain. Upon their release, some site contaminants are persistent and may be transformed to more bioavailable forms and mobilized in the food chain. Mobilization of contaminants in the terrestrial food chain could occur through the following pathways:

- Root uptake from contaminated soil by herbaceous plants,
- Bioaccumulation from vegetation or animal prey at the base of the food chain by wildlife.
- Contact and absorption, incidental ingestion, and feeding on contaminated food by invertebrates, and
- Drinking of contaminated surface water by wildlife

Based on these pathways, the following general classes of ecological receptors potentially might be exposed to contaminants at the LARC 60 site.

- Terrestrial plants growing within and adjacent to the sites,
- Terrestrial invertebrates likely to occur in surface soils and benthic invertebrates occurring within the sediments,
- Birds that forage or nest within the areas,
- Small mammals that reside and/or feed in the vicinity of the areas, and
- Other higher trophic level wildlife species (e.g., carnivores) that feed within the vicinity of the sites.

Ecological Risk Characterization

The levels of chromium in the soil and aluminum and vanadium in sediment were found to exceed phytotoxicity values. The levels of aluminum and iron in the sediment were found to exceed invertebrate toxicity values. Phytotoxicity values were not available for iron.

Results of the exposure calculations show that the levels of zinc resulted in an HQ of 1 for the Northern Bobwhite. The levels of aluminum resulted in HQs greater than 1 for the White-footed Mouse and the Gray Fox. These contaminants detected at the site may pose a risk to the species examined. The other contaminants are unlikely to pose a risk to the species examined. Avian and mammalian toxicity values were unavailable for iron. Therefore, the potential risk of this contaminant could not be estimated.

Summary of Risks

At the LARC 60 site, the potential risks of exposure to zinc for avian species and aluminum for small mammals and terrestrial carnivores were identified. The potential risk of exposure to chromium in the soil and aluminum and vanadium in sediment were identified for plants. Lastly, potential risks of exposure to aluminum and iron in the sediment were identified for sediment invertebrates. These risks of adverse effects were identified for the maximum exposure scenario.

Ecological Significance

The LARC 60 site is a potential source of environmental contamination in soil and sediments. These potential effects are considered to have minimal ecological significance for the following reasons:

- In many cases, wildlife risks were identified for the maximum exposure case. The average concentrations are more representative of exposure for mobile species of wildlife, such as the White-footed Mouse.
- The LARC 60 site is currently used for military activities occurring on the base. Consequently the habitat quality is poor and comparatively unattractive to potential ecological receptors. Give the site use and habitat quality, the site could only theoretically support no more than a few individuals, and the potential population impact is extremely remote.
- The ecosystems in the general vicinity of the site do not appear to be impacted or stressed due to chemical contamination.
- Apex predators and wildlife with large home ranges are not likely to be adversely affected due to the comparatively limited extent of contamination.

6.0 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are site-specific, qualitative or quantitative initial clean-up objectives that are established based on the nature and extent of contamination, the resources that are currently and potentially threatened, and the potential for human or ecological exposure. Because no potential unacceptable human health or ecological risk has been identified for the site and no MCLs were exceeded in the May 2007 sampling event, a **No Further Action** remedy is proposed at the LARC 60 site; therefore, no site-specific RAOs have been established.

7.0 SUMMARY OF REMEDIAL ALTERNATIVES

Because no potential unacceptable human health or ecological risk has been identified for the site and no MCLs were exceeded in the May 2007 sampling event, a FS was not conducted; therefore, no summary of remedial alternatives is available.

8.0 EVALUATION OF ALTERNATIVES

Because a FS was not conducted, an evaluation of potential remedial alternatives was not available.

9.0 PREFERRED ALTERNATIVE

Although a preferred alternative was not identified through the typical FS alternatives analysis, the proposed remedy for the site is **No Further Action** because of the lack of identified potential risk at the site.

Two additional groundwater monitoring events with analysis for VOCs and SVOCs will be conducted to confirm that COC concentrations are below MCLs. However, if a site-related MCL exceedence occurs, then the Army will implement the contingency of conducting two additional rounds of groundwater monitoring to confirm that a site-related concern exists or that the exceedence was an anomalous event. If the monitoring events indicate that COC concentrations exceed MCLs and the concentrations are not simply an anomalous event, then a re-assessment of potential risks and remedies will be warranted.

This selection is preliminary and subject to public comment. The selection could subsequently be changed if additional information is presented.

10.0 COMMUNITY PARTICIPATION

The site reports, including the Proposed Plan, have been made available for a public comment period, which begins on September 1, 2007 and concludes on September 30, 2007.

A public meeting will be held during the public comment period to explain the preferred remedy and to facilitate the receipt of public comments. The meeting will be held at a location to be determined.

Both written comments and comments received at the public meeting will be documented and responded to in the Responsiveness Summary appended to the Decision Document, the document which formalizes the selection remedy.
To send written comments or obtain further information, contact:

Ms. Joanna Bateman
Remedial Project Manager
U.S. Army Garrison
IMNE-EUS-PW-E
1407 Washington Blvd.
Fort Eustis, Virginia 23604-5306
Phone: (757) 878-4123 ext. 303
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Email: joanna.g.bateman@us.army.mil

Mr. Wade Smith
Remedial Project Manager
629 East Main Street
Richmond, Virginia 23219
Email: wmsmith@deq.virginia.gov

Copies of all supporting documentation are available at the repositories identified below.

Directorate of Public Works
Environmental Division, Building 1407
1407 Washington Blvd.
Fort Eustis, Virginia 23604
(757) 878-4123
Monday through Friday 8 a.m. to 4:30 p.m.

Groninger Library
Building 1313
Fort Eustis, Virginia 23604
(757) 878-5017
Monday through Thursday 11 a.m. to 7 p.m.
Sunday 12 p.m. to 5 p.m.

Fort Story Library
Building 530
Fort Story, Virginia 23459
(757) 422-7525
Monday through Friday 11 a.m. to 6 p.m.
Tuesday 11a.m. to 7 p.m.
Closed weekends

Central Library
4100 Virginia Beach Blvd.
Virginia Beach, Virginia 23452
(757) 385-0150
Monday through Thursday 10 a.m. to 9 p.m.
Friday and Saturday 10 a.m. to 5 p.m.
Sunday (1st Sunday after Labor Day – May) 1 to 5 p.m.

GLOSSARY OF TERMS

Applicable or Relevant and Appropriate Requirements (ARARs): The regulatory requirements set forth by federal and state environmental rules, regulations, and standards, which must be reached during the implementation of the remedial action.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): The federal law initially passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The law establishes the program commonly known as Superfund, and regulated by the United States Environmental Protection Agency, to investigate and remediate uncontrolled or abandoned hazardous waste sites.

Feasibility Study (FS): An engineering study conducted under the scope of CERCLA designed to evaluate potential clean-up alternatives, and determine which alternative would be best suited in terms of cost and feasibility to achieve cleanup criteria.

Maximum Contaminant Levels (MCLs): MCLs were developed by the EPA, in accordance with the Safe Drinking Water Act. MCLs are legally enforceable for drinking water supplies and represent the allowable concentration for a given constituent in drinking water.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The, NCP, more commonly called the National Contingency Plan, is the federal government's blueprint for responding to both oil spills and releases of hazardous substances, pollutants, or contaminants. This national response capability plan promotes the overall coordination among a hierarchy of responders and contingency plans.

Polynuclear Aromatic Hydrocarbons (PAHs): A class of chemicals commonly associated with heavy petroleum products. Many of the chemicals in this class have carcinogenic properties.

Proposed Plan: A document that presents a proposed cleanup alternative, rationale for the preference, and requests public input regarding the proposed alternative.

Record of Decision (ROD): A legal public document that describes the cleanup action or remedy selected for a CERCLA site, the basis for the choice of that remedy, and public comments on alternative remedies. The ROD is based on information and technical analysis generated during the RI/FS.

Remedial Action Objective (RAO): RAOs are site-specific, initial clean-up objectives that are established on the basis of the nature and extent of contamination, the resources that are currently and potentially threatened, and the potential for human and environmental exposure.

Remedial Investigation (RI): An investigation conducted under the scope of CERCLA designed to determine the nature and extent of contamination, identify potential human health and ecological risks posed by the site, and identify clean-up criteria.

Risk-Based Concentrations (RBCs): RBCs were calculated by the EPA Region III specifically for use at Hazardous Waste Sites, in order to evaluate risk to potential receptors posed by site contaminants. The EPA has provided risk-based concentrations for a variety of constituents contained in both soil and water matrices.

Semi-Volatile Organic Compound (SVOC): A class of chemicals, generally man-made, that are considered relatively involatile under normal atmospheric conditions.

Volatile Organic Compound (VOC): A class of chemicals, generally man-made, that are considered volatile under normal atmospheric conditions.

FROM:

Name

Address

Affiliation

Phone ( )

Place USPS

Stamp Here

TO:

U.S. Army Garrison
IMNE-EUS-PW-E, Building 1407
1407 Washington Blvd.
Fort Eustis, VA 23604-5306
Attn: Ms. Joanna Bateman
Remedial Project Manager

Please print or type comments here:

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