



**US Army Corps
of Engineers** ®

Buffalo District

**Former Linde Site,
GROUNDWATER PROPOSED PLAN
Formerly Utilized Sites Remedial Action Program (FUSRAP)**

Frequently Asked Questions

1. What is the purpose of the groundwater proposed plan?

The Proposed Plan for the Linde Groundwater Operable Unit presents the rationale for USACE recommendations for Linde groundwater and outlines the public's role in helping USACE make a final decision on Linde groundwater. The proposed plan also provides background information on the Linde Site, shallow Linde groundwater and deep groundwater in the area of the underground injection wells used during the MED/AEC era operations. It summarizes the findings and conclusions of USACE groundwater investigations conducted at the Linde Site to address the significance of MED/AEC-related constituents in Linde groundwater.

2. Why was the groundwater investigation for the Linde Site so much slower than what was done for the soils and buildings at the site?

The March 2000 Record of Decision for contaminated soils at the Linde site excluded groundwater because comments related to the 1999 Proposed Plan for the Linde Site expressed concerns about the sufficiency of the number of samples relied upon in reaching a conclusion that that no remediation of Linde groundwater is warranted. After completing further investigations in 2001 and 2002, and subsequent evaluation, the USACE still concludes that that no remediation of groundwater is necessary.

3. What did the Corps do to further investigate the groundwater at Linde?

In 2000 USACE met with NYSDEC and USEPA Region 2 to develop plans for supplemental investigations of the groundwater at Linde. USACE then developed a formal Sampling and Analysis Plan for the Linde Groundwater Operable Unit (2001 SAP USACE). In May 2002, USACE met with representatives of the NYSDEC to discuss findings of the investigations completed in 2001 and discuss recommendations for further sampling. A sampling plan addendum (SAP Addendum, USACE 2002b) was developed and additional sampling was completed in 2002.

USACE completed the groundwater sampling as well as soil sampling for leaching tests in accordance with the SAP and SAP Addendum. The principal

investigation activities that USACE conducted over the 2 year period (2001-2002) included:

- Construction of 3 new deep monitoring wells and the construction of 3 new shallow monitoring wells;
- Performance of two groundwater sampling rounds (March and June, 2001), with sampling conducted at the new and existing monitoring wells;
- Analyses of filtered and unfiltered groundwater samples from these wells for the presence of radionuclides and metals, and also analyses of unfiltered samples from these wells for general chemistry parameters;
- Collection of soil samples for radionuclide analyses and leaching tests;
- Performance of another groundwater sampling round (August 2002), with sampling conducted at the new monitoring wells constructed by USACE in 2001 and selected older monitoring wells that were constructed by DOE;
- Analysis of filtered and unfiltered groundwater samples from these wells for the presence of radionuclides and metals; and,
- Collection of soil samples for radionuclide analyses and leaching tests.

USACE released the results of the 2001 and 2002 investigations in the subsequent report, *Results of the 2001 and 2002 Groundwater Investigations at the Linde Site, Tonawanda, New York* (USACE 2003b). The results of the investigations are also summarized in the proposed plan. The sampling data were used as input to groundwater geochemistry modeling programs that provided confident results on which the proposed plan was developed.

4. What are the Corps conclusions?

Based on further assessment of potential exposure pathways for Linde groundwater, USACE has concluded that the groundwater operable unit at the Linde Site poses no current or potential threat to human health or the environment. This is why the Corps' recommendation presented in the Proposed Plan calls for no action for groundwater at the Site.

5. Is it possible that the radiological contamination from Linde could ever reach the Niagara River?

The radiological contamination from Linde is not expected to impact the Niagara River. Modeling was conducted to determine what concentration of uranium could exist in the deep groundwater in the vicinity of the former injection wells. This modeling indicates a final concentration of approximately 30 pCi/L (or 27 µg/L) for the uranium when leaving the vicinity of the former injection wells. This concentration is equivalent to the USEPA's drinking water standard for uranium. Discharge of uranium in groundwater to the Niagara River at this concentration would be below the river surface and would have no perceptible impact on the 100 billion plus gallons per day flow of the river. The

concentrations of other potentially MED/AEC-related constituents in the deep groundwater are much lower than the uranium and similarly would have no perceptible impact on the river.

In addition, the shallow flow gradients (~0.0003 ft/ft to the southwest) along with geochemical modeling indicate that uranium migration rates are minimal, to near stagnant. Groundwater flow rates estimated for the impacted zone vary between 5.5 and 24 ft/yr. However, the geochemical conditions in the ambient aquifer inhibit the uranium migration by creating stable uranium minerals (e.g., uraninite) in the pore space of both the contact-zone and bedrock aquifers. The long-term stability of this condition is secured by the shallow flow gradients and availability of uranium-mineralizing conditions abundant in the Camillus Shale (i.e., the slow moving groundwater will be in chemical equilibrium with the gypsum-rich shale that promotes uranium-fixing conditions).

6. How do you know that this won't occur 30 or 100 or 300 years from now?

As described above, if the contaminated groundwater ever reached the river, the impact would be insignificant (even assuming exaggerated conditions).

7. Aren't you obligated to ensure protectiveness into the future, like up to 1,000 years into the future? Especially since the Federal Government put the contamination there?

If the community ever decided to begin using the groundwater for drinking or another use such as irrigation, the groundwater would have to be treated first to make it suitable for these uses. This treatment is necessary because the groundwater has high concentrations of naturally occurring salts and other solids (i.e., it is not naturally potable, but rather saline and turbid). The treatment required to remove the naturally occurring constituents would also remove MED/AEC-related constituents in the groundwater. Therefore, there would be no need for institutional controls since the water could not be used without treatment due to the presence of naturally occurring constituents and that treatment would also remove MED/AEC-related constituents.

8. Don't we need some type of monitoring plan to ensure that the contamination in deep groundwater never reaches an area where people could be exposed (like creeks and rivers even?)

In the vicinity of the deep injection wells, the source of potential contamination, the final, stable concentration of uranium in the deep groundwater is estimated to be approximately equal to the USEPA's drinking water standard (Maximum Contaminant Level). This is a concentration that will not be harmful if ingested over a lifetime. If this limited contamination in the deep groundwater ever reached a nearby creek or river, the concentration of uranium would be greatly diluted, and would therefore pose even less of a risk to human health or the environment. Therefore no monitoring is warranted.

9. Who is the lead agency for cleanup of radiological contamination at the former Linde site?

The U.S. Army Corps of Engineers is the lead Federal agency in addressing MED-related radiological contamination at the Linde Site and for FUSRAP.

10. What has the Corps accomplished, so far, in cleaning up the site?

We have safely maintained radiological controls since 1997 and successfully engineered the safe removal of six buildings (14, 30, 57, 58, 67, and 73) and safely removed over 250,000 tons of contaminated material.

11. What specific air quality and monitoring controls are in place?

Continuous air monitoring and environmental surveillance has been present at the site for years. We have deployed twelve air sampling stations (including one on the roof of the Holmes Elementary School) and twenty-four environmental dosimeters. Data generated by the monitoring confirms there has never been an elevated reading of concern. Our data is available for general viewing on our public website <http://www.lrb.usace.army.mil/fusrap/linde>

12. How can I find out more information about the Former Linde Site?

The Corps of Engineers welcomes questions from citizens regarding the Former Linde Site or any other FUSRAP site. Questions may be addressed to: Public Affairs Office, Buffalo District, U.S. Army Corps of Engineers, 1776 Niagara Street, Buffalo, NY 14207, telephone (716) 879-4410 or toll-free at 1-800-833-6390. You can also email us at fusrap@usace.army.mil.

The Administrative Record File is another invaluable resource for information on the Former Linde Site. The file contains a collection of documents that form the basis for the decisions made during the environmental restoration of the site. The Administrative Record File is located at the following locations:

Buffalo District
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199

Tonawanda Public Library
333 Main Street
Tonawanda, NY 14150

Please call ahead to ensure facilities are open.