

Former Lake Ontario Ordnance Works (LOOW) Phase III (Underground Utilities) Remedial Investigation (UURI) and Human Health and Ecological Risk Assessment Results Workshop

Lewiston, New York
September 16, 2009



US Army Corps of Engineers
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Purpose

- Present an overview of results of Phase III of the ongoing RI of LOOW, referred to as the Underground Utilities RI
- Present the results of the human health and ecological risk assessment of selected exposure units
- Present an overview of the LOOW Management Action Plan



See handouts 1 and 2

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Previous phases of the ongoing remedial investigation (RI) (Phases I and II) targeted specific manufacturing, support areas, and aerial anomalies of the former DoD LOOW facility and subsequent Department of Defense (DoD) facilities.

The Underground Utility RI targeted formerly used underground utilities that were installed to support DoD facilities such as LOOW and Air-Force Plant-68.

The recently released risk assessments evaluated risks from areas of similar use, exposure potentials, and ownership, referred to as exposure units. The exposure units included in the evaluation were identified during RI Phases I-III.

The purpose and content of the soon to be released LOOW Management Action Plan and associated Property Management Action Plans will also be discussed.

Several handouts are available for reference during the presentation, including figures and a list of acronyms. All of the handouts are numbered, and the slides with associated handouts have a handout number listed in the bottom left hand corner of the slide.

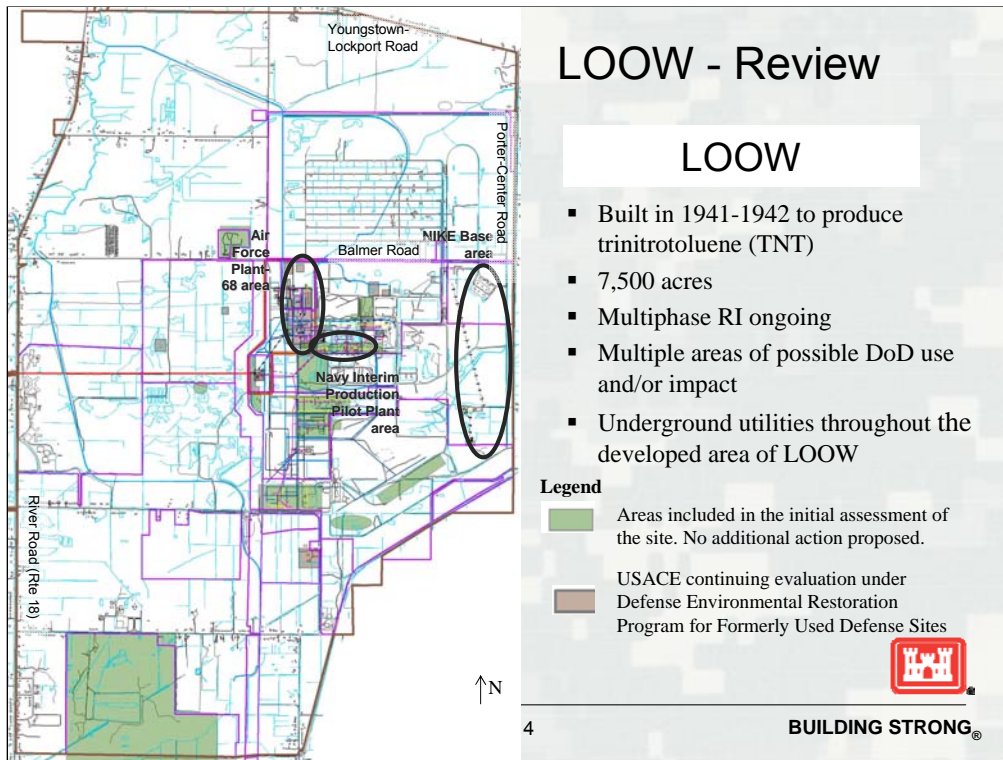
Workshop Agenda

- **Presentation of UURI results (30 minutes)**
 - ▶ RI Results (Phase III UURI and brief review of Phase I and II RI)
 - ▶ Risk Assessment Results
 - ▶ Introduce the LOOW Management Action Plan
- **Presentation and Update on Niagara Falls Storage Site (NFSS) (10 minutes)**
- **Poster breakout session (30 minutes)**
 - ▶ Station 1 – General information and Management Action Plan parcel grouping and methodology
 - ▶ Station 2 – UURI Report available for review
 - ▶ Station 3 – Summary of risk assessment results from selected exposure units
 - ▶ Station 4 – U.S. Department of Energy
- **Round Table Discussion (1 hour and 30 minutes)**



The poster session will be an opportunity for one-on-one discussion with US Army Corps of Engineers (USACE) and contractor representatives.

The USACE technical team will also be available for additional one on one discussion following the round table.

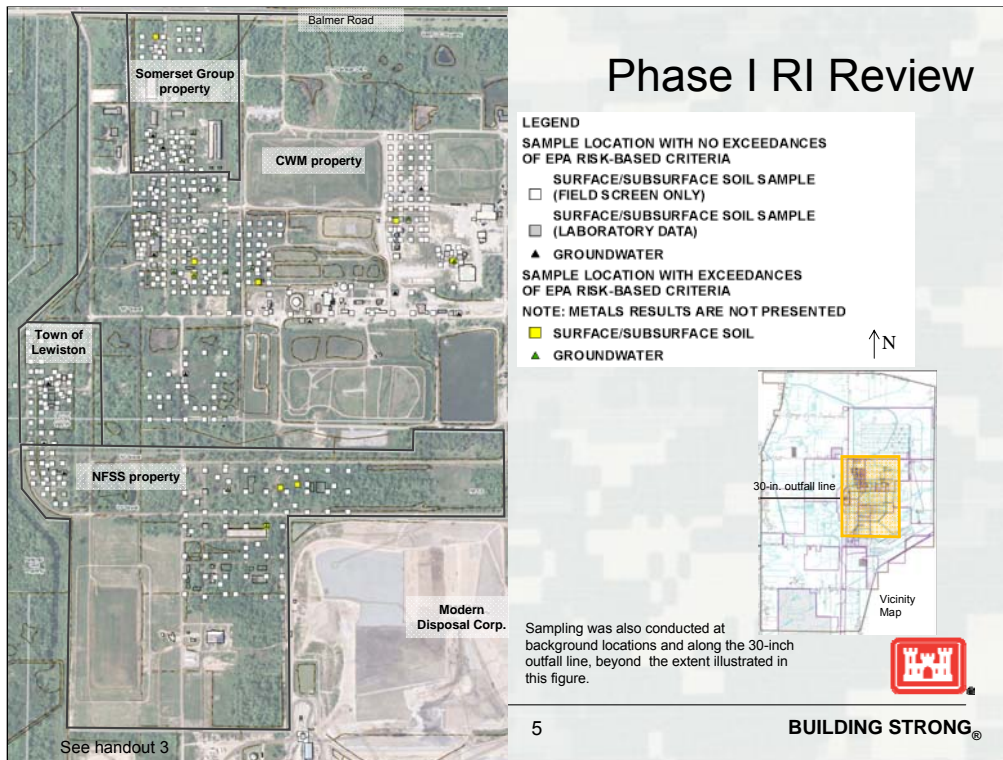


Subsequent to the closing of the 7,500-acre LOOW, the eastern “developed area” of LOOW was utilized for other DoD facilities including Air Force Plant-68 (AFP-68) and the Navy Interim Production Pilot Plant (both constructed for production of borane fuels), a NIKE Base, Air Force Plant-38 (AFP-38) (an engine testing facility), a chemical warfare depot, and a storage area for radiological wastes.

Several areas of concern identified with these DoD facilities were evaluated during the Phase I RI (see areas in light gray).

Additional evaluation was performed at many of these areas during Phase II of the RI (as depicted by light brown shading).

Underground utilities were constructed to support most of these former DoD facilities.



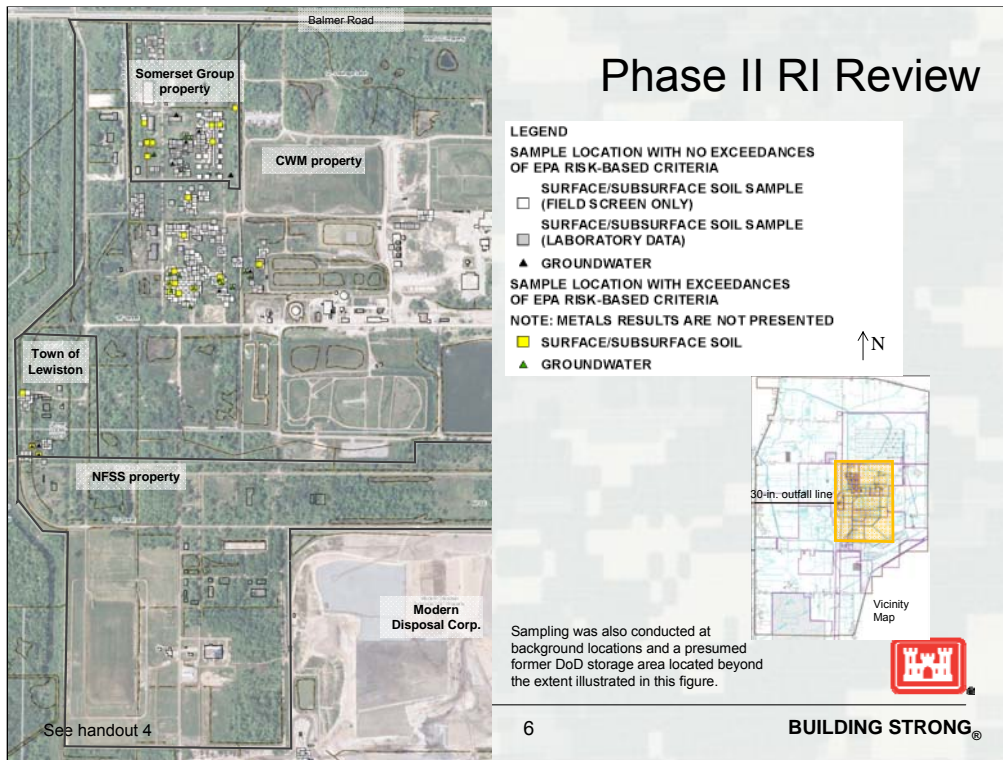
The Phase I RI was conducted in 1998. This figure represents a general overview of sampling locations and laboratory analytical results for Phase I of the RI. Yellow and green to indicate those soil and groundwater sampling locations, respectively, where analyte concentrations (either volatile organic compounds [VOCs], semivolatile organic compounds [SVOCs], pesticides, polychlorinated biphenyls (PCB), or explosives) were reported in concentrations exceeding the Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goals (risk-based criteria). Groundwater sampling (from a limited number of locations depicted on the figure) from temporary well points and limited sampling of underground utilities was also performed during the Phase I RI. Sampling of surface water drainages for DoD marker compounds (see below) was also performed (but is not illustrated on the figure).

The sampling and analysis plan for the Phase I RI included systematic grid and “biased” sampling for soil (at a subset of locations), field screening of soil samples, and selection of samples for submittal for more definitive laboratory analyses from the following areas of concern that were included in the investigation: Air Force Plant-68 process areas (e.g., Air Force Plant-68 Areas 2, 20, 4, 7, 8, 10, 11, **14, 16**, 18S, **22, 24** on CWM Chemical Services, LLC (CWM) property and Areas 3, 5, 6, 41 30, 30A, T1T2, **T3**, and 18N on Somerset Group property). **Waterline Construction Areas, Navy Interim Production Pilot Plant, Vicinity Property G**, Existing Nitration Houses, Areas C and **North of C**, Trash Pit, Acid Concentration Area, Shops Area, **WWTP**, and the **incinerator**.

Some areas (listed above with bold type) were suspected of having some contaminant impact from non-DoD site use. Therefore, the laboratory analysis program was limited to DoD marker compounds only, which included boron, lithium, and explosives for those areas of concern. While the DoD may have used other chemicals that had the potential to impact media at these areas of concern, the DoD marker compounds are more specific to DoD use, and are not expected to have been widely used by non-DoD site users.

Samples collected from areas of concern not expected to have significant impact from non-DoD site users were submitted for “full suite” analysis, including: Target Compound List (TCL) VOCs, SVOCs, pesticides/PCB, Target Analyte List (TAL) inorganic compounds (metals and cyanide), boron, lithium, and explosives.

Soil samples were analyzed on site for VOCs, polynuclear aromatic compounds (PAHs), PCBs, and TNT using field screening methods. Field screening results were used to select samples for more definitive laboratory analyses. Approximately 1047 soil samples were collected and field screened from grid and biased point locations. Additional soil samples from test trenches, as well as sediment samples from surface drainages, and sludge from underground lines, were also field screened. Approximately 104 soil/sediment/sludge samples were submitted for laboratory analysis of DoD marker compounds and approximately ½ of those were also analyzed for “full suite” analysis. Approximately 56 samples were submitted for DoD marker compounds and approximately ½ of those were also analyzed for the remaining “full suite”.



Based on the results of the Phase I RI, some areas of concern were recommended for further evaluation and were carried into a Phase II RI. Two additional areas of concern were added to the program: the presumed storage area and a pond located on Occidental Petroleum Corporation property. Both are located in the area west of that depicted in this figure.

Field activities included installation of approximately 620 borings, collection of approximately 1,300 soil samples for field screening and/or laboratory analysis, installation of 26 monitoring wells, and collection and laboratory analysis of approximately 36 ground-water samples to evaluate potential impact from former DoD use. Wastewater and sludge samples were also collected from potential contaminant sources, such as drains, sumps, and pipes.

Similar to the sampling and analysis program utilized during the Phase I RI, a combination of systematic grid and biased point sampling was performed. However, during the Phase II investigation, the grids were established around those Phase I locations with elevated concentrations. Generally, soil samples were field-screened (using methodology established during the Phase I RI) for VOCs, PAHs, PCB, and TNT to aid in selecting samples for laboratory analysis. Samples submitted to the contract laboratory were analyzed for "full suite".

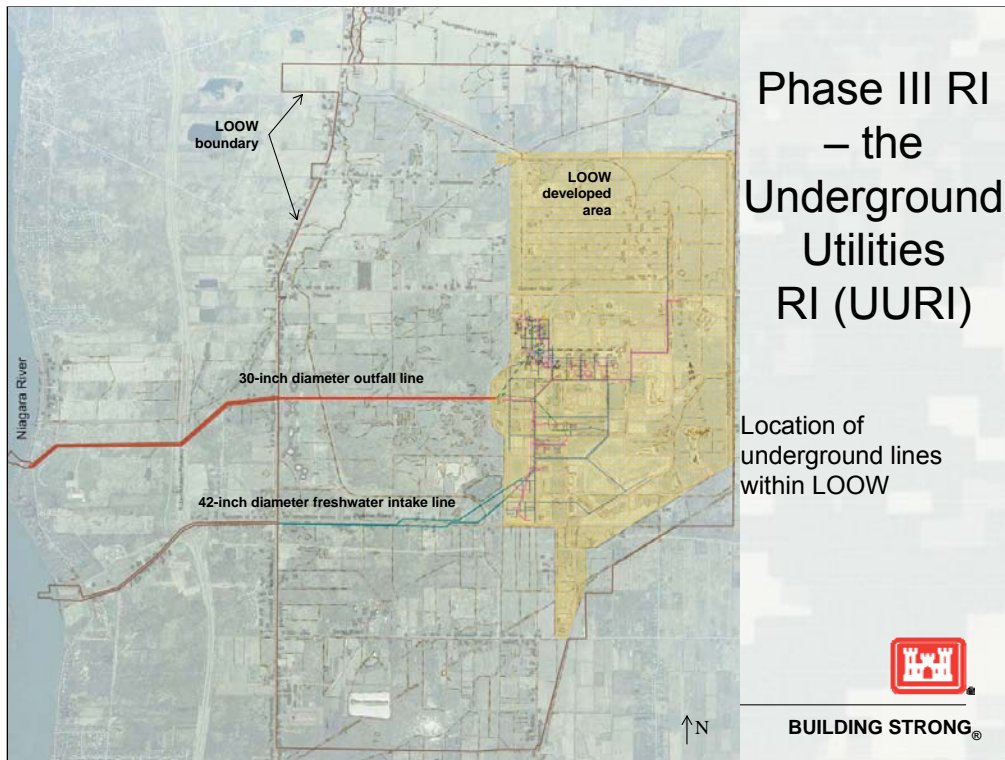
Below are examples (the list is not exhaustive) of constituents reported during the Phase II RI.

Soil and sludge: VOCs (chlorinated solvents); SVOCs (mostly PAHs); pesticides (dieldrin, heptachlor epoxide, and 4,4'-dichlorodiphenyltrichloroethane [4-4'-DDT]), explosives (TNT and breakdown products); metals.

Groundwater: VOCs (chlorinated solvents and benzene); SVOCs (mostly PAHs); pesticides (gamma-BHC, endosulfan sulfate, and alpha-chlordane); explosive constituents and/or breakdown products (dinitrotoluenes, HMX, and 1,3,5-trinitrobenzene); metals.

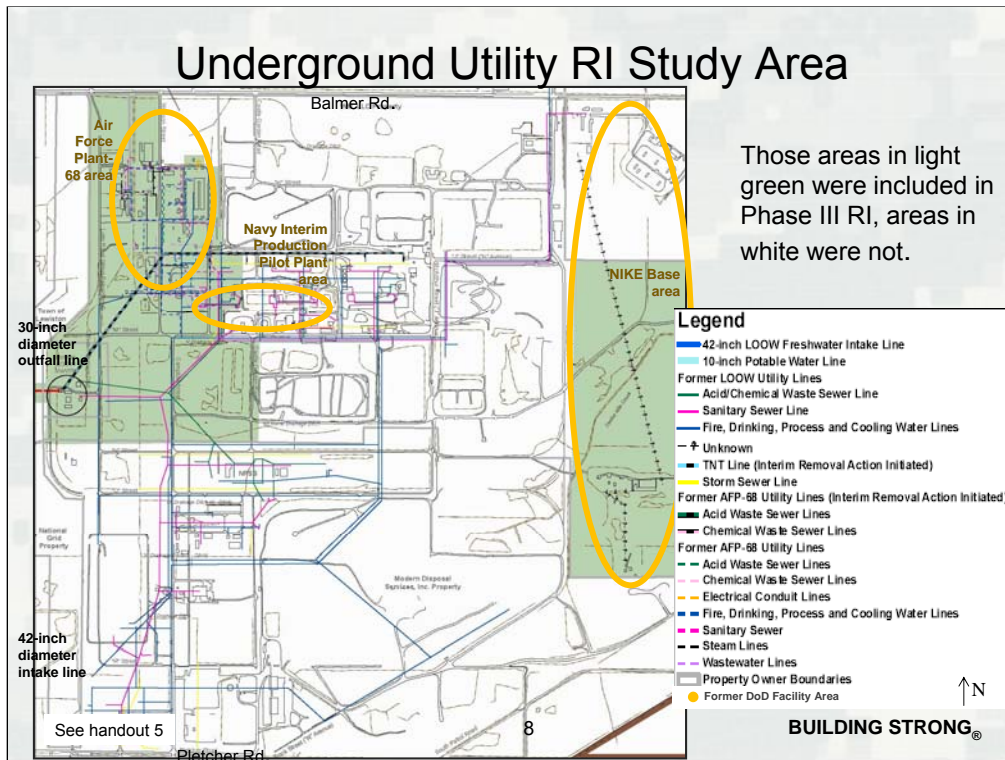
Most of the elevated constituents (VOCs and SVOCs) reported in the surface and subsurface soil samples were in the vicinity of former tanks, storage, and process areas associated with the Air Force Plant-68 and historical disposal areas. Some reported constituents did not have an existing or probable historical identified source. There were no distinct, definitive trends observed concerning the occurrence and distribution of pesticides, PCBs, or explosives. Metals and PAHs were reported throughout the areas included in the RI.

Elevated constituent concentrations were reported in soil/sludge samples collected from within subsurface pits, vaults, sumps, and drains. This indicated that there may be sludge with elevated concentrations within underground lines in the areas as well. Investigation of these pits and underground lines was recommended.



This figure illustrates the locations of lines discovered through archive searches and field investigations performed during the Phase III RI. The colored lines represent the underground utilities.

The majority of the former DoD utilities are within the area of LOOW referred to as the “developed area”, depicted in tan. The developed area was in the eastern portion of the LOOW acreage. The developed area was utilized for production of TNT during the operation of LOOW, and for various other DoD facilities following the closure of LOOW. Very few lines extended beyond the developed area, with the exception of a 30-inch diameter outfall line originating from the former LOOW wastewater treatment plant and discharging to the Niagara River, and a 42-inch diameter freshwater intake line originating from the Niagara River and discharging to the former LOOW freshwater treatment plant.



This figure depicts the central portion of the “developed area” of LOOW and the former DoD installations that had constructed underground utilities in the area.

Former DoD underground utilities on LOOW were installed to support the following facilities:

- LOOW
- Air Force Plant-68
- The Navy Interim Production Pilot Plant
- NIKE Base

Review of historical information indicated the following line types existed for each facility:

- LOOW: sanitary sewer; acid waste; TNT waste; stormwater; various process lines; water lines; steam; electrical conduit; a main 42-inch diameter fresh water supply line; and a main 30-inch diameter wastewater treatment plant outfall line; drains and sumps associated with the underground utilities; and possible “unknown” lines.
- Air Force Plant-68: all of the line types listed above for LOOW were also constructed for and/or reutilized by Air Force Plant-68. Additional line types were also constructed specifically for Air Force Plant-68 – wastewater and chemical waste lines.
- Navy Interim Production Pilot Plant: detailed information on the Navy Interim Production Pilot Plant construction has not been located. However, because the Navy Interim Production Pilot Plant was constructed to produce fuels similar to those produced at Air Force Plant-68, similar types would have been constructed. In addition, based on the location of the Navy Interim Production Pilot Plant within the central nitration area of the former LOOW, it is further assumed that the Navy Interim Production Pilot Plant would have reutilized many of the underground lines originally installed to support LOOW.
- NIKE Base: detailed information on the NIKE Base construction has not been located. However, it is assumed that the portion of the NIKE Base included in the Phase III RI would have required sanitary sewer, water, and possible other communications-type lines.

Based on results of historical archive reviews and Phase I and II of the RI, the underground utilities were included for additional evaluation. However, there is a significant possibility of impact to the underground lines from non-DoD site use. Therefore, some areas were excluded from the investigation. Those areas highlighted in green were included in the Phase III RI.

Underground Utility RI – Two Tiered Approach

- Non-intrusive investigation – locate the lines (2005-2006)



The Phase III investigation was designed as two investigative parts: non-intrusive (to locate the lines) and intrusive (to excavate and access the lines for sample collection).

Non-intrusive investigation – (2005-2006):

- Review historical information to determine the location of the lines (georeferencing of historical as-built drawings and aerial photographs with current site features).
- Locate lines through reconnaissance of above ground features (stickups, drains, pits).
- Locate lines through geophysics survey – metal detector and pipe and cable survey.
- Inspect/trace lines using “down hole” cameras.
- Determine where lines could potentially leak (cracks, joints, areas where roots were visible in the interior of the lines).
- Determine if there were areas of sludge/wastewater large enough to sample, and if crystalline TNT was present.
- Revise/develop maps showing line locations.

Underground Utility RI – Two Tiered Approach

- Intrusive Investigation – collect samples from within/around the lines (2006)

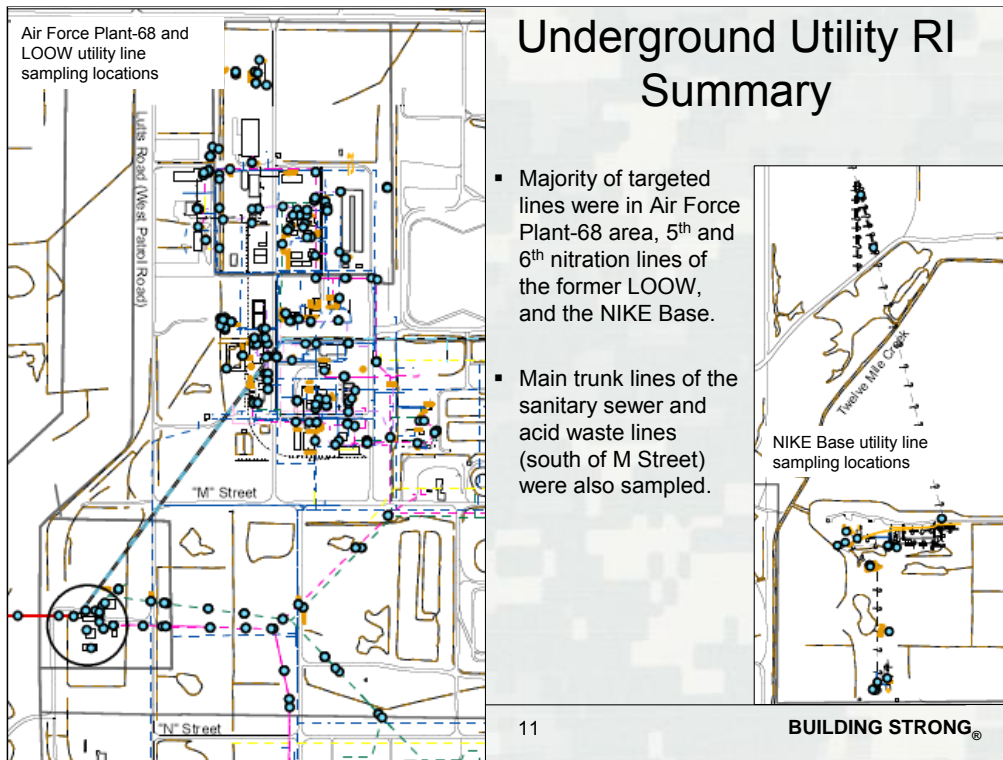


The Phase III investigation was designed as two investigative parts: non-intrusive (to locate the lines) and intrusive (to excavate and access the lines for sample collection).

Intrusive Investigation – (2006)

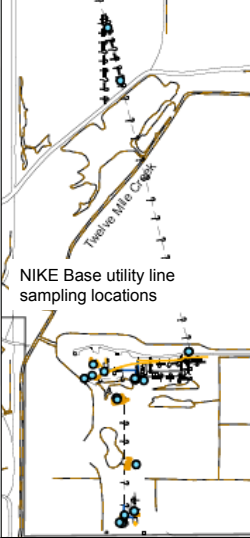
- Access lines of potential concern (e.g., acid waste, chemical waste, sanitary sewer, wastewater, storm water lines, and drains/pits/sumps) through excavation.
- Collect samples of sludge and wastewater (if present) from within the lines and soil from beneath the lines.
- Note presence of “unknown” lines that were not identified during non-intrusive survey.
- Note presence of bedding material beneath lines (that could potentially act as a pathway for contaminant migration). Water found in the bedding material was also sampled.
- Water lines were not specifically targeted, although some unknown line types were sampled and later found to be water lines.
- Samples submitted for “full suite” analysis (volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, explosives, metals).

All lines were sealed with a cement grout prior to backfilling the excavations.



Underground Utility RI Summary

- Majority of targeted lines were in Air Force Plant-68 area, 5th and 6th nitration lines of the former LOOW, and the NIKE Base.
- Main trunk lines of the sanitary sewer and acid waste lines (south of M Street) were also sampled.



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A total of 359 samples were collected from 202 excavations, pits, manholes, and sumps and outfalls.

Sludge (solids), wastewater (liquids) from the interior of the lines, subsurface soil from beneath the lines, and surface soil from outfalls (discharges to surface drainages) was collected during the investigation. One surface water and sediment sample was collected from the Southwest Drainage Ditch where the 30-inch outfall line crosses. In addition to the targeted matrices, some bedding material beneath the lines was found to contain liquid. The decision was made to collect this bedding material water for analyses.

Water lines were not targeted for sample collection during the UURI. However, five water lines (four on Somerset Group property and one on CWM property) warranted sample collection due to observation of visual staining, odor, proximity to other lines within the excavation, or were originally designated as an unknown line type.

Similarly, stormwater lines were not targeted for sample collection. However, in the northwest portion of Air Force Plant 68 on CWM property, historical drawings indicated lines exiting the building and tying into the stormwater lines. Because the origin and use of the lines exiting the building are unknown, these lines were included in the sampling program.

- A total of 58 sludge samples were collected during the UURI.
- 6 samples were collected from within confirmed acid waste sewer lines.
- 2 from confirmed chemical waste sewer lines.
- 9 were collected from drains, pits, and sumps (designated line type "DW").
- 18 were collected from confirmed sanitary sewer lines
- 2 were collected from the 30-in. outfall line.
- 10 were collected from wastewater lines.
- 11 were collected from unknown line type.

- A total of 96 wastewater samples were collected during the UURI from the following line types:
- 14 from acid waste sewer lines,
- 7 from chemical waste sewer lines,
- 4 from drains, pits, sumps, vaults, or tanks.
- 30 from sanitary sewer lines, three of which were collected from the 30-in. outfall line,
- 14 from wastewater lines,
- 23 from unknown line type,
- 2 from water lines, and
- 2 from stormwater lines.

- A total of 186 subsurface soil samples were collected from beneath the following line types:
- 16 from acid waste sewer lines.
- 14 from chemical waste sewer lines.
- 5 from pits, sumps, vaults, or tanks.
- 70 from sanitary sewer lines, including 26 from beneath the 30-in. outfall line.
- 28 from wastewater lines.
- 45 from unknown lines.
- 4 from water lines.
- 4 from storm/wastewater lines.

- A total of four bedding water samples were collected during the UURI from the following line types:
- 3 from wastewater lines,
- 1 from a chemical waste sewer line.

- A total of 13 surface soil samples were collected from the point at which sludge or wastewater exiting an outfall pipe would have impacted the sidewall of surface water body. The outfall samples were associated with the following line types:
- 2 were collected from sanitary sewer overflow outfalls.
- 6 were collected from wastewater line outfalls.
- 2 were collected from outfalls from unknown line type.
- 3 were collected from storm/wastewater lines.

Underground Utility RI Summary

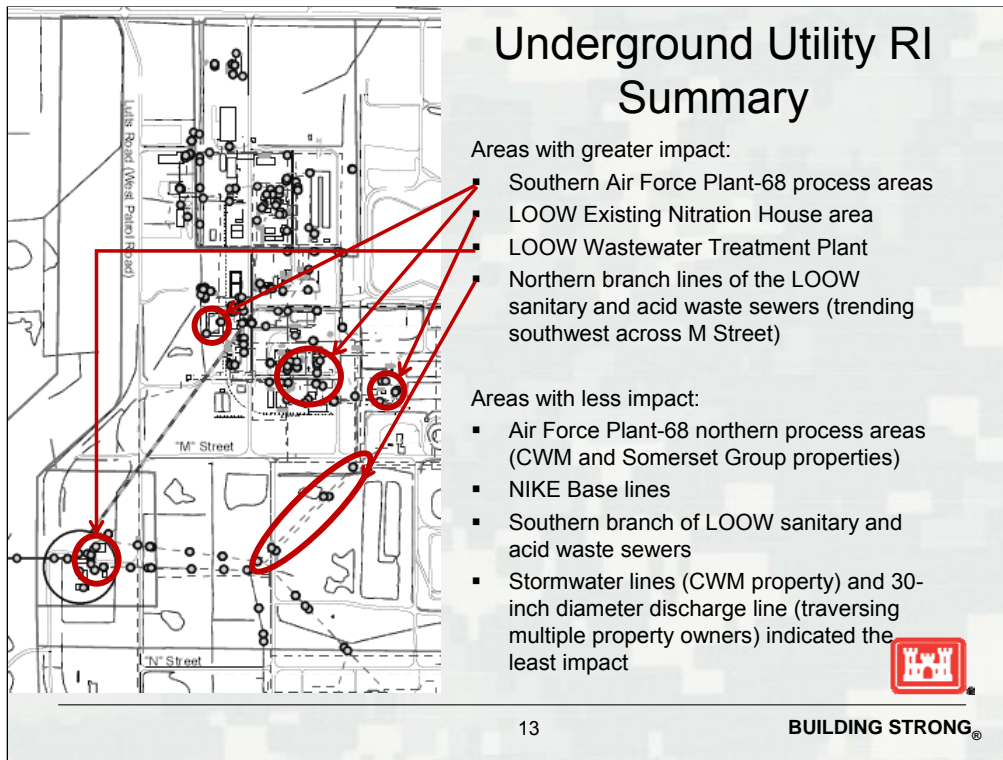
- Discharge of lines
 - ▶ Sanitary sewer, acid and chemical waste lines discharge to former LOOW wastewater treatment plant
 - ▶ Stormwater and wastewater lines discharged to surface drainages
 - ▶ Many above ground pipes ("stickups") and pits discharged to underground lines
- Construction
 - ▶ Larger diameter lines (30-inch outfall line, acid waste lines, sanitary sewer lines) were generally constructed of clay encased in concrete
 - ▶ Air Force Plant-68 wastewater lines were generally constructed of steel and transite
 - ▶ Smaller diameter lines were constructed of various materials (clay, transite, steel, iron, copper, concrete)
 - ▶ Depth ranged from at surface (some above ground pipes and pits) to 17 ft deep near wastewater treatment plant
 - ▶ Bedding material was found only beneath Air Force Plant 68 utility lines (but not all lines were underlain with bedding), and one line at the NIKE Base.



Most smaller diameter waste lines (acid waste, sanitary sewer, chemical waste sewer) were constructed of clay. Water lines were generally constructed of cast iron. Larger diameter (8-inch and larger) acid, chemical, and sanitary sewer waste lines constructed for LOOW were encased in concrete. However, the sanitary sewer line on Somerset Group property was not concrete-encased. A portion of the sanitary sewer line constructed for Air Force Plant-68 was also encased in concrete (that portion on CWM property encountered in excavations X63, X64 and X65).

Bedding material was found only beneath Air Force Plant 68 utility lines (but not all lines were underlain with bedding), and one line at the NIKE Base.

Of the 54 excavations where bedding material was encountered beneath lines, the bedding material contained liquid in 17 of the locations. A sample of bedding material liquid was collected from 4 of these locations. 50% of the wastewater lines and 60% of the chemical waste lines were underlain with bedding material. On Somerset Group property, all wastewater lines appeared to be underlain with bedding. Less than 25% of the other line types were underlain by bedding. Wastewater lines appeared to have the most widespread, consistent underlayment.



Sludge and wastewater were more highly impacted than soil.

Lines with most impact were located in the southern Air Force Plant-68 process areas (CWM property) and the former LOOW wastewater treatment plant (Town of Lewiston property).

Some impact to sludge in Nitration House area of LOOW and the northern branch lines of the LOOW sanitary and acid waste sewers (trending southwest across M Street) was also reported.

Lesser impact in Air Force Plant-68 northern process areas (CWM and Somerset Group properties), NIKE Base lines, and southern branch line of LOOW sanitary and acid waste sewers (originating from NFSS property) was reported.

Stormwater lines indicated little impact.

The 30-inch diameter discharge line, traversing multiple property owners, indicated the least impact.

Underground Utility RI Summary

- Acid waste lines
 - ▶ Sludge and wastewater impacted with PCBs, pesticides, and PAHs
 - ▶ Some impact to soil in the AFP-68 areas
- Sanitary sewer lines
 - ▶ Sludge and wastewater with PCBs, pesticides, SVOCs, and metals
 - ▶ Some impact to soil in the AFP-68 areas
- Unknown line type
 - ▶ Wastewater impacted with VOCs and metals
 - ▶ Soil impacted with PCB
 - ▶ Little impact to sludge
- Wastewater lines
 - ▶ Wastewater and soil impacted with PCBs
 - ▶ Sludge impacted with metals and PAHs
- Pits, vaults, sumps
 - ▶ PAHs in sludge

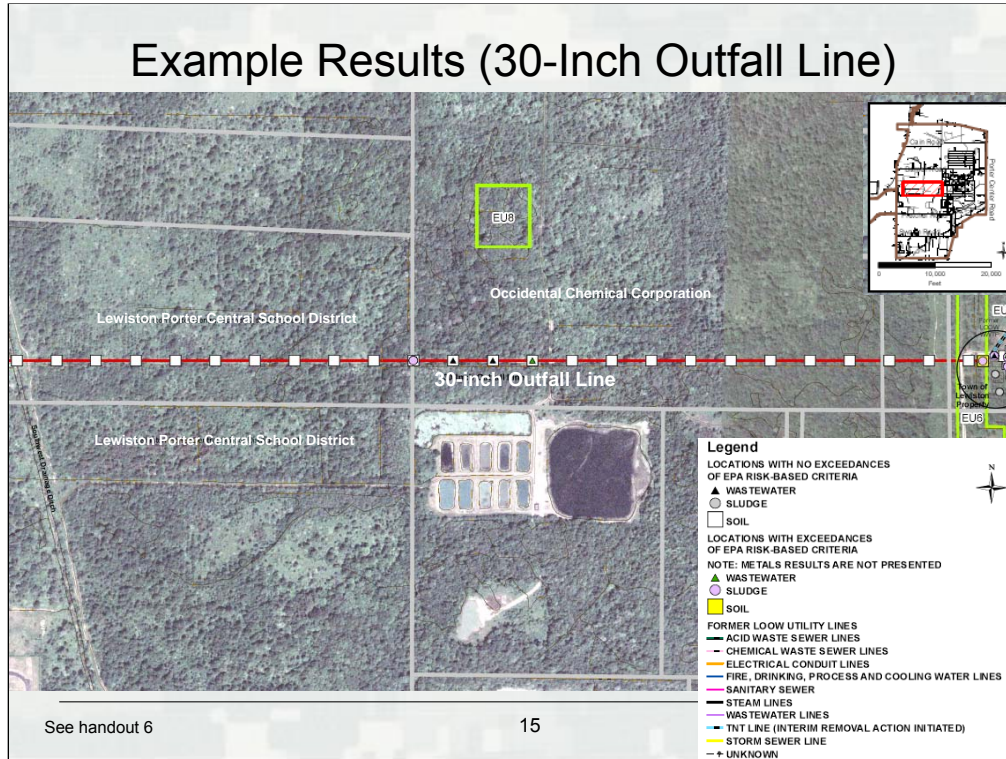
PCBs = polychlorinated biphenyls
VOCs = volatile organic compounds
SVOCs = semivolatile organic compounds
PAHs = polynuclear aromatic hydrocarbons



Generally, acid waste, sanitary sewer, unknown, and wastewater lines were most heavily impacted. Dry wells, pits, and sumps were also impacted, primarily in the wastewater treatment plant area.

Stormwater, chemical waste, and water lines were not as heavily impacted with chemical constituents.

Example Results (30-Inch Outfall Line)



This is provided as an example of the type of information displayed in the Underground Utilities Remedial Investigation Report figures (large size figures in Volume II of report).

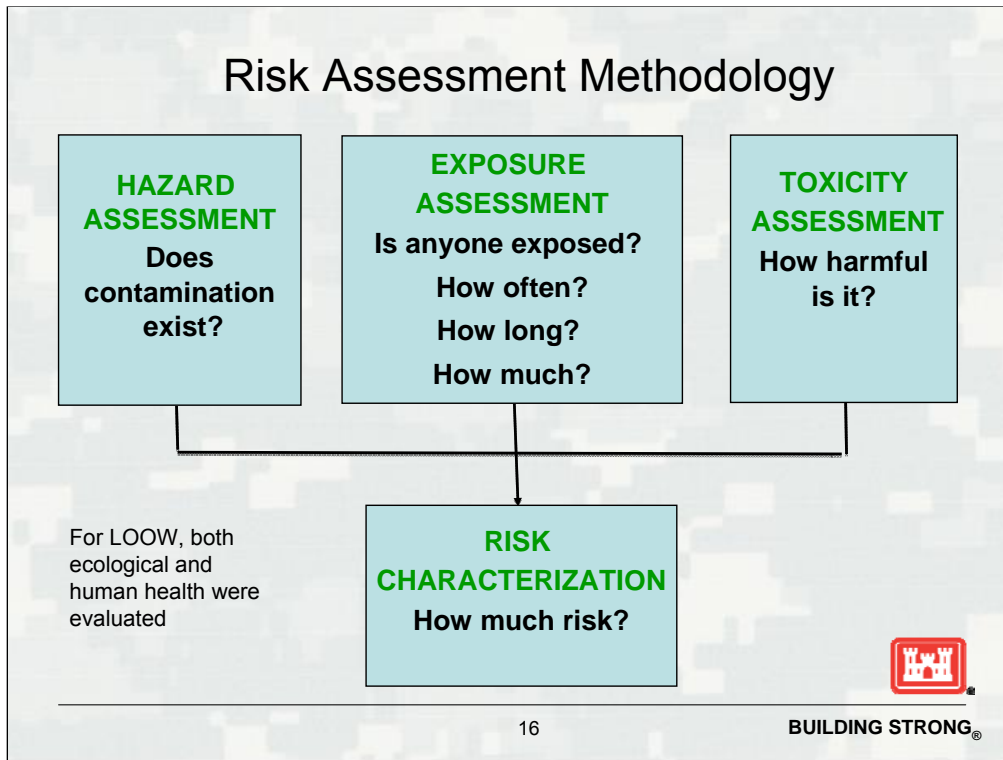
Report figures also display the constituent concentrations reported in each sample.

For the 30-Inch Outfall Line, subsurface soil samples were collected from 26 locations. One polynuclear aromatic hydrocarbon (PAH) (at one location) and some metals exceeded the EPA risk-based criteria. Because metals are reported throughout the former LOOW due (in part) to elevated background concentrations, they are not represented in the figure.

Sludge samples were collected at two locations. Several PAHs and metals exceeded the EPA risk-based criteria in the sludge samples.

Wastewater samples were collected from three locations. Pesticides and metals exceeded the EPA risk-based criteria.

A surface water and sediment sample was collected from within the Southwest Drainage Ditch where the 30-inch outfall traverses the ditch. The samples were submitted for analysis of DoD marker compounds only. Explosives were not reported. Boron and lithium were reported but did not exceed the EPA risk-based criteria.



The screening level ecological risk assessment and human health risk assessment processes have many similarities. The primary similarities are the development of conceptual site models to identify exposure pathways and potential receptors. Details of the steps for both the screening level ecological risk assessment and human health risk assessment are discussed below.

Additional details about the human health risk assessment four-step process:

- Hazard Assessment
 - RI sample results are reviewed for data quality; and
 - Chemicals of potential concern (COPCs) are selected for inclusion in the human health risk assessment based upon comparison to risk-based screening criteria.
- Exposure Assessment
 - Potential current and future receptors are identified;
 - Exposure pathways are identified;
 - COPC concentrations are calculated (either the 95% upper confidence level on the mean [UCLM] or the maximum concentration); and
 - COPC intakes are determined based upon the concentration and selected exposure parameters.
- Toxicity Assessment
 - Chemical-specific U.S. Environmental Protection Agency (EPA)-derived (or EPA-approved) toxicity values are identified along with a discussion of their scientific basis and derivation.
- Risk Characterization
 - Potential cancer risk and hazards are determined based upon a comparison of COPC intakes to COPC toxicity values.
 - Asks the question – What is the like non-cancer likelihood that a receptor might experience an adverse health effect due to on-site exposures?

The steps of the screening level ecological risk assessment are further defined as:

- Step 1 – The problem formulation and ecological effects evaluation includes:
 - Development of a conceptual site model to present exposure pathways based upon known or suspected chemicals and the fate and transport of those chemicals;
 - Evaluation of the toxicity of chemicals to ecological receptors is performed;
 - Possible receptors of concern at the site is developed; and
 - Selection of assessment and measurement endpoints (explicit expressions of environmental values to be protected) is made.
- Step 2 – Screening level exposure estimate: in this step, the potential for risk to ecological receptors is assessed by comparing site exposure concentrations to the toxicological thresholds.
- Step 3 – Additional refinements of the LOOW screening level ecological risk assessment were performed:
 - The use of wet weights, rather than dry weights, for soil and food organism ingestion in the food-web exposure assessment;
 - Bioaccumulation factors are used to estimate chemical concentrations in wildlife food rather than assume concentrations are equal to dry weight soil concentrations; and
 - Area use factors are used to calibrate the exposure of wide-ranging receptors, rather than assuming that these receptors receive all of their exposure from a given site.

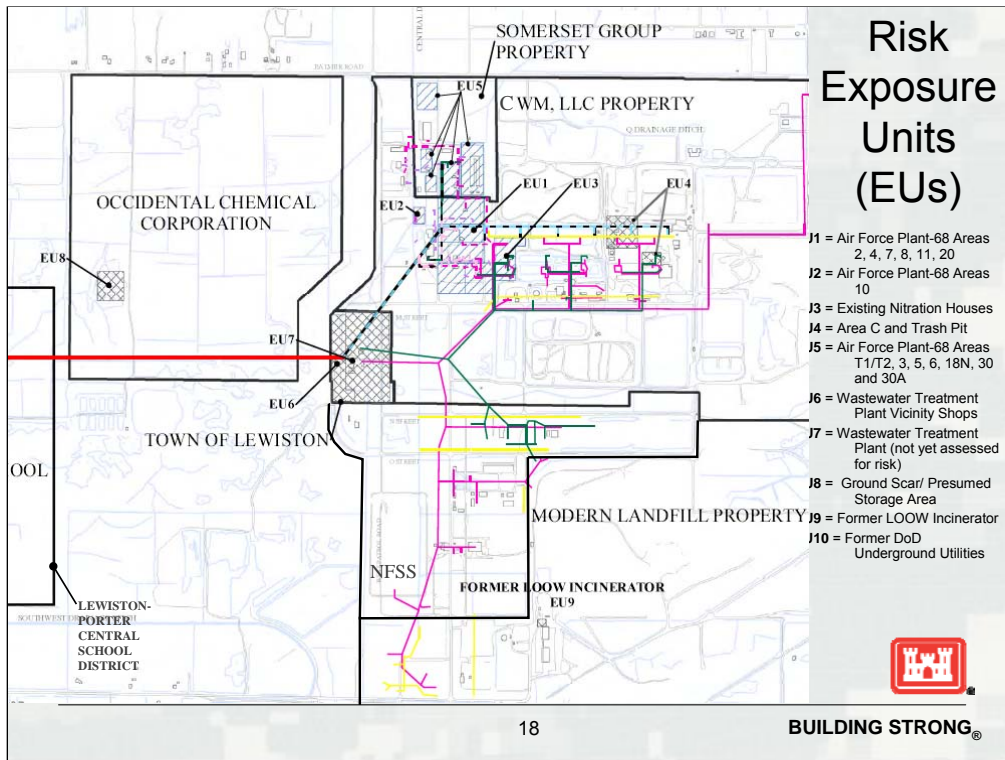
Risk Exposure Units

- What is an exposure unit?
 - ▶ To facilitate the risk assessment, similar areas were combined into exposure units.
 - ▶ Areas were combined based on:
 - proximity,
 - contaminant type and sources,
 - site use history,
 - similar terrain/vegetation, and
 - similar industrial processes.
 - ▶ Currently, 10 separate exposure units have been defined.



The ten exposure units identified thus far at LOOW include:

- Exposure Unit 1 = Air Force Plant-68 Areas 2, 4, 7, 8, 11, 20
- Exposure Unit 2 = Air Force Plant-68 Area 10
- Exposure Unit 3 = Existing Nitration Houses
- Exposure Unit 4 = Area C and Trash Pit
- Exposure Unit 5 = Air Force Plant-68 Areas T1/T2, 3, 5, 6, 18N, 30 AND 30A
- Exposure Unit 6 = Wastewater Treatment Plant (WWTP) Vicinity Shops
- Exposure Unit 7 = WWTP (not yet assessed for risk)
- Exposure Unit 8 = Ground Scar/Presumed Storage Area
- Exposure Unit 9 = Former LOOW Incinerator
- Exposure Unit 10 = Former DoD Underground Utilities



The exposure units are located on sever properties:

- Exposure Unit 1 = Air Force Plant-68 Areas 2, 4, 7, 8, 11, 20 (CWM property)
- Exposure Unit 2 = Air Force Plant-68 Area 10 (CWM property)
- Exposure Unit 3 = Existing Nitration Houses (CWM property)
- Exposure Unit 4 = Area C and Trash Pit (CWM property)
- Exposure Unit 5 = Air Force Plant-68 Areas T1/T2, 3, 5, 6, 18N, 30 AND 30A (Somerset Group property)
- Exposure Unit 6 = Wastewater Treatment Plant (WWTP) Vicinity Shops (Town of Lewiston property)
- Exposure Unit 7 = WWTP (not yet assessed for risk) (Town of Lewiston property)
- Exposure Unit 8 = Ground Scar/Presumed Storage Area (Occidental Chemical Corporation property)
- Exposure Unit 9 = Former LOOW Incinerator (Modern Landfill property)
- Exposure Unit 10 = Former DoD Underground Utilities (various properties)

Conditions That Must Be Met To Result in Risk

- The following must occur to have a complete exposure pathway:
 - ▶ chemical release
 - ▶ route of exposure
 - ▶ potential receptor (current and/or future)

- Incomplete exposure pathways do not result in exposure and are not included in the risk assessment



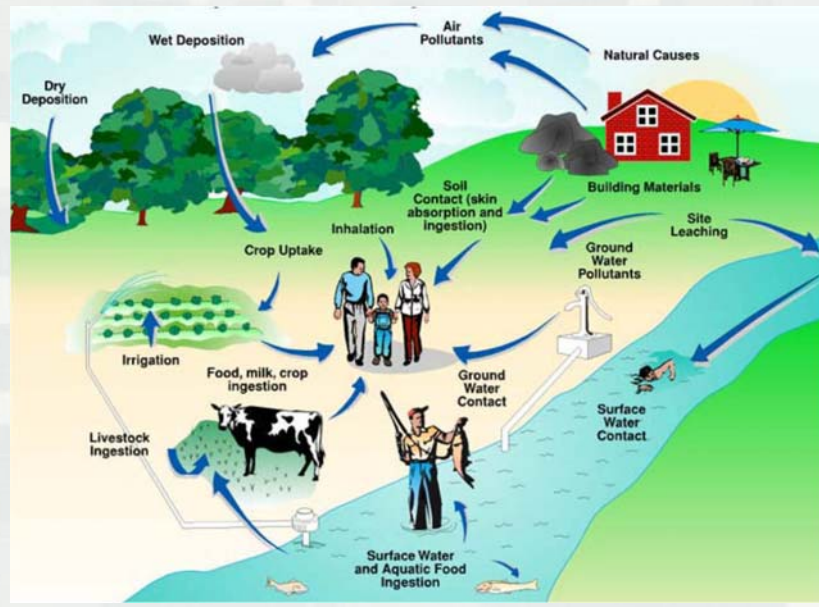
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Within the risk assessment process, certain conditions must be present to evaluate risk to potential receptors. The presence of a chemical at the site does not necessarily present a risk to receptors. The conceptual site models identify exposure pathways that are complete for each potential receptor.

Potential receptors are identified based upon the current use of the exposure unit. In addition, potential future land use scenarios are identified to determine any additional receptors that may be exposed to the site in the future. This ensures that current potential receptors and reasonably anticipated future potential receptors are evaluated in the risk assessment.

Illustrations of Exposure Pathways



See handout 7

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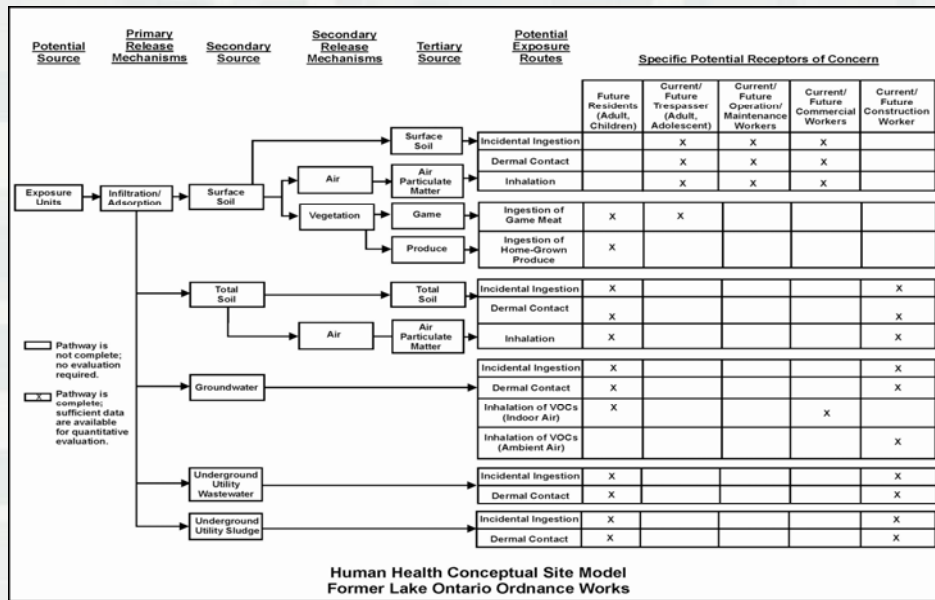
Exposure pathways consist of three elements. If any one of these elements is missing the exposure pathway is incomplete.

A chemical release – for example, historic operations at the site resulted in releases to soil.

An exposure route – Is there an actual mechanism for exposure. For example, direct ingestion, inhalation, and/or dermal contact. The receptor (for example, a resident child or trespasser) must come into contact with site contaminants for there to be an exposure.

A potential receptor – What ecological or human receptors will actually contact media affected by the chemical release. This includes an evaluation of current and potential future receptors.

Human Health Conceptual Site Model



See Handouts #8-9

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Within the conceptual site model, not all receptors or media are evaluated at every exposure unit. The trespasser (adult and adolescent), operations/maintenance worker, commercial worker, and construction worker are evaluated for all exposure units. The resident is only evaluated in the human health risk assessment for Exposure Units 5, 6, 7, 8, and 9. The resident is not evaluated in Chemical Waste Management (CWM)-currently owned property (Exposure Units 1, 2, 3, and 4) due to CWMS perpetual care agreement which requires them to maintain the property indefinitely. Soil (both surface and total) is evaluated in the human health risk assessment for all exposure units (except Exposure Unit 10 – underground utilities). Soil samples were collected from both systematically established sampling locations (i.e., an established sampling grid on the area of concern) with no bias towards any particular portion of the area of concern, as well as from locations placed specifically to characterize potential contaminant sources. Potential or suspected contaminant sources included areas of sparse vegetation, former storage tank areas, former process area buildings, areas exhibiting discolored soil, etc. Groundwater is evaluated in the human health risk assessment for Exposure Units 1, 3, 4, 5, and 6 because many of the borings did not indicate the presence of water bearing intervals. Furthermore, within Exposure Units 1, 3, and 5, groundwater was encountered in some portions of the Exposure Unit but not in others. In Exposure Unit 2, groundwater was not encountered in quantities sufficient enough to perform the proposed sampling program. For Exposure Unit 8, subsurface soil concentrations are compared to groundwater screening criteria. No COPCs in subsurface soil exceeded the groundwater screening criteria. As a result, groundwater was not evaluated for Exposure Unit 8. The sludge and wastewater media refers to solids and liquids, respectively, contained in vaults, pits, grates, floor drains, pipes, etc., except for Exposure Unit 10. The sludge and wastewater media evaluated, outside of Exposure Unit 10, were limited to pits and vaults that could be easily accessed by potential receptors.

For Exposure Unit 10 – underground utilities, subsurface soil, surface soil, wastewater, and sludge were evaluated in the human health risk assessment. In addition, the only potential receptors evaluated for Exposure Unit 10 are the construction worker and residents because the underground utilities are approximately 2 ft to 17 ft below ground surface (bgs). For areas where the underground utilities are within CWM, LLC property, only the construction worker is evaluated. Surface water and sediment were evaluated for the 30-inch outfall only. The surface water and sediment samples were collected from the Southwest Drainage Ditch, beneath the 30-in. outfall line where it traverses the ditch.

Risk Assessment

- Carcinogenic risks are evaluated as follows:
 - ▶ The probability that a United States resident will develop cancer in his or her lifetime is 50% for men and 33% for women (American Cancer Society).
 - ▶ Risk results are compared to the U.S. EPA established acceptable carcinogenic risk range (U.S. EPA, Code of Federal Regulations Title 40, Part 300).
 - ▶ The LOOW HHRA carcinogenic results are considered a potential concern if there is greater than a 0.01% increased incidence of cancer in a potential receptor.
- Non-carcinogenic risks are considered a potential concern if the chemical concentration is greater than the U.S. EPA derived level for no adverse effects.
- LOOW risk assessment assumptions:
 - ▶ Based upon potential, long-term exposures
 - ▶ Evaluated conservative exposures, for example:
 - Residential exposure assumes continuous ingestion and contact with soil for 350 days a year for 30-years.
- Additional information: "LOOW Risk Assessment Fact Sheet" at:
<http://www.lrb.usace.army.mil/derpfuds/loow/index.htm>



See handout 2

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Probabilities of developing cancer were obtained from American Cancer Society. 2004. Cancer Facts and Figures 2004: Basic Cancer Facts. <http://cancer.org/statistics/cff99/basicfacts.html#risk>

Carcinogenic risks are evaluated as follows:

The probability that a resident of the United States will develop cancer at some point in his or her lifetime is 1 in 2 for men and 1 in 3 for women (American Cancer Society).

The U.S. EPA has established an acceptable risk range of excess cancers as one increased incidence of cancer in a population between one million to ten thousand people (U.S. EPA, Code of Federal Regulations Title 40, Part 300).

Non-carcinogenic risks = chemical concentration divided by the toxicological threshold.

Definition of risk thresholds:

Carcinogenic results are evaluated against 1 increased incidence of cancer in a population of 10,000 (human health only).

Non-carcinogenic risks greater than 1 (see second major bullet) are evaluated further.

Risk Assessment Results

The screening level ecological risk assessment concluded:

- ▶ Exposure Units (EUs) 3, 4, 5, and 6 present negligible hazard to ecologic receptors.
- ▶ EUs 1, 2, and 8 have potential hazards to soil invertebrates.
- ▶ EU 8 also presents potential hazards to plant, bird, and mammal population.

The human health risk assessment concluded:


- ▶ EUs 2, 5, 6, and 9 and 30-inch outfall do not pose human health concerns.
- ▶ EUs 1, 3, 4, 8, and 10 have potential human health concerns.
- ▶ Primary chemicals of potential concern are PCBs, PAHs, explosives, metals, pesticides, and VOCs.

EU1 = Air Force Plant-68
Areas 2, 4, 7, 8, 11, 20
EU2 = Air Force Plant-68
Area 10
EU3 = Existing Nitration
Houses
EU4 = Area C and Trash Pit
EU5 = Air Force Plant-68
Areas T1/T2, 3, 5, 6,
18N, 30 and 30A
EU6 = Wastewater
Treatment Plant Vicinity
Shops
EU7 = Wastewater
Treatment Plant (not yet
assessed for risk)
EU8 = Ground Scar/
Presumed Storage Area
EU9 = Former LOOW
Incinerator
EU10 = Former DoD
Underground Utilities

PCBs = polychlorinated biphenyls
VOCs = volatile organic compounds
PAHs = polynuclear aromatic hydrocarbons

See Handouts 10-18

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The following areas were determined to have potential risk concerns:

CWM-currently owned property

- Exposure Unit 1 – Air Force Plant-68 Process Areas 2, 4, 7, 8, 11, and 20
human health risk assessment – operation/maintenance worker, commercial worker, and construction worker. Media include soil and groundwater, and sludge and wastewater within the underground utilities. Primary chemicals of potential concern (COPCs) are PCBs and VOCs. screening level ecological risk assessment – soil invertebrates exposure to zinc and manganese in surface soil.
- Exposure Unit 2 – Air Force Plant-68 Process Area 10
screening level ecological risk assessment – soil invertebrates exposure to manganese in surface soil, and unidentified pellets containing elevated levels of antimony.
- Exposure Unit 3 – Existing Nitration House Area
human health risk assessment – adolescent trespasser and construction worker exposure to sludge.
- Exposure Unit 10 – Underground Utilities
human health risk assessment – construction worker exposure to sludge, and wastewater. Primary COPCs include PCBs, PAHs, pesticides, and VOCs

Somerset Group, Inc.-currently owned property

- Exposure Unit 10 – Underground Utilities
human health risk assessment – 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-currently owned property

- Exposure Unit 10 – Underground Utilities
human health risk assessment – construction worker and child resident exposure to PAHs and PCBs in sludge within the acid sewer line, and construction worker exposure to PAHs in sludge within the dry wells, pits, and sumps.

Occidental-currently owned property

- Exposure Unit 8 – Ground Scar/Presumed Storage Area
human health risk assessment – construction worker and resident exposure to metals and explosives in soil. screening level ecological risk assessment – soil invertebrates exposure to chromium in surface soil, and potential hazards to birds and mammals from explosives in a single surface soil sample.

Risk Assessment Results

CWM-currently owned property

- Exposure Unit (EU) 1 – Air Force Plant-68 Process Areas 2, 4, 7, 8, 11, and 20
 - ▶ Human health risk assessment – operation/maintenance, commercial, and construction worker exposure to soil and groundwater, and sludge and wastewater within the underground utilities. Primary chemicals of potential concern are PCBs and VOCs.
 - ▶ Screening level ecological risk assessment – soil invertebrates exposure to metals.
- EU 2 – Air Force Plant-68 Process Area 10
 - ▶ Screening level ecological risk assessment – soil invertebrates exposure to metals and pellets.
- EU 3 – Existing Nitration House Area
 - ▶ Human health risk assessment – adolescent trespasser and construction worker exposure to sludge.
- EU 4 – Area C/Trash Pit
 - ▶ Human health risk assessment – commercial worker inhalation of VOCs in groundwater.
- EU 10 – Underground Utilities
 - ▶ Human health risk assessment – construction worker exposure to sludge and wastewater. Primary chemicals of potential concern include PCBs, PAHs, pesticides, and VOCs

PCBs = polychlorinated biphenyls
VOCs = volatile organic compounds
PAHs = polynuclear aromatic hydrocarbons



See Handouts 10-18

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Risk Assessment Results

Somerset Group, Inc.-currently owned property

- Exposure Unit (EU) 10 – Underground Utilities
 - ▶ Human health risk assessment – construction worker exposure to PAHs in sludge in the dry wells, and child resident exposure to arsenic and PCBs in total soil around the unknown lines.

Town of Lewiston-currently owned property

- EU 10 – Underground Utilities
 - ▶ Human health risk assessment – construction worker and child resident exposure to PAHs and PCBs in sludge within the acid sewer line, and construction worker exposure to PAHs in sludge within the dry wells.

Occidental-currently owned property

- EU 8 – Ground Scar/Presumed Storage Area
 - ▶ Human health risk assessment – construction worker and resident exposure to metals and explosives in soil.
 - ▶ Screening level ecological risk assessment – soil invertebrates exposure to chromium and birds and mammals from explosives in a single surface soil sample.

PCBs = polychlorinated biphenyls
VOCs = volatile organic compounds
PAHs = polynuclear aromatic hydrocarbons



See Handouts 10-18

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Next Steps

- Complete Phase IV of the ongoing RI (the former LOOW wastewater treatment plant area)
- Areas identified as presenting potential risk concerns will be evaluated further in a feasibility study.
- Both applicable and relevant and appropriate requirements (ARARs) and risk-based clean-up values will be calculated.



Management Action Plan

- **What is the Management Action Plan?**
 - ▶ Planning document that will describe the current status of the site within the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) environmental response program and those steps required to gain administrative closure
 - ▶ “Living document” that will be updated regularly with new findings and current status

- **Why do we need a Management Action Plan?**
 - ▶ Integrate and evaluate information from prior USACE reports and relevant non-USACE sources
 - ▶ Establish a single comprehensive agency planning document
 - ▶ Communicate findings, conclusions, and a framework to achieve the objectives of the USACE Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) responsibilities at the former LOOW site



See handout 19

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Due to the size of the former LOOW (7,567 acres), the number of current real estate tax parcels (over 550), and variability in site use (e.g., school to a Subtitle C landfill), the planning, funding, and execution of environmental response activities (including closure of those areas not adversely impacted) has been challenging. The purpose of the LOOW Management Action Plan is to integrate and evaluate information from prior USACE reports and relevant non-USACE sources to establish a single comprehensive agency planning document in which USACE formally communicates findings, conclusions, and a framework to achieve the objectives of the USACE CERCLA responsibilities at the former LOOW site.

The LOOW Management Action Plan is not intended to replace or serve as a formal CERCLA decision document (i.e. Proposed Plan or Record of Decision). It is a planning document presenting the anticipated path forward for completion of the environmental responses at the property parcels comprising the former LOOW.

Because the Management Action Plan is a management tool, the USACE plans to update the Management Action Plan regularly, and to issue revisions of those Property Management Action Plans that incurred significant change in strategy or status from the previous submittal. The revisions will include a summary of those comments received from community and stakeholder input and comments.

Management Action Plan

Layout of Management Action Plan

- **Part I – Management Action Plan**
 - ▶ Purpose, methodologies (parcel groupings), and sources of information
 - ▶ USACE and regulatory authorities and responsibilities
 - ▶ Summary of status of all parcel groups
- **Part II – Property Management Action Plans**
 - ▶ Property Management Action Plans for all 33 parcel groups defined in the Management Action Plan
 - ▶ DoD and non-DoD activities and documented and suspected impacts
 - ▶ USACE response strategy and response status
- **Part III – Responsiveness Summary**
 - ▶ Stakeholder comments and USACE responses



The Management Action Plan presents the following: objectives; methodologies; USACE and other Federal, State, and local agency authority and responsibilities; summary of findings and strategy; and explains why and how each of the real property parcels, defined by the Niagara County Department of Real Property, were combined into “parcel groups”.

A “parcel group” has been defined as a single parcel or multiple parcels with similar characteristics with regard to Defense Environmental Restoration Program for Formerly Used Defense Sites property eligibility, location relative to the developed area of LOOW, ownership, known or suspected DoD impacts, and land use. It is the unit for which each Property Management Action Plan was developed and for which findings, conclusions, and strategies for eventual closure are presented.

Over 550 property parcels were combined into 33 parcel groups using the characteristics listed above and per the hierarchy described in the Management Action Plan. The posters prepared for tonight’s work shop also present the hierarchy used to combine parcels into parcel groups.

Subsequent releases of the Management Action Plan will have a third part (Part III) that will include comments received from stakeholders.

Report Availability

- Copies of the Underground Utilities Remedial Investigation Report, Human Health and Screening Level Ecological Risk Assessment Reports, and associated Risk Summary Report are available at:
 - ▶ Lewiston and Youngstown Libraries
 - ▶ The Corps Buffalo District office (1776 Niagara Street)
 - ▶ or at the USACE website:
<http://www.lrb.usace.army.mil/derpfuds/loow/index.htm>

