



US Army Corps
of Engineers®
Buffalo District

Lake Ontario Ordnance Works Site Risk Assessment Fact Sheet

US Army Corps of Engineers, Buffalo District • May 2009

The Defense Environmental Restoration Program (DERP) was established in 1986 to address contamination caused by Department of Defense (DoD) activities. Sites no longer owned by the DoD as of 17 October 1986, are addressed under the DERP Formerly Used Defense Site (FUDS). The US Army is the executive agent responsible for the DERP-FUDS. This fact sheet has been prepared to address community outreach needs and is consistent with provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Site Description

The Lake Ontario Ordnance Works (LOOW) is a 7,500-acre site located in the towns of Lewiston and Porter, New York, and was formerly used for a World War II trinitrotoluene (TNT) manufacturing facility (see Figure 1). Approximately 7,000 acres of the site meet the criteria of a Department of Defense (DoD) Formerly Used Defense Site (FUDS). The TNT production, production support, and storage areas were constructed on approximately 2,500 acres. The remaining 5,000 acres, located to the west of the production area, were not heavily utilized and became known as the “buffer zone.” Current owners of the former LOOW site include local and federal government, individual private residents, and private corporations.

Remedial Investigations (RI)

The Corps conducts its environmental investigations, decision-making and cleanup work using the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process. The RI for LOOW is being conducted in multiple phases to work within funding constraints. The Phase I and Phase II RIs occurred in 1998 and 2000. The Phase II RI was designed to further evaluate those areas that appeared to be of potential environmental concern based upon a history search of the former LOOW, previous investigations, results of the Phase I RI, and areas that had little or no impact from non-DoD entities. The Phase III RI (UURI) was recently completed to investigate the underground utilities within the former LOOW. Additional information about the UURI can be found in the fact sheet located at www.lrb.usace.army.mil/derpfuds/loow/. The Phase IV RI on the former LOOW wastewater treatment plant (WWTP) is planned for 2009 and 2010. The human health risk assessment (HHRA) and the screening level ecological risk assessment (SLERA) are integral components of the RI within the CERCLA framework.

Exposure Units

To facilitate the evaluation of the contamination sources, the areas of concern (AOCs) at the former LOOW were combined into exposure units (EUs). An assessment of proximity, contaminant type and distribution, AOC history, similar terrain/vegetation, and industrial processes, was performed to determine how to combine the AOCs into EUs. The final list of properties (referenced by current owner) and the associated EUs evaluated in the HHRA are presented on Figure 2.

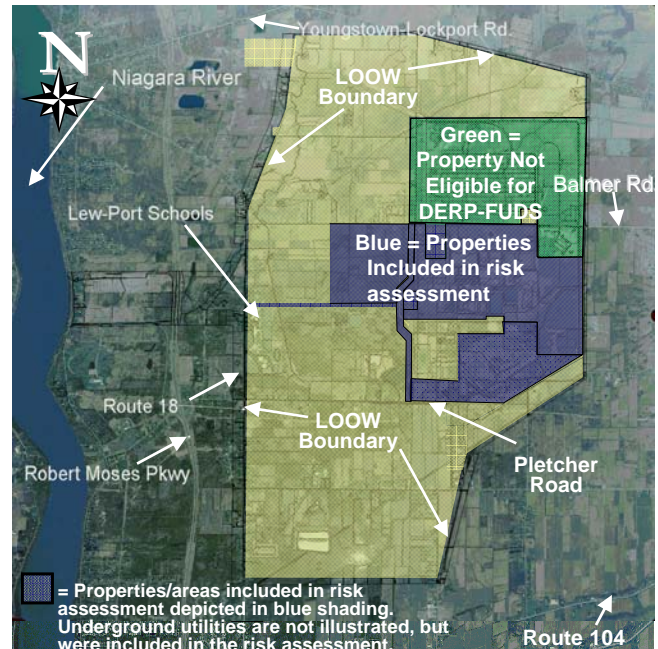
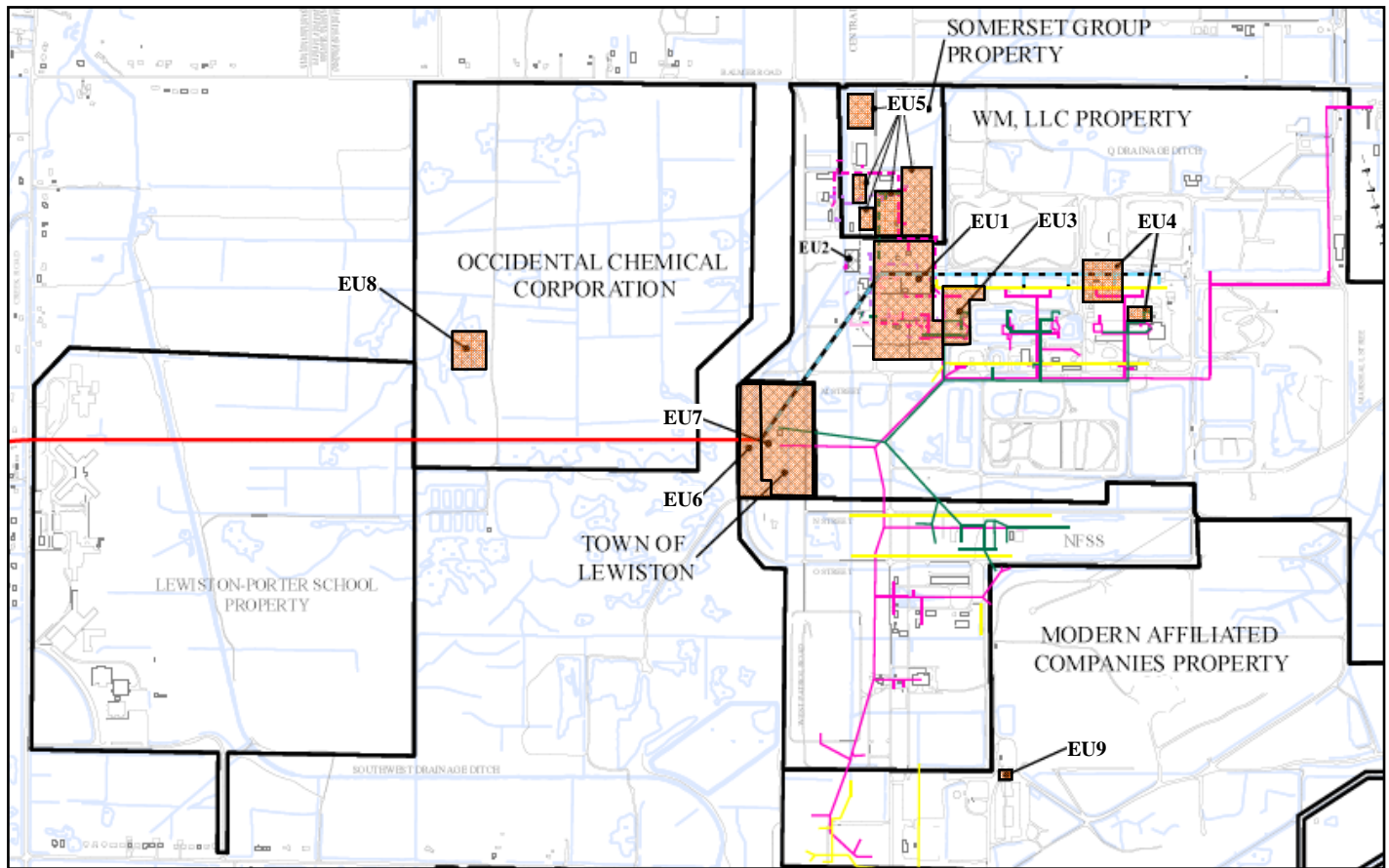


Figure 1 – Properties Included in Current Risk Assessment (1997 – US Geological Survey, aerial mapping photograph)

Figure 2 Location of EUs Within LOOW



EU1 = AFP-68 AREAS 2, 4, 7, 8, 11, 20

EU2 = AFP-68 AREA 10

EU3 = EXISTING NITRATION HOUSES

EU4 = AREA C AND TRASH PIT

EU5 = AFP-68 AREAS T1/T2, 3, 5, 6, 18N, 30 AND 30A

EU10 = FORMER DoD UNDERGROUND UTILITIES (comprised of the following lines):

EU6 = WWTP VICINITY SHOPS

EU7 = WWTP (not yet assessed for risk)

EU8 = GROUND SCAR/PRESUMED STORAGE AREA

EU9 = FORMER LOOW INCINERATOR

FORMER LOOW UTILITY LINES

- ACID/CHEMICAL SEWER LINES
- STORM SEWER LINES
- SANITARY SEWER LINES
- UNKNOWN LINES
- 30-IN. OUTFALL LINE

FORMER AFP-68 UTILITY LINES

- ACID SEWER LINES
- CHEMICAL SEWER LINES
- SANITARY SEWER LINES
- WASTEWATER SEWER LINES

UTILITY LINES UNDER *INTERIM* REMOVAL ACTION (IRA)
NOT INCLUDED IN RISK ASSESSMENT:

- ACID SEWER LINES (IRA INITIATED)
- CHEMICAL SEWER LINES (IRA INITIATED)
- TNT SEWER LINES (IRA INITIATED)

- EXPOSURE UNIT BOUNDARIES
- PROPERTY BOUNDARIES
- ROADS
- BUILDINGS
- PONDS AND DITCHES

Risk Assessment Methodology

General information on how risk assessments are performed can be found in the September 2008 fact sheet entitled "Fact Sheet, Risk Assessment," located at www.lrb.usace.army.mil/fusrap/docs/fusrap-fs-risk-2008-09.pdf. AOCs from the former LOOW and subsequent DoD facilities, identified from research of historical documents and aerial photographs, were investigated in the phased RI. Only areas that are fully eligible for investigation under the active DERP-FUDS Hazardous, Toxic, and Radiological Waste (HTRW) project were evaluated in the risk assessment. The LOOW risk assessments are performed in accordance with USEPA guidance.

Human Health Risk Assessment (HHRA)

An HHRA was performed for selected EUs within the former LOOW because the Phase I, II, and III RI results indicated chemicals associated with former DoD activities may be a potential human health concern, and current and possible future site uses may bring human receptors into contact with these chemicals. The objective of the HHRA is to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals within the EUs and to answer the overall question of, "What is the risk and how bad is it?".

Receptors/Exposure Routes

The HHRA evaluated the potential sources of contamination, routes of migration, and human exposure pathways that can currently occur, or have a potential to occur in the future, at the former LOOW site. This evaluation is based on the current and potential future site uses, and the highest maximum exposure (as defined by the USEPA) that has a potential to occur to a receptor. The HHRA assumes nothing will be removed from an AOC and no other means of exposure reduction (i.e., the use of personal protective equipment, digging restrictions, etc.) will take place. As a result, the HHRA results and conclusions are all considered potential.

Human receptors evaluated in the HHRA include: adult trespassers (>18 years), adolescent trespassers (6 to 12 years), commercial workers (i.e., work within a building), construction workers, operations/maintenance workers, adult residents (>18 years), and child residents (0 to 6 years). The evaluation includes potential current human receptors and potential future human receptors. Potential current receptors have a reasonable possibility to visit the EUs based on current site use. Potential future receptors are selected based on expected future site use and zoning. The trespasser is considered a potential current receptor for all EUs. The resident is not considered as a potential current receptor for any of the EUs, because no EUs are currently being utilized as residential property. The resident is considered as a potential future receptor for all EUs except those on CWM Chemical Services, LLC, property (CWM). For EUs on CWM, the resident is not considered because CWM has a New York State-imposed restriction that does not allow residential reuse of their property. Potential current and future receptors for CWM receptors are the same: trespasser, construction worker, operations/maintenance worker, and commercial worker. For the EUs within the other properties, the adult trespasser, adolescent trespasser, and operations/maintenance workers are considered current potential receptors. The future potential receptors are the commercial workers, construction workers, adult resident, and child resident.

The media evaluated in the HHRA that human receptors may come into contact with include: surface soil (0 to 1 ft below ground surface), subsurface soil (below 1 ft), total soil (a mixture of surface and subsurface soil), groundwater, wastewater, sludge, surface water, and sediment.

The routes of exposure that were evaluated include some or all of the following: inhalation, ingestion, dermal contact, consumption of home grown produce and consumption of game meat.

Evaluation of Human Health Risks and Hazards

The results of the HHRA are presented as carcinogenic risks and/or non-carcinogenic hazards. Carcinogenic risks are estimated as the probability of a human receptor developing cancer as a result of exposure to the potential carcinogen. The acceptable risk range of excess cancers has been established by the USEPA to be one extra incidence of cancer in a population of between one million to ten thousand people. If exposure to site contaminants results in a potential additional cancer risk greater than one in ten thousand, the USEPA requires a risk management evaluation. The USEPA has also identified a threshold of one (1) as a non-cancer hazard threshold (called a “hazard quotient” [HQ]), and exceeding 1 as potentially unacceptable. EUs with receptors having non-carcinogenic hazards exceeding 1, and/or additional cancer risk greater than one in ten thousand may require additional evaluation.

Screening Level Ecological Risk Assessment (SLERA)

The SLERA estimates the potential hazard to ecological populations at the former LOOW site. Following USEPA guidance, the SLERA provides a conservative assessment or “screening” of chemical concentrations at a site. The SLERA determined that surface soil (0 to 1 ft below ground surface) was the only exposure medium at the former LOOW for ecological receptors. There are no natural aquatic habitats within the EUs evaluated, therefore, surface water and sediment would not be relevant exposure media. Sludge and wastewater from within the underground utilities was not generally available to ecological receptors due to the depth, so was also not included in the SLERA.

The SLERA identified potential hazards to ecological populations within lower trophic level ecosystems and higher level ecosystems. Terrestrial vegetation and soil invertebrates represent the populations of potential concern at the lower trophic level ecosystem. At the higher trophic level ecosystem, six wildlife species—four mammals and two birds—are the populations of potential concern. The four mammals include: eastern cottontail, white-tailed deer, short-tailed shrew, and red fox. The two birds are the American robin and the red-tailed hawk.

The SLERA results in a scientific management decision point that has one of three possible outcomes: risk is negligible and no further action is warranted; the potential for ecological risk is great enough and sufficient information exists to proceed with a remedial action; or further information and evaluation are needed to better define potential ecological risks at the site (i.e., baseline ecological risk assessment).

Evaluation of Ecological Hazards

A weight-of-evidence approach is often used to evaluate populations at potential ecological risk; which considers the quality of the habitat (Is it capable of supporting a given species?) as well as potential toxicological effects. Hazard estimates in the SLERA are based on the HQ method, where the contaminant concentration that the receptor is exposed to is divided by a toxicological threshold concentration accepted by the USEPA. An HQ greater than 1 suggests the potential for risk. Only when the environment is capable of supporting ecological organisms and potential population-level risks are estimated at an HQ exceeding 1 would the EU require additional evaluation.

HHRA and SLERA Results

CWM – (construction, maintenance, and commercial workers and trespassers are current potential receptors on CWM; future potential receptors are the same as current receptors).

- EU 1 = Air Force Plant (AFP)-68 Process Areas 2, 4, 7, 8, 11, and 20.
 - The HHRA determined potential concern for the operation and maintenance worker, commercial worker, and construction worker. Primary media of concern are soil, groundwater, and sludge and wastewater within the underground utilities. Primary chemical contributors are polychlorinated biphenyls (PCB) and volatile organic compounds (VOCs).
 - The SLERA identified potential hazard to soil invertebrates due to exposure to zinc and manganese in surface soil.
- EU 2 = AFP-68 Process Area 10.
 - The HHRA determined there are no human health concerns from exposure to EU 2.
 - The SLERA identified potential ecological hazards to soil invertebrates due to exposure to manganese in surface soil. In addition, unidentified pellets and soil analyzed from EU2 yielded elevated concentrations of antimony that may represent food-web hazards to small mammals (short-tailed shrew and eastern cottontail).
- EU 3 = Existing Nitration House (NH) Area.
 - The HHRA determined potential concern for the adolescent trespasser and construction worker exposure to sludge collected from an underground line.
 - The SLERA did not identify any ecological concerns for EU 3.
- EU 4 = Possible DoD disposal area (Area C), including the drum trench and trash pit.
 - The HHRA determined there are no human health concerns for exposure to EU 4.
 - The SLERA did not identify any ecological concerns for EU 4.
- EU 10 = Underground Utilities (acid waste sewer line, chemical waste sewer line, dry wells, sanitary sewer line, storm sewer line, unknown lines, and wastewater line).
 - The HHRA determined there are potential concerns for the construction worker exposure to all underground utilities evaluated, except the storm sewer line. Primary contributors to human health concerns are PCBs, polynuclear aromatic hydrocarbon compounds (PAHs), pesticides, and VOCs in sludge and wastewater.

Somerset Group, Inc. – (trespasser and maintenance workers are considered current potential receptors; construction and commercial workers and residents (adult and child) are future potential receptors).

- EU 5 = AFP-68 Process Areas 3, 5, 6, Temporary Buildings T1 and T2, Tank Storage Area 18N, and storage warehouses 30 and 30A.
 - The HHRA determined there are no human health concerns for exposure to EU 5.
 - The SLERA did not identify any ecological risk concerns for EU 5.
- EU 10 = Underground Utilities (acid waste line, dry wells, sanitary sewer line, storm sewer line, unknown lines, and wastewater line).
 - The HHRA determined potential concern for the construction worker exposure to PAHs in sludge within the dry wells and the child resident exposure to arsenic and PCBs in total soil around the unknown lines.

Town of Lewiston – (trespasser and maintenance workers are considered current potential receptor; construction and commercial workers and residents are future potential receptors).

- EU 6 = Vicinity Shops.
 - The HHRA determined there are no human health concerns for exposure to EU 6.
 - The SLERA did not identify any ecological risk concerns for EU 6.
- EU 7 = Wastewater Treatment Plant (WWTP) risk has not been assessed but will be evaluated as part of the Phase IV RI.

Town of Lewiston – continued.

- EU 10 = Underground Utilities (acid waste line, dry wells, sanitary sewer line, and wastewater line).
 - The HHRA determined potential concern for the construction worker and child resident from exposure to PAHs and PCBs in sludge within the acid sewer line, and to the construction worker from exposure to PAHs in sludge within the dry wells, pits, and sumps.

Occidental Chemical Corporation – (trespasser and maintenance workers are considered current potential receptors; construction and commercial workers and residents are future potential receptors).

- EU 8 = Ground Scar/Presumed Storage Area.
 - The HHRA determined there are potential concerns for the construction worker, resident adult, and resident child due to exposure to soil.
 - The SLERA identified potential hazards to soil invertebrates from chromium in surface soil. In addition, there are potential hazards to birds and mammals from explosives within a single sample location in surface soil.

Modern Disposal Corporation – (trespasser and maintenance workers are considered current potential receptors; construction and commercial workers and residents are future potential receptors).

- EU 9 = Former LOOW incinerator.
 - The HHRA determined there are no human health concerns for exposure to EU 9.

***Various property owners** –

- EU 10 = Underground Utilities, 30-in. outfall line.
 - The HHRA determined there are no human health concerns from exposure to media associated with the 30-in. outfall line.

*Because the underground utilities are comprised of multiple line types traversing various owners, the risk assessment of EU 10 is the evaluation of risk from a specific line type on a specific property (referenced by current property owner). The exception is the 30-in. diameter wastewater treatment plant discharge line, which was assessed by itself.

Conclusions

The HHRA concluded the following:

- EUs 2, 5, 6, and 9 do not pose human health concerns.
- EUs 1, 3, 4, 8, and 10 have a potential for human health concerns for certain receptors.
- The primary chemicals of concern are: PCBs, PAHs, explosives (EU 8 only), metals, pesticides, and VOCs.

The SLERA concluded the following:

- Negligible hazard from chemicals in surface soil were determined for EUs 3, 4, 5, and 6.
- EUs 1, 2, and 8 have potential hazards to soil invertebrates.
- EU 8 exhibited potential hazards to soil invertebrates as well as to then plant, bird, and mammal population.

Next Step

EUs exceeding the USEPA acceptable ecological hazard thresholds may require: a risk management evaluation, a remedial action, closer scrutiny of reasonable exposure and receptor assumptions, and/or review of the inherent uncertainty of risk assessments and its effect on the risk outcome. The SLERA also indicated that none of the EUs contained sensitive environments or significant habitat (i.e. wetlands, presence of endangered species, etc.); and none of the EUs are presently managed, or are expected to be managed for ecological purposes. These modifying factors will be considered during the risk management decision process.

The recommended path forward for each EU is based on the results of the SLERA and HHRA. The following three outcomes are considered for each EU:

- No further action recommendation;
- Inclusion into a feasibility study for potential remedial action; or
- Completion of an interim removal action with eventual inclusion into a feasibility study.

The final path forward for each EU will be based on risk management decisions made by the Corps' Remedial Project Manager in consultation with members of the technical team and Corps' DERP-FUDS policy decision makers.

For More Information

For more information, please call the Buffalo District's toll-free public access line:

1-800-833-6390

Additional information regarding the former Lake Ontario Ordnance Works (LOOW) Site can be found on the Buffalo District Website:

www.lrb.usace.army.mil/derpfuds/loow/index.htm

Please let us know if you would like to be included on the postal mailing list or the electronic mailing list for the former LOOW Site. E-mail us at:

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