

## **NVY-BG-001 (CERCLA)**

### **Site Details**

Due to NVY-BG-001's close proximity to five additional features (NVY-UK-006, NVY-UK-005, NVY-GS-023, NVY-SE-001, and NVY-GS-026) it was determined to investigate this group as a single feature during the investigation. Details about each individual feature is as follows:

NVY-BG-001 is a former motor repair shop feature identified within the Navy Area during the historical geospatial analysis (HGA) was identified from as-built construction sheet numbers 9 and 10 of 13, dated 24 November 1944, sized at 40 feet by 100 feet. It was also visible in aerial imagery from 1951 to present. The feature was assessed in 2015 as part of the Phase I RI and was identified as a concrete pad with a vehicle service pit (trench drains) located on the west end. The feature was recommended for further investigation based on the feature type and potential for HTRW.

The trench drains were originally named NVY-UK-006, but the feature was combined with NVY-BG-001 due to being within the same foundation. The trench drains were full of standing water and an engine was visible within the water. The feature was recommended for further investigation based on the feature type and potential for HTRW.

NVY-UK-005 was identified during the HGA from 1977 aerial imagery as a possible mechanic's pit east of the motor repair shop. The feature was assessed in 2015 as part of the Phase I RI and the field team identified the vehicle service pit (mechanic's pit) on the eastern side of the foundation. Vegetation obscured visual confirmation of contents. The feature was recommended for further investigation based on the feature type and potential for HTRW.

A ground scar feature NVY-GS-023 was identified in the 1977 imagery to the east of the motor repair shop. The feature was assessed in 2015 as part of the Phase I RI and sparse vegetation immediately east of the motor repair shop was located. Various metal chips and a buried metal rod were found. The feature was recommended for further investigation.

NVY-SE-001 is a former drywell feature identified as a circular dark spot in 1977 imagery to the north of the motor repair shop. The feature was assessed in 2015 as part of the Phase I RI and a circular drywell was visible at the surface. A subsurface pipe was found to terminate in the wall from the motor repair shop floor drain. The feature was recommended for further investigation based on the feature type and potential for HTRW.

A ground scar feature NVY-GS-026 was identified in 1977 imagery to the northwest of the motor repair shop. The feature was assessed in 2015 as part of the Phase I RI and found to contain multiple metal anomalies in the berm on the north side of the feature and an area of stressed vegetation. The feature was recommended for further investigation.

The grassy area surrounding the motor repair shop concrete pad is relatively flat and is at the same grade as the pad. The average ground surface elevation of the site is 98.8 feet based on the North American Vertical Datum of 1988 (NAVD88).

## **Remedial Investigation**

In 2016, the RI following an individual approach (Section 14.2.6 of Attachment B-5) from the Work Plan for three of the features, and the Stressed Vegetation approach (Section 2.1 of Attachment B-5) from the Work Plan for the two ground scars. In accordance with the Work Plan, the field team began the investigation by advancing UVOST probes by Geoprobe around the perimeter of the foundation approximately every 20 feet with extension of the grid to the east and north to encompass NVY-SE-001 and NVY-UK-005. The probes to the east also encompassed NVY-GS-023. The grid was expanded to the west to encompass NVY-GS-026 (Figure N15-1). In total, twenty-six (26) UVOST probes were advanced to accomplish the original Work Plan grid area. An additional five probes were advanced through the concrete pad, and 18 probes were advanced to delineate impacts beyond the initial grid. The UVOST probes were advanced to refusal, generally occurring at a depth between 7.5 and 12.5 feet bgs. All told, forty-nine (49) UVOST probes were advanced. UVOST probe locations associated with each feature are described below.

- UVOST location 010 is associated with the vehicle service pit (NVY-UK-005) at the east end of the shop's concrete pad.
- UVOST location 049 is associated with the trench drains (formerly NVY-UK-006) at the west end of the shop's concrete pad.
- UVOST locations 004 – 007, and 048 are associated with the ground scar feature (NVY-GS-023) to the east of the shop's concrete pad.
- UVOST locations 016, 017, 025, and 026 surround the drywell feature (NVY-SE-001) to the north of the shop's concrete pad.
- UVOST locations 018 and 020 were advanced in the vicinity of the ground scar feature (NVY-GS-026) to the west of the shop's concrete pad.

A fuel signature was identified at 17 of the UVOST locations. The contamination identified by the UVOST was shallow, generally ranging from the ground surface to a depth of roughly 4 feet bgs (95 feet NAVD88) with two exceptions: the mechanic's pit (location 049) and one step-out probe (location 036) showed a UVOST fuel signature between 4 and 6 feet bgs. Step-out UVOST probes were advanced to delineate POL contamination to the north and south of the west end of the building footprint. The UVOST logs are attached.

Twelve primary soil samples and two duplicate soil samples were collected and submitted for laboratory analysis of GRO, DRO, RRO, PAHs, VOCs, and metals (Figure N15-2). One soil sample was submitted for analysis of GRO, DRO, RRO, BTEX, PAHs, and lead only following the stressed vegetation approach in the area of the ground scar. The table below provides a summary of soil sample location, depth, and purpose.

The site geologists noted multiple layers of tight silty sand. Most soil borings intersected gravel in the silty sand at depth of 8-15 feet bgs. Advancing Geoprobe tooling was difficult at this feature do to the very tight silty sand encountered at depth. The soil boring logs are attached.

Due to the presence of fuel impacts in soil, a monitoring well (MW-010) was installed on August 17, 2016, at UVOST probe location 018/boring locations 053 and 059 (Figure N15-3). Refusal was met at 13.5 feet bgs, and the well was screened from 3.5-13.5 feet bgs. The well was

constructed of a 2-inch diameter 0.01-inch slotted PVC screen pre-packed with 20/40 silica sand. On August 25, 2016, a groundwater sample was collected from MW-010. An odor and sheen were noted on the groundwater during sampling efforts. The groundwater sample was submitted for laboratory analysis for GRO, DRO, RRO, PAHs, VOCs, and metals.

At the conclusion of the 2016 field season it was determined an insufficient number of characterization soil samples were collected and lateral and vertical control of soil impacts was incomplete. In addition, lateral delineation of groundwater impacts was incomplete. The Work Plan Addendum prescribed the depths and locations for soil samples to be collected, proposed locations of monitoring wells, and asked for a co-located soil/sediment sample to be collected in the ponded water to the west of the concrete slab.

In 2017, the field team collected a co-located surface water and sediment sample at location 078 (Figures N15-2 and N15-3, respectively). The samples were submitted for DRO, RRO, VOCs, and PAHs. To ascertain groundwater flow direction and laterally delineate the groundwater impacts, the field team installed six additional monitoring wells around the 2016 source well MW-010. All wells were 0.01-inch slotted PVC screen pre-packed with 20/40 silica sand. Wells were constructed of 2-inch PVC where possible, but 1.5-inch wells were utilized in some situations due to the difficult drilling of the site. The 1.5-inch diameter wells allow for a narrow diameter drill tooling to be used than a 2-inch monitoring well, and therefore deeper wells are able to be installed.

- MW-011 was set at location 071 for lateral delineation to the south. MW-011 is 2-inch diameter and screened 5-15 feet bgs.
- MW-012 was set at location 072 for lateral delineation across the road to the south. MW-012 is 1.5-inch diameter and screened 7-17 feet bgs.
- MW-013 was set at location 073 for lateral delineation to the west. MW-013 is 2-inch diameter and screened 5-15 feet bgs.
- MW-014 was set at location 074 for lateral delineation to the west. MW-014 is 2-inch diameter and screened 5.5-15.5 feet bgs.
- MW-015 was set at location 075 for lateral delineation to the north. MW-015 is 2-inch diameter and screened 7-17 feet bgs.
- MW-016 was set at location 083 for lateral delineation to the east. MW-016 is 2-inch diameter and screened 3-15 feet bgs.

Three additional monitoring wells were later installed in the field season for further aiding in calculating groundwater flow direction and lateral delineation (Figure N15-3). The field team collected soil samples at the groundwater interface at these three well locations.

- MW-069 was set at location 085 for lateral delineation to the west. MW-069 is 1.5-inch diameter and screened 8-18 feet bgs.
- MW-070 was set at location 086 for lateral delineation to the north. MW-070 is 1.5-inch diameter and screened 5.5-15.5 feet bgs.
- MW-071 was set at location 087 for lateral delineation to the east. MW-071 is 1.5-inch diameter and screened 10.5-20.5 feet bgs.

All ten monitoring wells were developed and sampled with a bladder pump using low flow sampling techniques. The groundwater samples were submitted for laboratory analysis of GRO,

DRO, RRO, PAHs, and VOCs. MW-010 was resampled in 2017. The groundwater development, purging, and sampling logs are attached. Groundwater flow direction was determined to be to the southwest across the site, as shown on groundwater contours of Figure N15-3.

The field team collected subsurface soil samples as prescribed in the Work Plan and Work Plan Addendum. A total of 12 primary soil samples and two duplicate soil samples were collected in 2016 and analyzed for GRO, DRO, RRO, VOCs, PAHs, and metals. A total of 20 primary soil samples and five duplicate soil samples were collected in 2017. The sample suite for soil in 2017 was modified based on results from soil collected in 2016 to only require analysis of DRO, RRO, VOCs, and PAHs.

Soil Boring Location	Sample Elevation (NAVD88)	UVOST Probe Location	Fuel Signature Elevation (NAVD88)	Sample Purpose	Notes
053	97-95 93-92	018	98-94	Characterization of shallow fuel Vertical delineation	Monitoring well installed at this location.
056	97-96 92-91	016	98-95	Characterization of shallow fuel Vertical delineation	Duplicate sample taken at characterization interval.
051	95-94 92-91	049	92-90	Fuel Characterization Vertical delineation	Advanced thru bottom of service pit approximately 4 feet below pad grade
052	99-97	019	NA	Lateral delineation – too shallow	NA
054	97-96	023	NA	Lateral delineation	NA
055	97-95	026	97-95	Characterization of slight fuel signature	Slight fuel signature. DRO analytical below screening level.
057	96-95 93-92	010	97-95	Characterization of slight fuel signature Vertical delineation	At mechanic's pit
058	95-94	048	NA	Lateral delineation	NA
060	98-97	044	NA	Lateral delineation	NA
061	98-97 95-94	041	98-97	Lateral delineation Vertical delineation	Unlikely fuel at location 041
062	99-97 95-94	038	98.5-98	Characterization of slight fuel signature Vertical delineation of fuel signature	NA
063	100-98	034	~98	Characterization of slight fuel signature	Not deep enough, characterized by sample 065
064	98-96	045	NA	Lateral delineation	NA
065	98.5-97 95-94	034	~98	Characterization of slight fuel signature Vertical delineation	Successful characterization and vertical delineation
066	99-96	NA	NA	Lateral delineation	NA
067	97-95	NA	NA	Lateral delineation	NA
068	99-96.5	NA	NA	Lateral delineation	NA
069	98.5-97	012	98.5-98	Lateral delineation	Falsification of unlikely fuel at location 012
070	99-97	NA	NA	Lateral delineation	NA
077	99-97	039	NA	Lateral delineation	NA

Soil Boring Location	Sample Elevation (NAVD88)	UVOST Probe Location	Fuel Signature Elevation (NAVD88)	Sample Purpose	Notes
085	93-92	NA	NA	Lateral delineation	Monitoring well install. Sample at groundwater interface.
086	91-90	NA	NA	Lateral delineation	Monitoring well install. Sample at groundwater interface.
087	88-87	NA	NA	Lateral delineation	Monitoring well install. Sample at groundwater interface.

NA = not applicable

NAVD88 = 1988 North American vertical datum in feet

## **Analytical Results**

Analytical results of soil, sediment, groundwater and surface water samples are presented in Tables N15-1, N15-2, N15-3 and N15-4, respectively. Results were compared to the screening levels established for CERCLA sites.

### ***Soil Results:***

GRO was detected in multiple soil samples submitted for analysis but reported concentrations were below established screening levels. DRO was detected in all of the soil samples submitted for analysis at the site (38 in total) and was detected above the established soil screening level in eight of the soil samples, ranging from 720 to 8,700 mg/kg. RRO was also detected in all of the soil samples submitted for analysis at the site (38 in total). RRO was detected above the established human health soil screening level in three of the soil samples, ranging from 8,400 to 23,000 mg/kg.

The PAHs of 1-methylnaphthalene, 2-methylnaphthalene, benzo(a)pyrene, and naphthalene were detected in the soil from boring locations 051, 053, 056, and 062 at concentrations above human health screening levels. In total, 18 other PAHs were detected but at concentrations below human and ecological health screening levels.

The VOCs of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, carbon tetrachloride, and hexachlorobutadiene were detected in the soil from boring locations 051, 053, 056, and 065 at concentrations above screening levels. Twelve other VOCs were detected in the soil below human and ecological health screening levels across the site. The analytical LOD was reported to be above the human health soil screening levels for 22 VOC analytes, including benzene, trichloroethene, and vinyl chloride. Four analytes, 1,1,2-trichloroethane, 1,2-dibromo-3-chloropropane, 2-hexanone, and hexachlorobutadiene had LODs that exceeded both the human health and ecological soil screening levels. Acetone had an LOD that exceeded the ecological screening level.

All analytical detections of metals were below established screening levels.

### ***Groundwater Results:***

In the groundwater sample collected from the source well (MW-010) in 2016 and 2017, GRO was detected at 0.25 mg/L and 0.33 mg/L, respectively, well below the established screening level. DRO and RRO were detected below established screening levels in all wells with DRO concentrations ranging from 0.04 mg/L in MW-012 to 1.0 mg/L in MW-010 and RRO concentrations ranging from 0.061 mg/L in MW-012 to 1.1 mg/L in MW-010.

The VOCs 1,2,4-trimethylbenzene, 1,2-dichloroethane, 1,3,5-trimethylbenzene, ethylbenzene, trichloroethene, and vinyl chloride were detected above the human health screening level from groundwater collected from MW-010 in both 2016 and 2017. No additional analytical exceedances were reported from groundwater sampled from the other monitoring wells. In total, 19 VOCs were detected in the groundwater but at concentrations below screening levels. Acetone was detected in several groundwater samples, but flagged as elevated due to laboratory contamination. The LOD was reported to be above established human health screening levels for ten VOC analytes in groundwater.

The PAH naphthalene was detected in the groundwater from MW-010 at 0.0036 mg/L in 2016 and 0.0035 mg/L in 2017, which is above the human health screening level of 0.00017 mg/L. Eleven other PAHs were detected in groundwater at concentrations below screening levels. Benzo(a)pyrene and dibenzo(a,h)anthracene had LODs that exceeded the screening levels.

The calculated TAH and TAqH levels exceeded the established screening criteria in the samples from MW-010 in both 2016 and 2017. The calculated TAH and TAqH levels in all other monitoring wells were reported below the established screening levels.

All metals were detected in the groundwater sampled, but concentrations were reported below screening levels.

### ***Surface Water Results:***

DRO and RRO were detected in the surface water sample at 0.18 mg/L and 0.97 mg/L, respectively, well below established screening levels.

The VOCs chloromethane, acetone, and chloroform were detected in the surface water sampled, but reported concentrations were flagged as elevated due to laboratory contamination. No other VOCs were detected in the surface water. The LOD was reported above established screening level for eleven analytes.

No PAHs were detected in the surface water. The LOD for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene exceeded human health screening levels. The LOD for dibenzo(a,h)anthracene exceeded human and ecological health screening levels. The LOD for benzo(k)fluoranthene and chrysene exceeded ecological health screening levels.

The calculated TAH and TAqH levels were reported below the established screening levels for surface water.

### ***Sediment Results:***

DRO and RRO were detected in the sediment sample below established screening levels.

The VOC carbon disulfide was detected at a concentration above its ecological screening level. The LODs for twelve analytes were reported above ecological soil screening levels. The LODs for 22 analytes were reported above human health soil screening level.

The PAH benzo(a)pyrene was detected in the sediment above the human health screening level. All other PAHs detected in the sediment were below human and ecological health screening levels.

### **Conclusions and Recommendations**

The investigation at NVY-BG-001 was conducted in accordance with the Work Plan. Field screening and analytical results show the presence of primarily petroleum contamination in the soil in around and under the concrete pad of the former building footprint (Figures M36-4 through M36-6). UVOST screening identified a petroleum plume in soil at a depth of 0 to 6 feet bgs (roughly 94-100 feet NAVD88) except beneath the vehicle service pits where fuel signatures were slightly deeper. All DRO and RRO exceedances in soil have been successfully delineated both vertically and laterally. The estimated volume of petroleum impacted soil is estimated at 550 cubic yards.

The VOCs of 1,2,4-trimethylbenzene, carbon tetrachloride, and hexachlorobutadiene are not vertically delineated in soil at boring location 056. At boring location 053, the VOC 1,2,4-trimethylbenzene in soil is also not vertically delineated. These VOC are laterally delineated.

All PAH exceedances in soil have been successfully delineated both laterally and vertically and are collocated with petroleum contamination.

A total of nine monitoring wells were installed at NVY-BG-001. In the source well MW-010, the VOCs 1,2,4-trimethylbenzene (0.055 mg/L), 1,2-dichloroethane (0.00023 mg/L), 1,3,5-trimethylbenzene (0.024 mg/L), ethylbenzene (0.063 mg/L), trichloroethene (0.0025 mg/L), and vinyl chloride (0.00018 mg/L) and the PAH naphthalene (0.0036 mg/L) were detected in the groundwater above screening levels. Eight of the wells were used to successfully delineate the groundwater plume in and around the impacted source well MW-010. Contamination observed in MW-010 has been successfully delineated. The estimated aerial extent of impacted groundwater is 3,000 square feet. Groundwater was measured flowing to the southwest across the site.

The analytical detections from the surface water sample collected were below established screening levels. The calculated TAH and TAqH levels for surface water were reported below established screening levels.

With the exception of benzo(a)pyrene and carbon disulfide all other analytical detections in the sediment sample were below screening levels.

The CSM for NVY-BG-001 is consistent with the site-wide CSM in Section 4.7 in that all media are present. However, surface water and sediment do not appear to be a transport mechanism nor an exposure risk.

The presence of DRO, RRO, and VOCs in soil, VOCs in groundwater (including TCE), and PAHs in sediment warrants the inclusion of NVY-BG-001 in the baseline risk assessment to be conducted for Atka..