

February 23, 2005

Denise Baker, Task Monitor
United States Environmental Protection Agency
1200 Sixth Avenue, Mail Stop ECL-115
Seattle, Washington 98101

RE: Contract No. 68-S0-01-01, Technical Direction Document No. 02-05-0011;
Nike Site #92 Trip Report

Dear Ms. Baker:

Enclosed please find a copy of the final trip report for Nike Site #92 located in Kingston, Washington.

If you have any questions, please call me at (206) 624-9537.

Sincerely,

Linda Foster
START-2 Project Leader

Enclosure

Nike Site #92
Trip Report
Kingston, Washington
TDD: 02-05-0011

Contract: 68-S0-01-01
February 2005

Region 10
START-2

Superfund Technical Assessment and Response Team

Submitted To:
Denise Baker, Task Monitor
United States Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

TRIP REPORT

DATE: February 23, 2005
TO: Denise Baker, Task Monitor, EPA, Mail Stop ECL-115
FROM: Linda Foster, Project Manager, E & E, Seattle, WA
SUBJ: Nike Site #92
REF: Contract No. 68-S0-01-01, Technical Direction Document No. 02-05-0011

Place Visited:

Nike Site #92 and nearby drinking water wells in Kingston, Washington.

Purpose of Trip:

To complete a radiation survey of the site property and to sample nearby drinking water wells for radionuclides.

Persons Responding:

Linda Foster, Ecology and Environment, Inc. (E & E), Seattle, WA
Steve Merritt, E & E, Seattle, WA
Mike Brennan, Washington State Department of Health (DOH), Olympia, WA
Gary Palcisko, DOH, Olympia, WA

Persons Contacted:

North Kitsap School District, Robin Shoemaker, Director of Capital Programs

Site Owners:

North Kitsap School District

Date of Trip:

August 26, 2004

BACKGROUND

Nike Site #92 is a former missile launch facility operated by the United States Department of Defense located in Kingston, Washington. The facility operated from 1954 to 1975, first as an Ajax missile launch site and subsequently as a Hercules missile launch site. The Hercules missile was designed to use either conventional or nuclear warheads. The type of warhead used at the Nike Site #92 could not be confirmed from available information. Apparently, a radiation survey of the site has not been previously conducted.

In response to a lack of information concerning whether or not the site once stored nuclear weapons, the EPA in coordination with DOH, conducted a radiation survey of the site and sampled nearby drinking water wells for select radionuclides that may be associated with nuclear weapons. Costs for this joint effort were funded in part by the EPA (i.e., partial funding of the radiation survey, drinking water well sampling efforts, and all costs associated with this trip report) and in part by DOH (i.e., partial funding of the radiation survey, the drinking water well sampling efforts, and all radionuclide analytical work).

START-2 ACTIONS

On August 26, 2004, the Superfund Technical Assessment and Response Team (START)-2 met with representatives of the DOH to conduct a radiation survey of the site and to sample nearby drinking water wells. The radiation survey consisted of screening for alpha, beta, and gamma radiation at locations known to have been involved in the maintenance and storage of Hercules missiles. These locations included the Missile Assembly and Test Building, the former Warheading Building, the former Missile Dolly Walk (the tram that was used to convey missiles between the Missile Assembly and Test Building and the former Warheading Building), and the sealed Missile Magazines. Alpha/beta radiation screening was conducted by measuring radioactivity at 1 to 2 centimeters above the ground, since these types of radiation are easily shielded by matter, including molecules and particles in air. Screening for gamma radiation, which is not easily shielded by air, was conducted by continually measuring surface radioactivity at approximately 1 meter above the ground as the meter passed over the surface.

Alpha/beta radiation screening was conducted using a Ludlum Model 2241-2 radiation meter with a Ludlum Model 44-9 alpha/beta "pancake" probe. Prior to screening site features, START-2 determined the level of naturally occurring background alpha/beta radioactivity by collecting readings from two off-site areas where the presence of radioactive materials from the facility was not probable. The naturally occurring background alpha/beta radioactivity at both locations was determined to be 60 counts per

minute (cpm), which is consistent with background levels throughout the Puget Sound Basin. The general industry standard is to use a value that is two times the background level as a screening indicator of possible radiation contamination at a site. Based on this standard, a reading of greater than twice the background level, or 120 cpm, was established as an appropriate indicator of possible site-related contamination.

Alpha/beta screening of site features began at the former Warheading Building. The START-2 collected readings at three locations within the former Warheading Building. Alpha/beta radioactivity ranged from 38 to 55 cpm (Figure 1). The survey continued with the screening of seven discrete locations, equally spaced, along the former Missile Dolly Walk between the former Warheading Building and the Missile Assembly and Test Building. Alpha/beta radioactivity at these locations ranged from 38 to 70 cpm. Next, eight discrete locations were screened around the perimeter of the Missile Assembly and Test Building. Radioactivity around the building perimeter varied from 44 to 67 cpm. Then, START-2 surveyed the interior of the Missile Assembly and Test Building. Screening inside the building included both the floor of the building and various dust accumulation points, such as the level surfaces above breaker boxes and ventilation ducts. In total, 11 discrete locations within the building were screened and the alpha/beta radioactivity ranged from 31 to 70 cpm. Finally, the area of the former Missile Magazines was surveyed. A total of 32 discrete locations spaced 10 paces apart on a grid over the area of the former magazines were screened for alpha/beta radioactivity. The radioactivity at these locations ranged from 30 to 71 cpm. All alpha/beta radioactivity measurements taken on the site were similar to naturally occurring background levels and none exceeded the threshold of 120 cpm.

Gamma radiation screening was conducted using a Ludlum Model 19 radiation survey meter. Unlike the instrument used to detect for alpha/beta radioactivity, this meter measures gamma radioactivity in units of microroentgens/hour ($\mu\text{R/hr}$), which is a unit of dosage related to the amount of ionization caused by ionizing radiation in air. Prior to screening site features, START-2 determined the amount of naturally occurring gamma radioactivity by taking continuous readings from an area outside the site boundaries where the presence of any radioactive materials from the facility was not expected to influence the instrument readings. The naturally occurring background gamma radioactivity was determined to be 5 $\mu\text{R/hr}$, which is consistent with background levels in the Puget Sound Basin. A reading greater than twice the background level, or 10 $\mu\text{R/hr}$, was established as an appropriate indicator of possible site-related contamination.

The gamma radiation screening was conducted in conjunction with the alpha/beta screening. The capabilities of the radiation survey instrument allowed for continuous measurements of gamma

radioactivity throughout the survey. START-2 recorded the gamma radioactivity readings throughout the site simultaneous with the collection of the alpha/beta radioactivity readings. Over the former Warheading Building, along the former Missile Dolly Walk, around the perimeter of the Missile Assembly and Test Building, and over the former Missile Magazines, the readings were all similar to the naturally occurring background gamma radioactivity, ranging from 4 to 7 $\mu\text{R/hr}$. The gamma radioactivity measured inside the Missile Assembly and Test Building was also consistent with the naturally occurring gamma radioactivity, at 6 $\mu\text{R/hr}$.

Following the radiation survey, START-2 and DOH sampled six drinking water wells near the site. The wells sampled were well locations DW01 (background well), DW02, DW03, DW05, DW06, and DW07 from the preliminary assessment/site inspection of the site completed by the EPA in July 2004 (Figure 2; E & E 2004). Water from each well was collected for isotopic plutonium and isotopic uranium analyses (EPA Methods 0911 and 0908.2, respectively). These analyses include the types of radioactive isotopes that are associated with nuclear weapons, but also include a variety of naturally occurring isotopes. Analyses was conducted by DOH at their Public Health Laboratory located in Shoreline, Washington. Analytical results indicate that uranium-238 was detected in DW03 and DW06 and that uranium-234 was detected in DW03. These are naturally occurring isotopes of uranium that are not associated with nuclear weapons (Brennan 2004). No isotopes of plutonium were detected in the sampled drinking water wells. A summary of analytical results is provided in Table 1. Laboratory data sheets supplied by DOH are included as Attachment 1.

During fieldwork, START-2 took photographs of site activities and of all collected drinking water samples. This photographic documentation is provided as Attachment 2.

CONCLUSION

The radiation survey revealed that alpha, beta, and gamma radioactivity present in missile-related areas at the site is consistent with naturally occurring background radioactivity. No elevated radioactivity was observed at any of the surveyed features, which included the former Warheading Building, the former Missile Dolly Walk, the Missile Assembly and Test Building, and above the sealed Missile Magazines. Further, the analytical results from the analyses of six drinking water samples did not detect the presence of nuclear weapon-related radionuclides. Results of the radiation survey and drinking water radionuclide analyses indicate that the site is not a source of radioactive contamination.

REFERENCES

- Brennan, Mike, October 25, 2004, Washington State Department of Health, Office of Radiation Protection, Radiation Health Physicist, e-mail communication regarding Nike Site #92 - Radionuclide Test Results, to Linda Foster, Ecology and Environment, Inc., Seattle, Washington.
- Ecology and Environment, Inc (E & E), July 2004, *Final Preliminary Assessment/Site Inspection Report, Nike Site #92, Kingston, Washington*, prepared for the United States Environmental Protection Agency.

Table 1

**DRINKING WATER ANALYTICAL RESULTS SUMMARY
NIKE SITE #92 TRIP REPORT
KINGSTON, WASHINGTON**

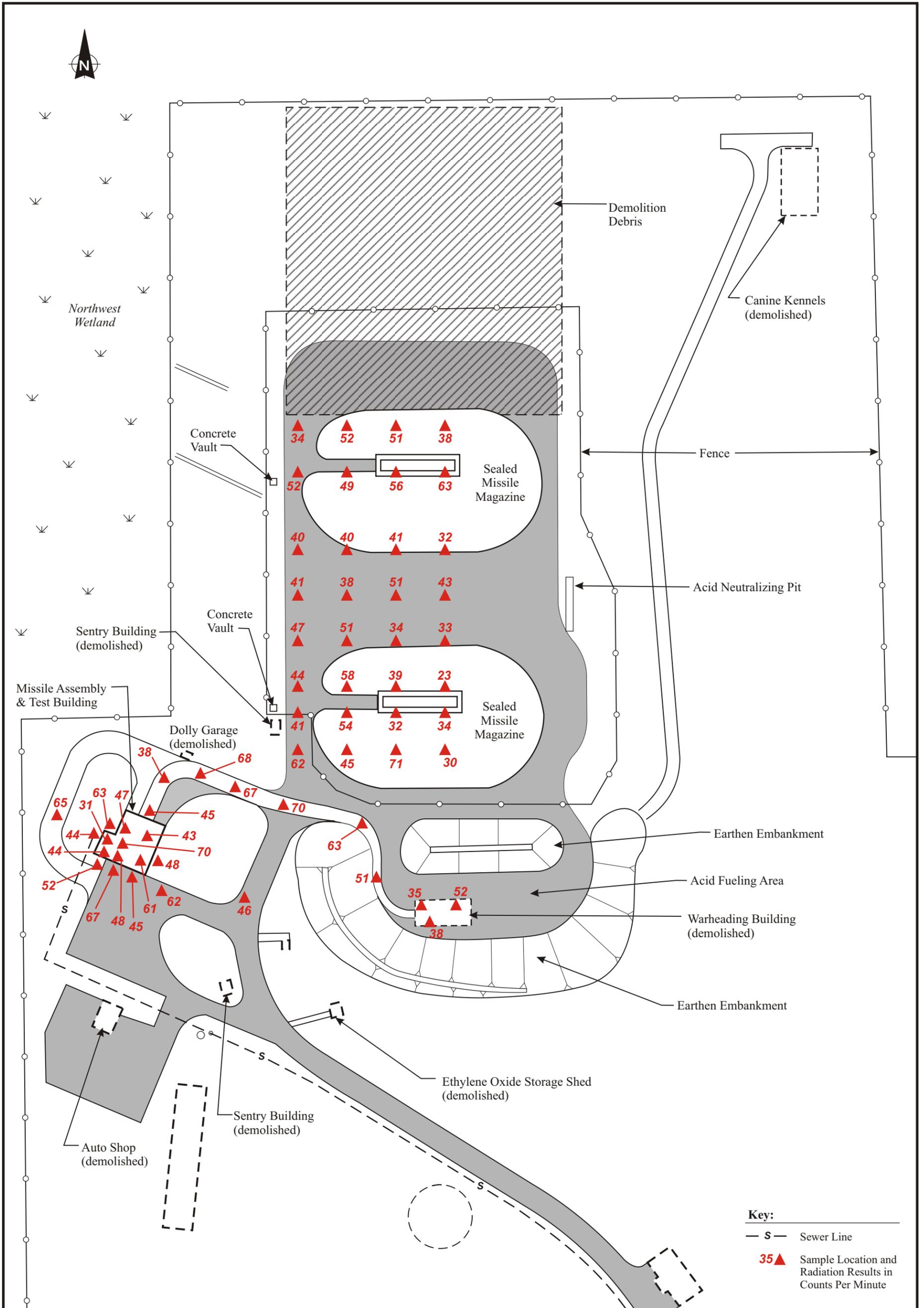
Station Location	DW01	DW02	DW03	DW05	DW06	DW07
Description	Background Well	Downgradient Drinking Water Wells				
Isotopic Uranium (pCi/L)						
Uranium-238	0.05 U	0.04 U	0.074	0.05 U	0.031	0.05 U
Uranium-234	0.06 U	0.06 U	0.13	0.08 U	0.022 U	0.06 U
Isotopic Plutonium (pCi/L) - Not detected above method detection limits.						

Note: Bold type indicates the analyte was detected.

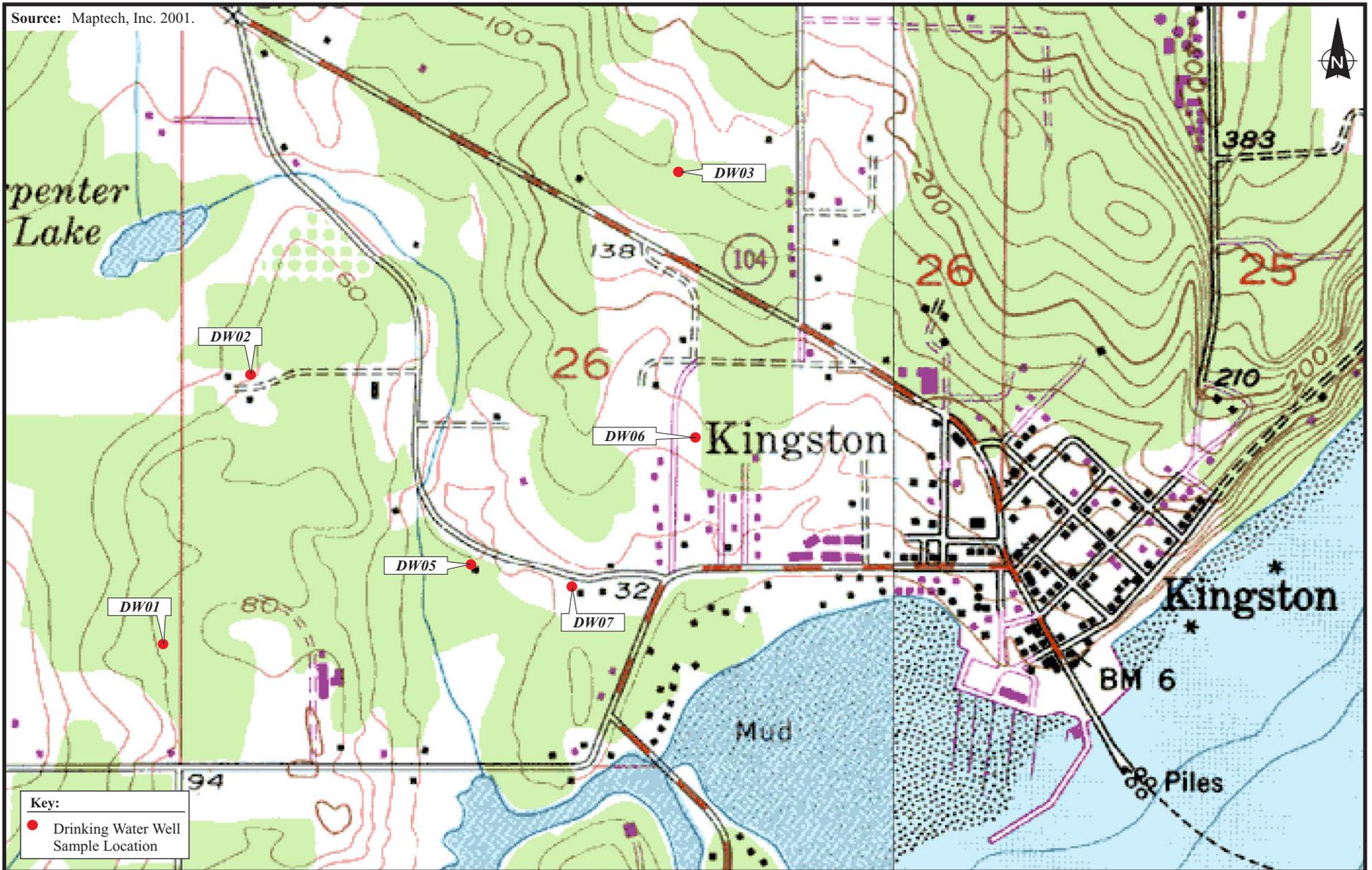
Key:

pCi/L = Picocuries per liter.

U = The analyte was not detected. The associated numerical value is the method detection limit.



Source: Maptech, Inc. 2001.



ecology and environment, inc.
 International Specialists in the Environment
 Seattle, Washington

NIKE SITE #92
 Kingston, Washington



Figure 2
 DRINKING WATER WELLS MAP

Date:
 10/26/04

Drawn by:
 AES

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ATTACHMENT A

**WASHINGTON STATE DEPARTMENT OF HEALTH
RADIONUCLIDE TEST RESULTS**

ATTACHMENT B
PHOTOGRAPHIC DOCUMENTATION

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial No. Digital Camera
Lens Type: 35 millimeter

TDD No. 02-05-0011
Site Name: Nike Site #92

Photo No.	Date	Time	By	Direction	Description
1	8/26/04	0902	SM	NW	View of Missile Assembly and Test Building.
2	8/26/04	0908	LF	NE	Radiation surveying activities over former Warheading Building area.
3	8/26/04	0917	LF	S	Radiation surveying activities near Missile Assembly and Test Building.
4	8/26/04	0923	LF	N	Radiation surveying activities near Missile Assembly and Test Building.
5	8/26/04	0930	LF	NE	Radiation surveying activities inside Missile Assembly and Test Building.
6	8/26/04	0959	LF	N	Radiation surveying activities over Missile Magazines.
7	8/26/04	1017	LF	SE	Radiation surveying activities over Missile Magazines
8	8/26/04	1114	LF	Down	Sample DW01 from background drinking water well.
9	8/26/04	1142	LF	Down	Sample DW02.
10	8/26/04	1213	LF	Down	Sample DW06.
11	8/26/04	1317	LF	Down	Sample DW05.
12	8/26/04	1335	LF	Down	Sample DW07.
13	8/26/04	1419	LF	Down	Sample DW03.

Key:

E = East.
LF = Linda Foster.
N = North.
S = South.
SM = Steve Merritt.
W = West.