

**US Army Corps
of Engineers®**

FUSRAP Fact Sheet

Niagara Falls Storage Site (NFSS)

Former University of Rochester Burial Area Investigation

Vicinity Property G (VPG)

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History of “Rochester Burial Area”

During the Manhattan Engineer District Project in the 1940s, the University of Rochester was assigned the task of performing research in support of radiation safety (Aerospace Corporation, 1982)¹. Some of this research involved testing of radiation effects on animals. In 1951, the University of Rochester (U of R) established the burial site on what is now Vicinity Property G (VPG) of the NFSS for the burial of test animal carcasses and other contaminated debris from their research laboratory.

In 1972, the Department of Energy (DOE) excavated the U of R Burial Area to a depth of 10 feet and removed 512 cubic yards of soil, drums and debris. The DOE placed the material “onsite” on the spoils pile (Aerospace Corporation, 1982)¹. It is unknown whether or not this excavated material was originally placed on the NFSS or if it eventually was placed into the interim waste containment structure at the NFSS.

The Corps’ NFSS investigative team continues to research historic reports and files to determine where the “onsite” location is and where the material excavated was ultimately disposed.


Background


Since 1999, the U.S. Army Corps of Engineers has been conducting a Remedial Investigation (RI) of the Niagara Falls Storage Site (NFSS) to verify the presence and location of existing contamination. The Corps’ RI work focuses on areas on the NFSS not addressed by the Department of Energy (DOE) during previous clean up activities at the site. Areas not thoroughly addressed in the vicinity outside of NFSS are Vicinity Property G (VPG), VPE and VPE’. Characterization of these three properties, located to the north of NFSS on the former Lake Ontario Ordnance Works (LOOW), was performed, but not completed, by the United States Department of Energy (DOE) since small portions of interest on each property were not accessible. Accordingly, these properties remain as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP).


Response to Community

Based upon historical records and local community concern, the Lake Ontario Ordnance Works Restoration Advisory Board (LOOW RAB) requested that the Corps perform an investigation to confirm the presence or absence of animal carcasses associated with the University of Rochester (U of R) Burial area.

Legend:

 Vicinity Properties previously certified as closed (i.e. remediated) by DOE.

 Investigations at Vicinity Properties G, E and E were not completed by DOE and will be investigated as FUSRAP sites by the Corps of Engineers.

 The Niagara Falls Storage Site (NFSS); currently undergoing a Remedial Investigation/Feasibility Study conducted by the Corps of Engineers.

Site Description

Vicinity Property G (see fig. 1) is almost 30 acres in size and privately owned. It is located north of the NFSS in the Lewiston and Porter Townships, New York. An old farmhouse that predates government activities (see figure 2 reference to 'red roof house') is located on the site, as well as an active liquid waste treatment pond. A chain link fence restricts access to the site by the general public.

The VPG property, currently owned by CWM Chemical Services, is one of three open (or incompletely investigated) vicinity properties associated with the Niagara Falls Storage Site.

Site Location

The location of the U of R burial area is marked on Figure 2, the 1957 Hooker Electrochemical Company Chart A-D353, Rev 2 (Aerospace Corporation, 1982)¹. The map showed the U of R burial area as an approximately 21-foot (6.5 meter) by 21-foot (6.5 meter) area located 88 feet (27 meters) east of the Red Roof House and about 37 feet (11 meters) south of the trail in the central to southeastern portion of VPG.

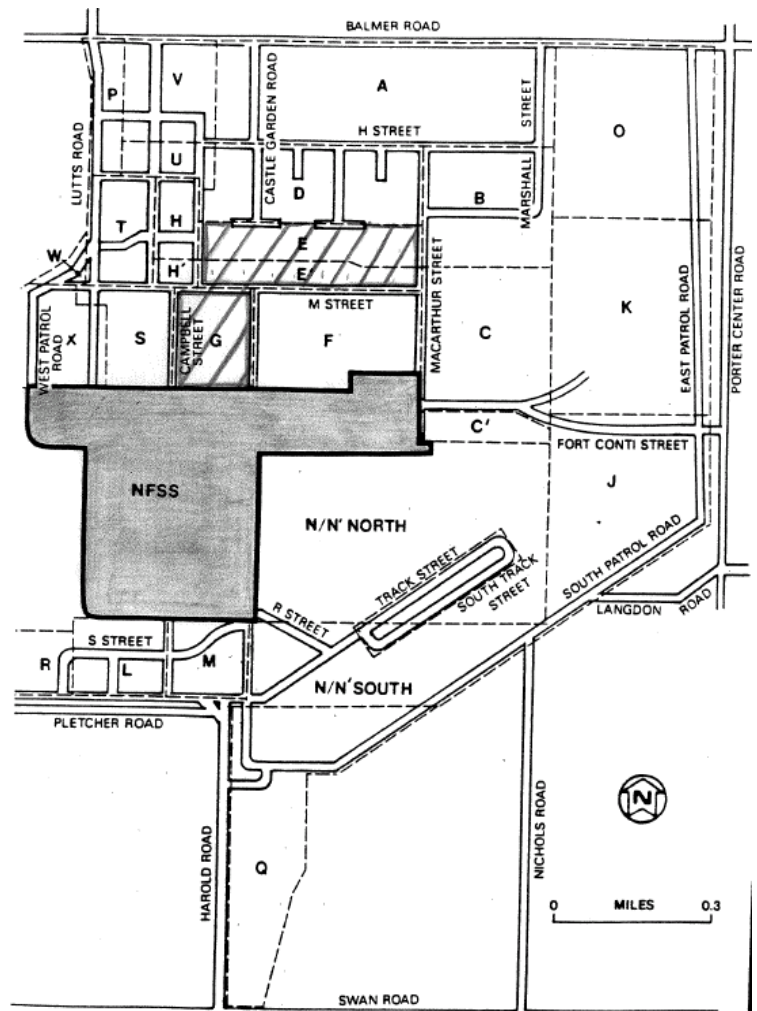


Figure 1: Letter-Designated Vicinity Properties (Bechtel, 1989)²

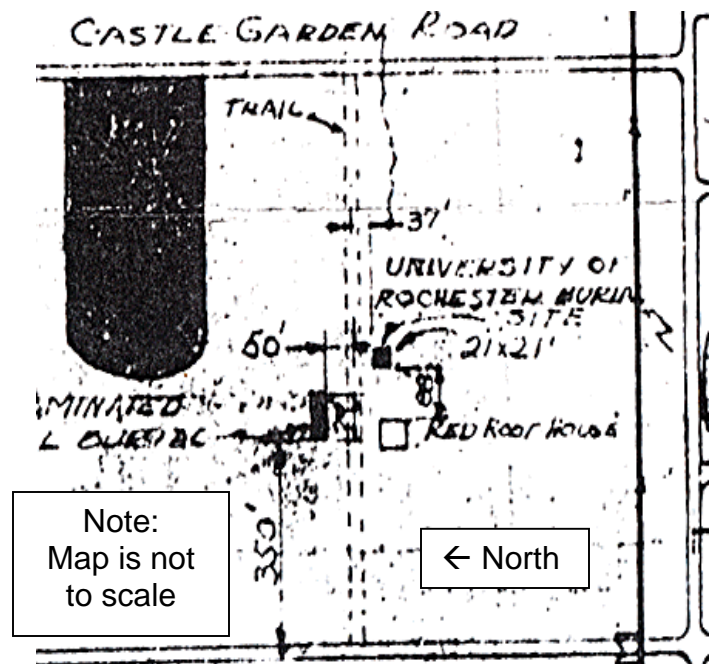


Figure 2: 1957 Map of U of R burial area 2 (Aerospace Corporation, 1982)¹

Geophysical Investigation

In November 2001, the Corps' investigative team conducted a focused frequency domain electromagnetic (EM-31) survey over the entire southern portion of Vicinity Property G south of the gravel road (see Figure 7) to locate the former U of R Burial Area.



**Figure 3: EM-31 Survey of VPG
(Red Roof House in background)**

Using the EM-31 survey approach, the Corps' investigative team looked specifically for buried metal or changes in soil properties— signs that may indicate a burial area (Figure 3).

The Corps' team identified one near-surface area of interest (where electrical conductivity readings were higher than background) within the vicinity of the former U of R burial area, indicating possible buried metallic debris.

The Corps targeted this area for trenching activities. The excavation of soil was selected to investigate the suspect burial area since it allowed for better physical identification and investigation of a larger amount of soils than standard drilling techniques.

Trenching Objectives

The Corps conducted soil excavation activities on VPG to:

1. Confirm the presence or absence of debris associated with the former U of R Burial Area based upon historical information, visual evidence, and geophysical results.
2. Collect samples to characterize debris and soils surrounding debris for future characterization efforts.

No formal surface gamma radiation walkover was conducted since deeper gamma readings were needed to investigate subsurface features. However, the Corps' team scanned each bucket of excavated soil for volatile organic compounds and gamma radiation using real-time reading instrumentation in the field. The Corps team also used test kits to inspect the excavated soil for evidence of nitroaromatic compounds. A magnetometer (iron-seeking metal detector) survey of the trench bottom was conducted after each foot of soil was excavated.



Figure 4: Trench on VPG. This picture shows the start of the 65 foot-long, 12-foot deep trench began on May 22, 2002.

May 22, 2002 Trenching Activities

On 22 May 2002, excavation of a 65-foot long and 12-foot deep maximum trench was started to:

- ❑ Confirm the 1972 excavation of the former Rochester Burial Area,
- ❑ Evaluate the suspected buried area (identified in the geophysical survey),
- ❑ Measure gamma radiation levels, and
- ❑ Collect samples to support future investigations.

The location of the burial area was taken from the 1957 hand-drawn map (Figure 2). Trench TBG01 is located 88 feet from the red roofed farmhouse mentioned earlier, which was aligned with the centerline of the disposal area. The length of the trench accounted for the fact that the trail is no longer straight (as shown in Figure 7).

A small pit near TBG01, designated as TBG02, was investigated due to a gamma reading greater than background. A rusted, corrugated metal trashcan containing laboratory debris was unearthed between 6 inches and 3.5 feet below ground surface in TBG02. The container contents included standard laboratory debris, such as tubing, syringes, syringe needles, microscope slides, petri dishes, glass reagent bottles, pipettes, emesis basin, test tubes, and laboratory gloves.



Figure 5: Unearthed Metal Trashcan



Figure 6: Unearthed Glass Bottle

Average background gamma radiation levels in non-impacted subsurface soils (using a 2" x 2" sodium iodide (NaI) gamma radiation detector) were normally around 15,000 counts per minute (CPM). The corrugated metal container and contents exhibited gamma radiation levels up to 290,000 CPM, or approximately 20 times greater than background radiation levels to a depth of 3.5 feet, after which background radiation levels were encountered.

Due to the level of gamma radiation measured in this trench, the discovery of microscope slides (indicative of biological testing like the University of Rochester would have conducted), and the age of the glass reagent bottles (mid 1940s), the laboratory debris fit the profile of University of Rochester laboratory debris. However, burial is likely to have taken place between 1944 and 1953.

The Corps suspended trenching activities in May 2002 due to the discovery of laboratory debris. A more thorough trenching investigation was scoped and the Corps' Contractor's Site Safety and Health Plan was revised to include protocol for alerting the laboratory personnel receiving the samples that there may be sharps (such as glass), minimizing the number of personnel in the exclusion zone while trenching, perimeter air monitoring during trenching activities, and increasing the level of respiratory protection in the exclusion zone.

September 11-16, 2002 Trenching Activities

The Corps continued trenching TBG01 on September 11-16, 2002. Four additional trenches (for a total of 6 trenches) were investigated (see Figure 7). The trench locations were based upon previous geophysical evidence, and visual depressions. Upon further trenching of TBG01, one pelvic bone from a small mammal (ACG01) was found one foot below ground surface with slightly above background surface gamma radiation levels. Also, a few items of laboratory debris were unearthed (LDG01, LDG02, LDG04). A soil sample containing a dime-size portion exhibiting an elevated gamma radiation reading (greater than 1,000,000 CPM) was collected within a foot of the surface in TBG03. The radioactive material associated with this sample, initially non-detectable at the surface, was later determined to be principally radium-226, with lesser amounts of thorium-230, strontium-90, actinium-227, uranium 233/234, uranium 235/236, and uranium-238.

Once this soil sample was collected (i.e. removed from the site), gamma readings below this sampled area were typical of background. No evidence of animal bones or lab debris was found in TBG03, TBG05, and TBG06.

The November 2001 electromagnetic (EM-31) geophysical survey was conducted over more than 8 acres of the southern portion of VPG (see Figure 7 for EM-31 survey tracks). A total of 45 soil samples, five laboratory debris samples, and the animal bone were collected from the six trench locations (Figure 7) and analyzed for various metals, radionuclides, pesticides, polychlorinated biphenyls (PCBs), semi volatiles, and volatile organics. The selection of sampled parameters for each sample was based upon historic review, measured gamma radiation (using a 2" x 2" NaI detector) and volatile organics (using a Photoionizing Detector). Deteriorated trash cans, miscellaneous lab debris, and other material generated from this investigation were contained in drums. These drums are temporarily stored on the NFSS with other remedial investigation-derived waste pending acceptance of ultimate bulk disposal at Waste Control Specialists (Andrews, TX).

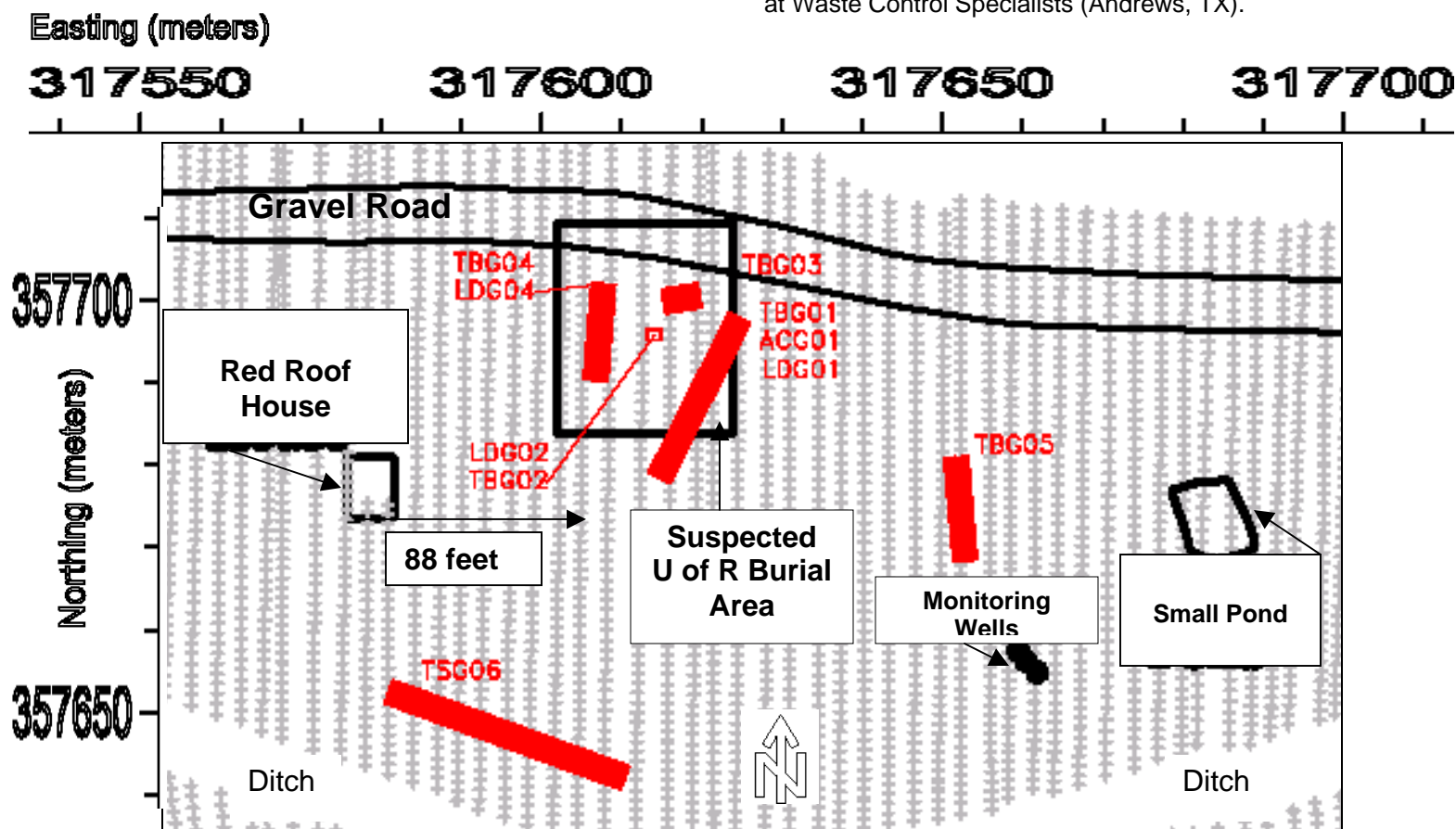


Figure 7: Trench Sample Locations and Geophysical (EM-31) Survey Lines

Findings

- Detectable concentrations of plutonium-239/240 (Pu-239/240) and strontium-90 (Sr-90) were identified during the May and September 2002 sampling efforts. A total of eight Pu-239/240 detects were reported in the small animal bone (1), laboratory debris (2), and subsurface soils in TBG01 and TBG02 (5) with concentrations ranging from 0.409 to 17.6 pCi/g. Twelve Sr-90 detects were reported in the small animal bone (1), laboratory debris (3), and subsurface soils in TBG01, TBG02, and TBG03 (8) with concentrations ranging from 0.576 to 306 pCi/g. Two Sr-90 detects were co-located with Pu-239/240 detects and one was co-located with the dime-size sample exhibiting elevated gamma radiation in the field. These contaminants are not linked with historical activities at NFSS but are only linked to activities by the University of Rochester (U of R). There is no documentation available indicating that radiological wastes containing Pu-239/240 and/or Sr-90 were buried on VPG.
- One pelvic bone from a small mammal (ACG01), unearthed from the former U of R Burial Area, exhibited elevated Sr-90 (306 pCi/g) with a lesser degree of Pu-239/240 (8.08 pCi/g). The small animal bone may be a remnant from the former disposal of animal carcasses associated with testing at the U of R. There is no documentation available indicating that radiological wastes containing Pu-239/240 and/or Sr-90 were buried on VPG.
- One subsurface soil sample collected (i.e. removed from the site) during the September 2002 trenching activities containing a dime-size portion with elevated gamma radiation >1,000,000 CPM (in TBG03) exhibited radium-226 concentrations similar to K-65 residues according to laboratory results. Since historical information links VPG to K-65-related activities, it is likely that VPG was contaminated with the same K-65 residue currently stored in the interim waste containment structure at NFSS.

Conclusions:

- The Corps confirmed the presence of a remnant animal bone and laboratory debris associated with the 1972 excavation of the U of R burial area. Therefore, the Corps concluded that VPG has isolated areas of buried radiologically contaminated materials through activities from two independent sources: Mallinckrodt K-65 and U of R animal testing, which was sent to the site as part of the Atomic Energy Commission operations. The available data and the historical information associated with these potential sources support the conclusion that the U of R is likely the source of the plutonium-239/240 and strontium-90 contamination and NFSS is the source of the radium-226 contamination.
- Based upon the findings of strontium-90 and plutonium-239/240 in debris and subsurface soils and K-65-like radium-226 concentrations in subsurface soils, further characterization of VPG is warranted. Note: A portion of VPG is inaccessible due to the presence of a water treatment pond (restricting full access to the site for characterization purposes).
- The findings of this investigation do not present any exposure or risk to the general population since the surface soil investigated exhibited near background radiation levels and VPG is inaccessible to the general public. In addition, no elevated gamma radiation, presence of lab debris, or animal bones was detected in 99% of the approximately 300 foot trenched area.
- The U.S. Army Corps of Engineers will request appropriations from Congress for funding to characterize all vicinity properties not certified closed by the DOE (VPG, VPE, and VPE'). Once funding is available, a thorough Remedial Investigation of the entirety of VPG, VPE, and VPE' will be conducted.

References:

¹Aerospace Corporation, *Background and Resurvey Recommendations for the Atomic Energy Commission Portion of the Lake Ontario Ordnance Works*, November 1982. (Volume 5 in LOOW Administrative Record)

²Bechtel National, Inc., *Post-Remedial Action Report for the Niagara Falls Storage Site Vicinity Properties – 1985 and 1986*, January 1989. (NF-006 in NFSS Administrative Record)