Environmental Restoration Program
Final Record of Decision for Sites 3 & 6

109th Airlift Wing
New York Air National Guard Base
Scotia, New York

March 2012

NGB/A7OR
Andrews AFB, Maryland

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Prepared For:

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NYSDEC Site Number 447022

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List of Acronyms

ANG	Air National Guard
ARARs	Applicable or Relevant and Appropriate Requirements
AWQS	Ambient Water Quality Standards
bgs	Below ground surface
AW	Airlift Wing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CVOC	Chlorinated Volatile Organic Compound
Cis-1,2 DCE	Cis-1,2 Dichloroethene
COC	Chemical of Concern
COPC	Chemicals of Potential Concern
CY	Cubic yard
DERP	Defense Environmental Restoration Program
DNA	Deoxyribonucleic acid
EOS	Edible Oil Substrate
ERP	Environmental Restoration Program
FFS	Focused Feasibility Study
FS	Feasibility Study
Ft	Feet
HHRA	Human Health Risk Analysis
In	Inch
IRA	Interim Remedial Action
IRP	Installation Restoration Program
Kg	Kilogram
MDC	Maximum detected concentration
MNA	Monitored Natural Attenuation
NGB	National Guard Bureau
NYANG	New York Air National Guard
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operations and Maintenance
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety & Health Administration
PCE	Perchloroethylene (tetrachloroethene)
PID	Photo Ionization Detector
PPB	Parts Per Billion
PPM	Parts Per Million
PRAP	Proposed Remedial Action Plan
PVC	Polyvinyl Chloride
RA	Remedial Action
RAO	Remedial Action Objective
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SANGB	Schenectady Air National Guard Base
SCA	Schenectady County Airport
SCO	Soil Cleanup Objective
SCG	Soil Cleanup Goal
SDC	Supplemental Data Collection
SMP	Site Management Plan
TAGM	Technical and Administrative Guidance Memorandum
TCE	Trichloroethene

TCRA	Time Critical Removal Action
TOGS	Technical and Operational Guidance Series
VOC	Volatile Organic Compound

1.0 Declaration

1.1 Site Name and Location

This Record of Decision (ROD) applies to the Defense Environmental Restoration Program (DERP) Site 3 (Drum Burial Area) and Site 6 (Suspected Spill Area), which are identified as having soil and groundwater contamination. Due to the close proximity of Sites 3 and 6, these sites are discussed together throughout this document. The Site is located at the New York Air National Guard (NYANG) 109th Airlift Wing (AW) at the Schenectady County Airport (SCA), Scotia, New York. The federal government leases the land from the SCA and licenses the land back to the NYANG. The lease extends through 30 June 2042. A site location map is provided as Figure 1.

1.2 Statement of Basis and Purpose

This ROD presents the selected remedial actions for DERP Sites 3 and 6 located at the 109th AW of the NYANG located at the Schenectady Air National Guard Base (SANGB) in Scotia, New York. Figure 2 provides a map depicting the location of DERP Sites 3 and 6 on the Base. The remedial action (RA) was chosen by the Air National Guard (ANG), which is the lead agency responsible for implementing the DERP, in cooperation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH). The RA selected for this Site is in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

This decision is based on the Administrative Record for Sites 3 and 6. The NYSDEC concurs with the RA presented in this ROD.

1.3 Assessment of the Site

The RA selected in this ROD is necessary to protect the public health and/or the environment from the actual or potential releases of pollutants or contaminants into the environment.

Site 3 (Drum Burial Area) is located near the former sewage treatment plant and sand filter. This area was identified when buried drums were discovered during construction activities. Site 3 covers an area of approximately 0.68 acres and is bounded to the south by a chain link fence, to the west by a chain link fence and extending approximately 250-ft to the northeast from the chain link fence, along the drainage ditch which bounds the north of Site 3.

Site 6 (Suspected Spill Area) consists of an area of contaminated groundwater northwest of the former sewage treatment plant and sand filter. Site 6 covers an area of approximately 0.96 acres and is bounded by the drainage ditch to the west, to the north by monitoring well 6MW-21, and to the south by monitoring well 6MW-20.

The total area of these two sites is approximately 1.64 acres as shown in Figure 2. Soil and groundwater has been impacted at these sites by past releases from aircraft fueling, maintenance, operation activities, and training exercises.

1.4 Description and Selected Remedy

The proposed remedies for Sites 3 and 6 have been based on previous investigations, interim removal actions, feasibility study, human health and ecological risk assessments, and remedial action objectives. The proposed remedies are summarized below.

Site 3

- No further action for soils associated with the five interim removal or remedial action (IRA) excavation areas: 3-1, 3-2, 3-3, 3-4, and 3-5 (see Figure 3).

- Delineation, removal and off-site disposal of soil contaminated with xylene associated with the "Creek Bank B" drainage ditch sample (Figure 3). Until these soils are removed, Site 3 will be limited to industrial/commercial use.

- Installation of a non-permeable geomembrane along the southern bank of the drainage ditch to isolate the Site 3 soils from any potential recontamination from upgradient sources.

Site 6

- Removal of a limited amount of soil, near soil sample location EX-6-1-SW-07 (see Figure 4).

- Injection of substrate or chemical oxidant into the infusion gallery network (see Figures 4 and 5) to enhance bioremediation or chemical oxidation of the dissolved phase Chlorinated Volatile Organic Compounds (CVOCs). If groundwater cleanup criteria have not been met following the first round of injections, based on an evaluation of groundwater sampling performed following the injections, additional injections will be required.

- Groundwater sampling to monitor the performance of remedial measures for continued application of substrate and quantify the rates of groundwater contaminant reduction will be performed at three months and 12 months following the initial injections. Additional sampling will be required if additional rounds of injections are required.

- Upon completion of the injections, conduct required NYSDEC closure monitoring of four quarterly groundwater sampling events once groundwater cleanup criteria have been achieved to show concentrations are below groundwater cleanup criteria.

- A site management plan (SMP) will be developed and implemented.

- Effective institutional controls, such as an environmental easement, will be placed on the Site should the proposed remedy for groundwater not meet groundwater cleanup criteria for unrestricted use. These institutional controls will serve to (1) limit the use and development of the property for commercial/industrial use, (2) comply with the approved SMP; and (3) restrict the use of groundwater as a source of potable water, without necessary water quality treatment as determined by the NYSDOH. The SMP will provide for proper management of on-site soil to prevent exposures during ground intrusive activities and require the property owner to complete and submit to the NYSDEC a periodic certification of all institutional and engineering controls.

- An evaluation of indoor air quality will be required if site use changes or buildings are constructed on or near Site 6. Mitigation will be required should the evaluation indicate the presence of CVOC above NYSDOH guidelines.

1.5 Statutory Determinations

The chosen remedy satisfies the legal requirements of CERCLA. The selected RA is protective of human health and the environment. It complies with federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy also satisfies the statutory preferences for remediation technologies that reduce toxicity, mobility and/or volume of site contaminants.

The outcome of the RA should result in levels of hazardous substances, pollutants, or contaminants below the applicable or relevant and appropriate requirements (ARARs), which are defined in Section 2.8. However, the time required to achieve the Remedial Action Objectives (RAOs) and cleanup levels for the Sites can extend to five years. Five-year reviews will be conducted on the Sites until the concentration of hazardous substances, pollutants, or contaminants are below the ARARs.

1.6 Record of Decision Data Certification Checklist

The following information is included in the Decision Summary section of this ROD:

- A summary of the chemical of concern (COCs) and their respective concentrations (Section 2.8);

- Cleanup levels established for COCs and the basis for these levels (Section 2.8);

- Current and reasonably anticipated future land use assumptions used in the development of the ROD; (Section 2.6);

- Potential land use that will be available at the Site as a result of the selected remedy (Section 2.9);
- Community participation in the ROD process (Section 3.0);
- The number of years over which the remedy is projected (Section 2.11); and
- A summary of the key factors which led to the selection of the remedy (Section 2.13).

1.7 Authorizing Signatures

FOR AIR NATIONAL GUARD

Signature 6·12·2012
Date

Benjamin W. Lawless, P.E.
Chief, Operations Division
Installations and Mission Support Directorate

New York State Department of Environmental Conservation

[x] Concur [ ] Non-Concur (Please Provide Reason)

The New York State Department of Environmental Conservation (NYSDEC) has concurred with the findings of this Final Record of Decision (ROD) for Sites 3 & 6. The NYSDEC concurrence letter for the Final ROD is presented in the Attachment.

2.0 Decision Summary

The Decision Summary describes the factors and analyses that led to the selection of the soil and groundwater remedies for DERP Sites 3 and 6. It includes the site background, community involvement efforts, site characteristics, the nature and the extent of the contamination, current and future site use, the assessment of human health and environmental risks posed by the contaminants, RAOs, and the identification and evaluation of remediation action alternatives.

2.1 Site Name, Location, and Description

The SANGB is located in the southeast portion of SCA in Scotia, New York. The federal government leases the land from the SCA and licenses the land back to the NYANG. The lease extends through 30 June 2042. The Base covers an area of approximately 106 acres, located approximately 2 miles northeast of Scotia, NY (Figure 1).

Cleanup of contaminated areas has taken place over the last decade in order to prevent further environmental impacts. The current focus is to cleanup CVOC impacted ground water at Site 6, tetrachloroethylene (PCE) impacted soils at Site 6 and xylene impacted soils at Site 3 along the drainage ditch.

2.2 Site History and Enforcement Activities

Previous actions have been taken to reduce the contamination at Sites 3 and 6. The following subsections summarize previous investigations and remedial actions that have been completed at the SANGB.

2.2.1 Remedial Investigation

In June 1999, a Remedial Investigation (RI) was completed at the Base (ANEPTEK, 2000). The RI initially included installation of groundwater monitoring wells, hydraulic conductivity testing of the shallow overburden, and two rounds of groundwater sampling. The investigation at Site 3 also included the collection of soil and sediment samples, and the excavation of 49 test pits to identify the types and extent of buried debris/wastes.

During the RI, CVOCs were detected in groundwater samples collected from monitoring wells upgradient of Site 3. Subsequent investigations reported a distinct dissolved CVOC plume in the groundwater that was determined to be unrelated to historical activity at Site 3. This area was added to the Environmental Restoration Program (ERP) and designated Installation Restoration Program (IRP) Site 6.

2.2.2 Supplemental Data Collection

A supplemental data collection (SDC) program for Site 6 was conducted in 2002 that consisted of monitoring well installation, collection and analysis of subsurface soil samples, and collection and analysis of groundwater samples. Results from the SDC indicated that CVOCs in excess of soil cleanup goals (SCGs) remained in the soils and that a dissolved-phase CVOC plume existed at Site 6. The SDC report recommended that further remedial measures be performed for Site 6 soils and groundwater.

2.2.3 Interim Remedial Actions

Between May and September 2007, the ANG, completed IRAs at Site 3 and Site 6. The objectives of the IRAs were to remove and treat all unconsolidated material from both sites and to perform an in situ pilot test to evaluate the use of enhanced bioremediation to treat the chlorinated hydrocarbon plume at Site 6.

During excavation activities, Site 3 was broken into five excavation areas. Approximately 390 tons of contaminated soils were removed from the five areas. During excavation, buried drums, automobile parts, and scrap metal were uncovered and disposed of accordingly.

Site 6 soils inside the CVOC groundwater 50 parts per billion (ppb) plume, as delineated by previous investigations, were excavated. All of the soil in the area was removed from the ground surface to the top of competent bedrock which was encountered at a depth interval of 5 to 7 feet. A total of six sections of Site 6 were excavated sequentially, tested, and backfilled beginning with the furthest upgradient area and advancing downgradient towards the creek. The total volume of soil excavated in Site 6 was 4,790 cubic yards (CY), based on measured *in-situ* volume. A mechanical screener was brought onto the site to physically separate the larger material (2-inch [in] plus) from the smaller material, with the smaller material being segregated into stockpiles based on Photo Ionization Detector (PID) readings. The total estimated volume of soil with PID readings less than 5 parts per million (ppm) was approximately 2,870 CY. The amount of soil removed with PID measurements greater than 5 ppm but less than 50 ppm was approximately 1,920 yards. No stockpiled soil had PID readings greater than 50 ppm. All stockpiled soils were screened, sampled and used as backfill based on the analytical results.

During the soil removal activities at Site 6, a horizontal infusion gallery was constructed. The layout of the infusion gallery is shown in **Figure 4**. The infusion gallery consists of four horizontal laterals of slotted polyvinyl chloride (PVC) pipe aligned somewhat perpendicular to the assumed groundwater flow direction. A detail of the infusion gallery is shown in **Figure 5**.

Based on the sequencing and final limits of the excavation and apparent local groundwater flow direction the final length of the laterals varied from 45-Feet (ft) to 120-ft, with the longer laterals located near the center of Site 6.

The laterals were constructed of 4-inch (in) diameter, Schedule 40 PVC 0.010-slot screen placed along the top of competent bedrock at the base of the excavation with solid vertical risers to grade at each end and in the middle of the horizontal well. The lateral well screens were covered with approximately a one-foot-thick layer of the highly permeable material (2-in plus aggregate) that had been screened from the excavation materials. A permeable woven geotextile liner was placed over the aggregate and the remaining excavation(s) backfilled to grade with the screened stockpiled soils that were less than 2-in diameter.

2.2.4 Enhanced Bioremediation Pilot Test

An enhanced bioremediation pilot test was conducted at Site 6 in August 8, 2007. Edible Oil Substrate (EOS) and Vitamin B12 supplement was gravity fed sequentially into each of the 12 vertical riser pipes of the infusion gallery constructed as part of the Site 6 IRA beginning with the furthest upgradient riser and advancing progressively downgradient. The infusion was prepared by mixing one drum of EOS and one quart of Vitamin B12 supplement with 10,000 gallons of treated groundwater. The objectives of the pilot test were to decrease the concentrations of VOCs in the groundwater, and to prevent the migration of the CVOC plume.

The groundwater was monitored across five groundwater sampling events. One round of groundwater samples were collected prior to the infusion activities while four rounds of groundwater samples were collected post-infusion. The overall conclusions were the injection of EOS and the Vitamin B12 Supplement had a beneficial effect on the concentration of CVOCs in the groundwater at Site 6. The amount of contaminants in Site 6 has been reduced as a result of the intial infusion of the substrate, and is expected to be further reduced by continued infusion of the substrate or chemical oxidant. An increase in CVOC concentrations was identified in two of the wells (MW-22 and MW-25) in the infusion gallery area during the final sampling event. This increase is attributable to CVOCs being flushed from the coarse aggregate which was separated by screening from the fine grained material, then reintroduced into the excavation. Despite this increase in CVOCs, the overall trend is that of reduction and breakdown through dechlorination.

2.2.5 Soil Gas Sampling

Two soil gas samples were collected to characterize the potential for soil vapor migration from the dissolved CVOC plume at Site 6 to the closest indoor air receptor. The closest indoor air receptor is Building 18, located 475-ft cross-gradient to the Site 6 groundwater plume. The locations of the two soil gas sampling points are shown in Figure 4. The soil gas samples were analyzed using modified Method TO-15 (chlorinated hydrocarbons only). No CVOCs above their respective laboratory method detection limit were reported for either soil gas sample.

2.3 Community Participation

A copy of the PRAP is available for public review at the Schenectady County Public Library (Glenville Branch), 20 Glenridge Road, Glenville, New York. The complete Administrative Record can be viewed at the 109th AW Environmental Management Office, SANGB, by contacting Ms. Kimberly Kotkoskie.

The public was made aware of the finalization of the PRAP through notices in the Daily Gazette and the Times Union on 25 August 2011 which initiated the public comment period, and documents were made available at the Schenectady County Public Library (Glenville Branch). The PRAP was then presented to the public on 8 September 2011at 6:00 PM at the Glenville Senior Citizens Center in Scotia, NY. No representatives of the public were in attendance at the public meeting.

The public was allowed to submit comments on the PRAP during a 45-day public comment period which closed on 9 October 2011. No comments were received as a result of the public notice.

2.4 Scope and Role of the Remedial Actions

The primary object of the RAs at Sites 3 and 6 is to reduce potential risks to human health and the environment from COC impacted soil and groundwater. Cleanup of the impacted soil was substantially completed by the performance of the soil removal IRA in 2007 as previously discussed. Cleanup of the groundwater will reduce COC concentrations to below the ARARs, therefore reducing potential future risk to human health and the environment. Since the Site exhibits exceedances of the chemical specific ARARs for limited areas of soil (Site 3 and 6) and groundwater (Site 6), the ANG has determined that RAs at Sites 3 and 6 are necessary. The selected remedy therefore consists of actions that will mitigate the potential risks to human health that result from COCs that exceed the chemical-specific ARARs. Detailed descriptions of the selected RAs are provided in Section 2.11.

2.5 Site Characteristics

Physical site characteristics of DERP Sites 3 and 6 are described below.

2.5.1 Geology

2.5.1.1 Surficial Geology

The unconsolidated deposits in eastern Schenectady County are not uniform in character; rather they consist of interbedded layers of different materials. The majority of all soils are glacial deposits. The soils consist of glacial till (clays, silts and sands) that were deposited by temporary glacial lakes; and coarse sands and gravel deposited by glaciofluvial streams sourced in the receding glaciers.

As the glaciers advanced over the area, the topography was modified; parallel ridges and valleys were formed by the movement of ice. Glacial till was deposited directly from the sheet of moving ice. Till is one of the most widespread deposits in the region. The till in the Schenectady region contains cobble and boulder of igneous and metamorphic origin that were transported from the Adirondack Mountains. The till deposit underlying the Base typically consists of a gray to dark gray, silty to sandy clay containing varying amounts of cobbles and boulders. Thin sand and/or gravel deposits are scattered through the till. The thinnest deposits of till are present on the uplands surrounding the Base with thicker deposits found in bedrock depressions. During the retreat of the ice, Glacial Lake Albany was formed in the lowland regions confined by the upland boundaries of the Hudson Valley. Deposits in the lake included clays, silts and sands.

2.5.1.2 **Bedrock Geology**

Bedrock units underlying Schenectady County consist of the Schenectady Formation, Canajoharie Shale, as well as the Trenton and Black River Groups. Smaller portions of the Beekmantown Group are also found in the northwestern corner of the County.

The Schenectady Formation underlying the Base is composed of layers of black to gray shale with coarse-grained sandstone deposits, greywacke, and siltstones. In some localities the alternation of beds of shale and sandstone follow a coarsening upward sequence. The Schenectady Formation is estimated to have a thickness of 2,000 feet and a gentle south to southwest dip of up to 5 degrees. The Canajoharie Shale, which underlies the Schenectady Formation, is comprised of fine grained black shales estimated to be at least 1,000 feet thick in areas of the Mohawk Valley.

The rocks of the Schenectady Formation are dense and relatively impermeable. The bedrock may yield small amounts of water from fractures and bedding planes but low yield and poor water quality generally characterize the bedrock aquifer. The direction of groundwater flow in the bedrock aquifer is controlled by fracture orientation, size, density of joints and bedding planes, and by the interconnection with the glacial soil aquifer.

2.5.2 Hydrogeology

2.5.2.1 **Regional Hydrogeology**

The Schenectady Aquifer (also referred to as the Great Flats Aquifer, the Schenectady Sole Source Aquifer, and other names) is the sole source of potable water to five municipalities and approximately 90 percent of Schenectady County residents. Municipal well fields utilizing this groundwater resource include the City of Schenectady, Town of Rotterdam (including a separate well field at Rotterdam Junction), Town of Glenville, Village of Scotia and part of the Town of Niskayuna. Pumping wells are approximately 50 feet deep and located over four miles west of the Base. The SANGB is situated near, but not over, the eastern end of the Schenectady Aquifer. The aquifer underlying the site is in general finer grained, less productive, and less subject to recharge when compared to Schenectady Aquifer. The SANGB and surrounding residents are all connected to the Town of Glenville public water system; no residents adjacent to the Base use private wells as a potable water supply.

Regionally, groundwater flow tends to follow topographic controls flowing to the south and southeast towards the Mohawk River. Most of the water supplies are from groundwater encountered in the highly permeable unconsolidated glacial deposits which overlie somewhat impermeable bedrock.

Groundwater recharge occurs almost wholly from precipitation. Under natural conditions, the water table fluctuates on a seasonal basis depending on precipitation and discharge. Both consolidated and unconsolidated deposits in Schenectady County are aquifers, even though their saturation and production characteristics vary greatly.

Regional bedrock formations are relatively poor sources of groundwater and normally only yield enough water for domestic use. The rocks are relatively impermeable, and groundwater occurs principally in open fractures along joints in the rock. The most common water-bearing zone lies within the top few feet of the bedrock surface.

The regional soil consists of glacial deposits containing irregularly spaced deposits of sand and gravel from glaciofluvial streams. These relatively coarse grained deposits are the most productive sources of water in the area. These productive zones range greatly in aerial extent and thickness due to changing depositional conditions. At many locations, a thin permeable zone of gravel is present between the till and the underlying bedrock that is capable of producing water at a rate measured in thousands of gallons per minute (ANEPTEK, 2000).

2.5.2.2 Local Hydrogeology

Glacial deposits at the Base consist predominately of clay and silt overlying a shallow fractured bedrock zone. Groundwater depths reported in monitoring wells screened at the soil/bedrock interface ranged between 6 and 11 feet below ground surface (bgs). Hydraulic conductivity tests conducted in these monitoring wells reported groundwater flow velocities estimated between 2 and 25 feet per year (ANEPTEK, 2002) consistent with typical groundwater flow velocities found in fractured bedrock (ANEPTEK, 2000) or a silt/clayey fine sand.

As part of the site investigations, four bedrock borings were advanced to a depth of 100 feet or deeper. Groundwater was not encountered and the borings were abandoned. A bedrock monitoring well (MW-27D) was installed as part of the 2007 IRA with an open interval extending from 5-ft into the competent rock (15-ft bgs) to 40-ft bgs. Bedrock well MW-27D does yield limited quantities of water, though no pump tests have been performed.

2.5.3 Ecology

The areas encompassed by Sites 3 and 6 are primarily covered by grasses, trees, bushes, and asphalt or concrete pavement, with no significant natural wildlife other than birds, and small mammals.

2.5.4 Surface Features

Surface features at Sites 3 and 6 mainly consist of grassy areas, and paved areas. In general, the base is generally flat with gentle slopes to the east towards the Mohawk River.

2.6 Current and Future Site Uses

The 109th AW is stationed at the SANGB which is located in the southeast portion of Schenectady County Airport in Scotia, New York. The federal government leases the land from the SCA and licenses the land back to the NYANG. The lease extends through 30 June 2042. The surrounding land is a mixture of residential, agricultural, and commercial properties. The land located to the north, east, and west of the base is primarily

residential and agricultural. The properties located south of the Base consist of commercial and residential properties. The Mohawk River and a railway are also located south of the Base.

There are no current on-site residents located at Sites 3 and 6. Overall land use has not changed, and operations of the airbase will continue as currently implemented at the installation. No expected changes in land use are proposed by SANGB in the foreseeable future.

2.7 Summary of Site Risks

2.7.1 Summary of Human Health Risk Assessment

As part of the Focused Feasibility Study (FFS) (Earth Tech 2008), the potential health risks to people who would be living or working at or near the impacted sites were evaluated. The HHRA consists of two Tiers: 1) the screening of confirmation sample results against project human health-based residential cleanup goals, and 2) quantitative risk estimates for chemicals that exceed HHRA screening criteria.

All chemicals detected in surface soil, subsurface soil, groundwater, surface water, and sediment during previous investigations for the RI/FS were considered preliminary chemicals of potential concern (COPCs) for human health. Chemical constituents detected in soil, sediment and groundwater confirmation samples during the IRAs are considered COPCs for assessment of post remediation residual health risks.

- The maximum detected concentrations (MDC) for soil and sediment were compared to media specific cleanup goals based on 6 NYCRR 375-6.8 (a): residential human exposure to identify human health COCs.

- The residual risk to human receptors from exposure to Site 6 groundwater is estimated based on the analytical results from the groundwater samples taken from monitoring wells in August 2008, after the infusion of edible oil to stimulate breakdown of chlorinated solvents in the groundwater by the resident soil microbial community.

Site soils were remediated in the removal action based on 6 New York Codes, Rules and Regulations (NYCRR) 375-6.8 (a): Unrestricted Use Soil Cleanup Objectives (SCOs). These objectives are based on the most restrictive of all land use categories considered in 6 NYCRR 375-6. Although the land use for the area is, and will continue to be, considered industrial, the human health risk assessment uses a comparison of maximum and mean confirmatory soil sample results to more conservative residential SCOs (6 NYCRR 375-6.8 (b): Restricted Use Soil Cleanup Objectives – Residential).

2.7.1.1 **Exposure Assessment**

There are no current on-site residents at Sites 3 and 6. The Base currently eliminates access by trespassers via Base perimeter fencing and administrative controls. The following current human receptors may be potentially exposed to site-related contaminants remaining in Sites 3 and 6 based on current land use:

Current Land Use

- Current on-site industrial workers at Sites 3 and 6.

Based on site characteristics and historical site data, several hypothetical future human receptors may be exposed to site-related contaminants based on potential future land use:

Future Land Use

- Hypothetical future industrial workers who are assumed to work on site.
- Hypothetical future on-site construction workers who are assumed to perform excavation activities that disturb site subsurface soil.
- Hypothetical future off-Base residents located at the boundaries of the Base who may be exposed (via potable uses) to contaminants in the upper water-bearing unit if it has migrated from Sites 3 and 6 to the Base boundary, and it is utilized for potable uses.

Groundwater in the upper water-bearing unit was characterized and is evaluated for the risk assessment as a single plume. Sites 3 and 6 were investigated as a potential source area for this groundwater plume.

New York State has developed SCOs and these values are published in NYCRR Chapter IV, Subchapter B: Solid Wastes NYCRR Subpart 375-1. The basis of the SCOs is:

- Human-health-based levels that correspond to excess lifetime cancer risks of one in a million for Class A and B carcinogens, or 1 in 100,000 for Class C carcinogens.
- Human-health-based levels for systemic toxicants, calculated from reference doses (RfDs). RfDs are an estimate of the daily exposure an individual (including sensitive individuals) can experience without appreciable risk of health effects during a lifetime. An average scenario of exposure in which children ages 1 to 6 is assumed. An intake rate of 200 milligram (mg) per day for a five-year exposure period for a 16-kilograms (kg) child is assumed.
- Environmental concentrations which are protective of groundwater/drinking water quality; based on promulgated or proposed New York State standards;

Thus the Subpart 375-1 SCOs are protective of residential exposure scenarios. As such, they may be overprotective of identified current and future land uses for Sites 3 and 6.

2.7.1.2 **Risk Characterization**

If a chemical did not exceed its screening criterion for any medium, the chemical was eliminated from further evaluation in the Human Health Risk Analysis (HHRA) and remediation for that chemical was considered complete with respect to human health risk. If no chemical detected in a specific medium exceeded its screening criteria, the medium was eliminated from further evaluation in the HHRA and remediation of that medium was considered complete with respect to human health risk.

COCs in Soil –

- Site 3: None
- Site 6: Benzo(a)anthracene, Chrysene and Benzo(b)fluoranthene

COCs in Groundwater (only Site 6) –

- Tetrachloroethene
- Trichloroethene
- Cis-1,2-dichloroethene
- Vinyl chloride

In the soil Tier 1 evaluation, maximum concentrations were used to represent soil exposure point concentrations (EPCs). Because people may be exposed as they move around the entire site, the average soil concentration at the site better represents the actual exposure. The average EPC can be estimated as the mean concentration or, more conservatively, as the 95 percent upper confidence limit (UCL) on the mean (95 UCL). The confirmation sampling collected sufficient samples to confirm the success of the removal action down to the cleanup goals, but in some cases did not collect sufficient samples to perform more sophisticated statistical tests. For this Tier 2 risk assessment, the mean of the confirmation samples is used to represent the EPC and is compared to 6 NYCRR 375-6.8 (b): Restricted Use Soil Cleanup Objectives – Residential). The mean concentration of each Tier 2 COC is divided by the criterion. The resulting quotient is called the hazard quotient (HQ). An HQ greater than 1 means that the EPC exceeded the criterion and that the risk of adverse health effects may result.

All three of these COCs have only a single detection; therefore, a mean could not be computed. The detected value of each of the three COCs is compared to the NYSDEC to develop an HQ. None of the rounded HQs exceeds one. Therefore, the risk to human health from exposure to Sites 3 and 6 soils is considered acceptable.

Due to the small number of groundwater samples available from the post remediation monitoring well samples, accurate representation of the exposure point concentration as the 95 percent UCL of the mean could not be calculated. Therefore, the EPC is represented as both the maximum and mean detected concentration. Although the EOS feasibility study showed a substantial reduction in VOCs during the demonstration period, the groundwater concentrations of PCE, TCE, cis-1, 2-DCE, and VC were not reduced below residential drinking water standards and could not be eliminated as COCs. Although the upper water bearing unit is not considered a potable aquifer, these four chlorinated VOCs are conservatively considered present in groundwater at concentrations that pose a risk to human health.

2.7.2 Summary of Ecological Risk Assessment

All chemical constituents detected in surface soil, subsurface soil, groundwater, surface water, and sediment during previous investigations for the RI/FS were considered preliminary chemicals of potential concern (COPCs) for ecological receptors. Chemical constituents detected in soil, sediment and groundwater confirmation samples are considered COPCs for assessment of post remediation residual risk.

1. The soil Maximum Detected Concentrations (MDCs) were compared to SCGs based on 6 NYCRR 375-6.8 (a): Protection of Ecological Resources to identify ecological COCs.
2. The sediment MDCs were compared to sediment-specific cleanup goals based on protection of benthic organisms to identify sediment COPCs.
3. Because groundwater could discharge to surface water downgradient of Site 6, groundwater MDCs were compared to surface water-specific cleanup goals based on protection of aquatic life to identify water COPCs. All analytical data results and data packages were presented in the Site 3 and Site 6 IRA Completion Report (Earth Tech, 2007).

2.7.2.1 Exposure Assessment

Surface water and sediment were observed in an unnamed drainage ditch that leads to the Mohawk River, that is located along the western boundaries of Sites 3 and 6. The unnamed tributary originates from the culvert outfall of part of the Base storm water system. This suggests that there may have been some groundwater discharge into the unnamed tributary. It is possible that chemicals in soils have washed down the tributary or deposited as sediment in the stream located nearby. The unnamed tributary navigates through several residences and industrial properties after it leaves the SANGB.

Site-related contaminants in groundwater from the upper water-bearing unit are not known to have migrated beyond the Base boundaries. However, site-related contaminants in the upper water-bearing unit may be discharged to the unnamed tributary where they could contact aquatic life and migrate beyond the boundaries of the Base to the Mohawk River.

Terrestrial animals may be exposed to site chemicals through:

- Incidental ingestion of soil or sediment with food or while grooming;
- Ingestion if chemicals in plants that have taken up the chemical from the soil;
- Ingestion of chemicals within invertebrates that have taken up the chemical from the soil, and

- Terrestrial animals may drink water from the contaminated surface water body.

The ERA showed the IRA post remediation risk for Site 3 and Site 6 soil is acceptable for terrestrial ecological receptors with the exception of xylene, which was detected along the drainage ditch bank. The ERA showed that groundwater does not pose a risk to aquatic organisms if discharged to the Site 3 drainage ditch. All sediment was removed from the drainage ditch eliminating the exposure medium for any remaining benthic organisms. The risk of adverse effects to benthic organisms is considered acceptable. The drainage ditch weir is a functioning engineered control structure and is expected to trap future oily waste that may enter the storm water system from what upgradient areas (parking lots, taxiway, and hangar).

2.7.2.2 **Ecological Risk Characterization**

The residual risk to ecological receptors from exposure to Sites 3 and 6 soils after the IRAs is estimated based on the analytical results from the confirmation samples taken from the sides and/or bottom of the remedial excavations. The residual risk to ecological receptors from exposure to Site 6 groundwater is estimated based on the analytical results from the confirmation samples taken from monitoring wells after the feasibility study using edible oil to stimulate breakdown of chlorinated solvents in the groundwater by the resident soil microbial community. The confirmation samples are located in the subsoil and are used as a surrogate for surface soil in the post-remediation ERA. The groundwater samples are used to represent groundwater that may seep from the ground into the unnamed tributary to the Mohawk River located downgradient from the drainage ditch weir.

COCs in Soil

- Site 3 – Silver, Xylenes, Naphthalene, 2-methylnaphthalene
- Site 6 – Tetrachloroethene, Pyrene, Nickel

COCs in Groundwater

- None

In Tier 1, maximum concentrations were used to represent soil EPCs. Because ecological receptors may be exposed as they move around the entire site, the average soil concentration at the site better represents the actual exposure. The average EPC can be estimated as the mean concentration or, more conservatively, as the 95 percent upper confidence limit on the mean (95 UCL). The confirmation sampling collected sufficient samples to confirm the success of the removal action down to the cleanup goals, but in some cases did not collect sufficient samples to perform more sophisticated statistical tests. For this Tier 2 ERA the mean of the confirmation samples is used to represent the EPC and it is compared to 6 NYCRR 375-6.8 (b): Soil Cleanup Objectives – Protection of Ecological Resources.

EPA's ProUCL program was used to calculate the mean soil concentrations when more than 1detected concentration was present in the data set. For chemicals with only one detected concentration, the non-detected concentrations were used in the calculation at ½ the reporting limit. The mean concentration of each Tier 2 COEC was divided by the criterion. The resulting quotient is called the HQ. A HQ greater than 1

means that the EPC exceeded the criterion and that the risk of adverse effects to wildlife may result. Xylenes were the only COEC that had a HQ greater than 1 (HQ = 2).

2.8 Chemicals of Concern and Cleanup Criteria

The HHRA showed the post remediation risk for Site 3 and Site 6 soil is acceptable for residential exposure scenarios. Since the residential land uses have more conservative exposure assumptions than industrial or commercial exposure scenarios, use of Site 3 and Site 6 for industrial or commercial purposes should not result in adverse effects to human receptors and remediation of soil is considered complete.

The latest round of groundwater analysis indicates concentrations of four CVOCs are above the NYSDEC groundwater standards. Groundwater analytical results are shown in Table 1. PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2 DCE), and vinyl chloride are the COCs associated with the proposed groundwater remedial action.

The ERA showed the post remediation risk for Site 3 and Site 6 soil is acceptable for terrestrial ecological receptors with the exception of xylene, which was detected along the drainage ditch bank in Site 3.
Table 2 summarizes the maximum concentrations of the chemicals detected at Sites 3 and 6.

2.9 Remedial Action Objectives

Based on the evaluation discussed above and the final NYSDEC guidance for development of RAOs in DER-10 (NYSDEC 2010), the RAOs for groundwater and Sites 3 and 6 include:

Site 3:

- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent migration in surface water of upgradient contaminants associated with the drainage ditch weir system from impacting soils.

Site 6:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Achieving the RAOs through the application of the selected groundwater RA should allow for the unrestricted future uses of DERP Sites 3 and 6.

2.10 Description of Remedial Alternatives

A Focused Feasibility Study (FFS) was conducted to evaluate potential remediation technologies for remediating COCs in soil and groundwater at Sites 3 and 6. Remediation technologies were identified based on professional experience and site-specific conditions. The FFS process incorporated the results and directives of the ANG in selecting remedies for impacted groundwater at DERP Site 6. For soil at Sites 3 and 6 above SCGs, no alternative analysis was performed as excavation was the assumed preferred remedy.

Four potential alternatives for Site 6 have been evaluated:

- Alternative 1: No Action. This alternative would leave the site in its present condition. No actions would be taken to monitor groundwater, prevent human contact, or prevent contaminant migration.
- Alternative 2: Monitored Natural Attenuation (MNA). Alternative 2 utilizes MNA which involves natural subsurface processes to treat the contaminated groundwater.
- Alternative 3: Hydraulic Containment. In Alternative 3, the primary treatment utilizes a hydraulic containment and treatment system which would be used until groundwater contaminant concentrations have been reduced to below SCGs.
- Alterative 4: In Situ Remediation. In Alternative 4, the primary treatment consists of enhanced bioremediation or chemical oxidation.

2.11 Summary of Comparative Analysis of Alternatives

The selected remedy must be protective of human health and the environment, be cost effective, and comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The purpose of the comparative analysis is to identify the advantages and disadvantages of the selected alternatives relative to one another to aid in the selection of remedy options for each site. The comparison of the four alternatives developed for the SANGB site has been conducted using the seven Technical and Administrative Guidance Memorandum (TAGM) 4030 evaluation criteria and community acceptance and is summarized in the following sections.

Alternative 1 - Alternative 1 assumes that no active treatment measures, site modifications, groundwater monitoring, or other actions would be undertaken to prevent or eliminate human health and environmental risks associated with impacted media.

This alternative will comply with applicable SCGs given the fact that PCE and its breakdown products will naturally attenuate to meet groundwater standards given enough time to complete the process. In order to obtain the SCGs, it would likely take greater than 30 years. No costs would be associated with implementing the No Action Alternative as shown in Table 3.

Alternative 2 - Alternative 2 utilizes MNA for Sites 3 and 6. MNA was based on the principle that, in the absence of a sustaining source area (or a controlled source), a dissolved phase contaminant plume will expand

until it achieves equilibrium between the rate of expansion and the rate of decay at the leading edge of the plume through physical, chemical, and biological reduction in the concentration of the contaminants. Over time, these natural processes will mitigate the contamination, collapse the plume back on the original source area, and reduce concentrations to the SCGs.

Implementation of Alternative 2 at the Sites would include:

- Development of a hydrodynamic predictive model to identify the current and assumed maximum extent at equilibrium of the advective and dispersive migration of the plume.

- First-year sampling at eleven (11) wells including five wells currently containing COCs in excess of groundwater standards, four cross-gradient wells (two well pairs) and two upgradient wells (one well pair). The samples would be analyzed for VOCs, nitrates, sulfates and ORP.

- Microbiological Deoxyribonucleic acid (DNA) testing would be conducted at two wells with varying levels of COCs. This level of sampling would be conducted every five years.

- Annually, between successive five year sampling events, the number of wells sampled and analyses performed would be reduced to five of the eleven wells. Samples would be collected from three wells containing exceedances of SCGs and VOC (based on previous sampling) in the center of the plume, one downgradient well at or near the leading edge of the plume, and one bedrock well. These samples would be analyzed for VOCs only. Evaluation of the analytical results would be conducted each year with modeling, and detailed analysis would be completed every five years to determine the rate of attenuation and the recommended sampling frequency.

The costs associated with implementing Alternative 2 are included in Table 3.

Alternative 3 - Alternative 3 utilizes a hydraulic containment through groundwater extraction and water treatment system which would be installed and operated until groundwater contaminant concentrations have been reduced to below SCGs. The removal of groundwater from the area of contamination would cause an alteration of the groundwater flow paths from their natural state to a flow toward the area of contamination, or an inward gradient toward the pumping wells. Activated carbon was considered for the on-site treatment of extracted groundwater in the PRAP. The on-site treatment would consist of two bag filters and two granular activated carbon units, all in series, capable of handling a maximum flow rate of 25 gallons per minute. The system would use between 0.5 and 5 pounds of carbon per day with two 1,000 pound vessel that would require a yearly change out. The system would also require dedicated extraction pumps.

Alternative 3 would require operation, maintenance and monitoring for the duration of the remedial action. The time frame for achieving site remedial goals under this alternative was anticipated to extend to 10 years. Though

the system would prove to be effective, the amount of monitoring and maintenance is considerable and was taken into account for the purpose of selecting the remedial alternative to be implemented at the site. The costs associated with implementing Alternative 3 are included in Table 3.

Alternative 4 - Alternative 4 utilizes in-situ remediation and would use either enhanced bioremediation or chemical oxidation. Enhanced bioremediation would occur through the infusion of food-grade additives designed to enhance the growth of reductive organisms and promote the metabolic dechlorination process in order to permanently reduce the toxicity of site contaminants to environmentally benign compounds. The subsurface environment may also be enhanced through the addition of microbes preferentially chosen for their ability to effectively dechlorinate contaminants, and organic material that allows for the rapid expansion of the microbial population. The environment created sustains and fosters the microbes that provide the desired breakdown of TCE through the entire dechlorination series to ethane. Injection of a mixture of a food substrate (e.g., EOS), Vitamin B12 supplement and water will be utilized to provide a long term carbon source to enhance the bioremediation of contaminants. Chemical oxidation would occur through the infusion of a chemical to react with the COCs to produce innocuous substances including carbon dioxide, water, and inorganic chloride. Chemical oxidants may include the infusion of one of the following: potassium or sodium permanganate, activated persulfate, ozone, and peroxide.

Alternative 4 will require operation, maintenance and monitoring for the duration of the system's operation. Groundwater monitoring for COCs will be performed after each injection, and upon completion of the injections, conduct required NYSDEC closure monitoring of four quarterly groundwater sampling events once groundwater cleanup criteria have been achieved to show concentrations are below groundwater cleanup criteria. The time frame for achieving site remedial goals under this alternative is anticipated to extend to 5 years. The system will prove to be effective in a relatively short period of time when compared to other applicable alternatives. The amount of monitoring and maintenance is limited due to the shortened remediation timeframe and minimal operation. These factors were taken into account for the purpose of selecting the remedial alternative to be implemented at the site. The costs associated with implementing Alternative 4 are included in Table 3.

The evaluation of the four remedial alternatives for Site 6 groundwater is summarized in Table 4.

2.12 Principal Threat Wastes

There are no principle threat wastes present at the Sites.

2.13 Selected Remedy

Based on the information that is available, Alternative 4 was selected as the most appropriate remedial alternative for the treatment of CVOCs in the groundwater.

Alternative 4 involves the reduction of contaminated groundwater via enhanced bioremediation or chemical oxidation. This remedy would be able to utilize the horizontal well network installed during the IRA. Alternative 4 provides for managed accelerated breakdown of contaminants to environmentally benign constituents. This alternative is the least costly of the acceptable alternatives, will be completed within the shortest time frame, and will achieve Site RAOs.

A summary of the selected remedy for Sites 3 and 6 is provided below.

Site 3

- No further action for soils associated with the five interim removal action (IRA) excavation areas: 3-1, 3-2, 3-3, 3-4, and 3-5 (see Figure 3).

- Delineation, removal and off-site disposal of soil contaminated with xylene associated with the "Creek Bank B" drainage ditch sample. Until these soils are removed, Site 3 will be limited to industrial/commercial use.

- Installation of a non-permeable geomembrane along the southern bank of the drainage ditch to isolate the Site 3 soils from any potential recontamination from upgradient sources.

Site 6

- Removal of a limited amount of soil, near sample location EX-6-1-SW-07 (See Figure 4).

- Injection of substrate or chemical oxidant into the soils surrounding the horizontal well network to enhance bioremediation or chemical oxidation of the dissolved phase CVOCs. If groundwater cleanup criteria have not been met following the first round of injections, based on an evaluation of groundwater sampling performed following the injections, additional injections will be required.

- Groundwater sampling to monitor the performance of remedial measures for continued application of substrate and quantify the rates of groundwater contaminant reduction will be performed at three months and 12 months following the initial injections. Additional sampling will be required if additional rounds of injections are required.

- Conduct required NYSDEC closure monitoring once groundwater cleanup criteria have been achieved.

- Development and implementation of a SMP.

- Effective institutional controls, such as an environmental easement, will be placed on the Site should the proposed remedy for groundwater not meet groundwater cleanup criteria for unrestricted use.

These institutional controls will serve to (1) limit the use and development of the property to commercial/industrial use, (2) comply with the approved SMP; and (3) restrict the use of groundwater as a source of potable water, without necessary water quality treatment as determined by the NYSDOH. The SMP will provide for proper management of on-site soil to prevent exposures during ground intrusive activities and require the property owner to complete and submit to the NYSDEC a periodic certification of all institutional and engineering controls.

- An evaluation of the potential for soil vapor intrusion will be required on Site 6 if the site use changes and/or buildings are developed on the site in the future including provisions for mitigation for any impacts identified.

2.14 Statutory Determinations

The RA selected for implementation at Site 6 is consistent with CERCLA requirements. The selected RA is protective of human health and the environment, and will comply with ARARs. In addition, the selected remedy uses solutions that permanently and significantly reduce the concentration of COCs. The selected RA meets all Federal and State ARARs and therefore no waiver of ARARs are required.

The selected groundwater RA may result in COCs remaining on-site following implementation, a site review would be performed every five years pursuant to CERCLA Section 121 (c) and 40 Code of Federal Regulations 300.430(f)(4)(iii)(c). Five-Year Reviews will be conducted until concentrations of COCs remaining on-site are reduced to levels that allow for unlimited use and unrestricted exposure. All site activities, including RA and monitoring, will be carried out pursuant to Occupational Safety Health Administration (OSHA) standards (29 Code of Federal Regulations 1904, 1910, and 1926).

2.14.1 Protection of Human Health and the Environment

The selected RA will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through remediation of the contaminated groundwater at DERP Sites 3 and 6.

2.14.2 Compliance with Applicable or Relevant and Appropriate Requirements

The DERP is responsible to perform the RAs within the overall framework of CERCLA that are protective of both human health and the environment, and comply with applicable state and federal ARARs. Chemical-specific, location-specific, and action-specific ARARs were reviewed in the FFS and include the ARARs provided by NYSDEC, as well as ARARs compiled based on ANG's review. The regulations providing the cleanup criteria for soil COCs can be found in 6 NYCRR Subpart 375, Unrestricted Use. The cleanup criteria for groundwater COCs can be found in Ambient Water Quality Standards (AWQS) and Guidance Values and Groundwater Effluent Limitations, Division of Water Technical and Operational Guidance Series 1.1.1 (TOGS 1.1.1).

2.15 Documentation of Significant Changes

The PRAP (AECOM 2011) for Sites 3 and 6 was released for public comment on 25 August 2011. No written or verbal comments were received during the public comment period. Therefore no significant changes are necessary.

3.0 Responsiveness Summary

3.1 Stakeholder Comments and Lead Agency Responses

The National Guard Bureau (NGB) has prepared this Responsiveness Summary for the Site, as part of the process for making a final remedy selection. This Responsiveness Summary documents for the Administrative Record, public comments and issues raised during the public comment period on the NGB's preferred remedial alternative presented in the PRAP, and provides the NGB's responses to those comments. The NGB's actual decisions for the Site are detailed in this ROD. Pursuant to Section 117 of the CERCLA, 42 USC. § 9617, the NGB has considered all comments received during the public comment period in making the final decision contained in the ROD for the Site.

3.2 Overview of Public Comment Period

The NGB issued the PRAP detailing remedial action recommendations for public review and comment on 25 August 2011. All documents and information that were used to make recommendations in the PRAP were made available to the public on 25 August 2011 at the Schenectady County Public Library (Glenville Branch) in Glenville, NY and at the 109th AW Environmental Management Office, SANGB . The public comment period began on 25 August 2011 and ended on 9 October 2011. No written comments were received during the comment period, and there were no attendees from the public at the meeting held on 8 September 2011.

This Responsiveness Summary summarizes comments submitted during the public comment period and presents NGB's written response to each issue that was addressed. The NGB's responses to comments received during the public meeting are provided below.

3.2.1 Summary of Public Comments and NGB's Responses

NBG received no oral or written comments from the general public during the public comment period.

3.2.2 Technical and Legal Issues

The selected remedy is consistent with the future property use for unrestricted purposes assuming the RAOs are achieved.

4.0 References

Aneptek Corporation. 2000. *Final Remedial Investigation Report Site 2 – Site 3 – Site 6*. Stratton Air National Guard Base. September.

Aneptek Corporation. 2003. *Final Time Critical Removal Action Completion Report – Site 6*. Stratton Air National Guard Base. January.

Aneptek Corporation. 2003. *Final Supplemental Data Collection Technical Memorandum Site 6*. Stratton Air National Guard Base. August.

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Earth Tech. 2007. *Interim Remedial Action (IRA) / Focused Feasibility Study (FFS) Work Plan*. Schenectady Air National Guard Base. April.

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NYSDEC, 1994. *Determination of Soil Cleanup Objectives and Cleanup Levels.* NYSDEC Division of Hazardous Waste Remediation Technical and Administrative Guidance Memorandum (TAGM) Number 4046. April.

NYSDEC, 1998. *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.* NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) Memorandum Number 1.1.1. June (amended April 2000).

NYSDEC, 2010. *DER-10, Final Technical Guidance for Site Investigation and Remediation*. Division of Environmental Remediation. May.

Tables

Table 1: Site 6 Annual Groundwater Site Table

Well ID	Sample Date	Selected Chlorinated VOCs (µg/L)						Wet Chemistry (mg/L)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	Total CVOCs	TOC	Alkalinity	Nitrate	Ferrous Iron	Sulfate	Chloride
	AGWQS	5	5	5	5	2				20		500	500
MW-11	May 07	ND	ND	ND	ND	ND	0	**3.9**	**320**	ND	ND	**52**	**0.907**
	Sept. 07	ND	ND	ND	ND	ND	0	**0.77**	**420**	ND	ND	**210**	**1.55**
	Nov. 07	ND	ND	ND	ND	ND	0	**2.4**	**410**	**0.19**	ND	**220**	**1.15**
	Jan. 08	ND	ND	ND	ND	ND	0	**2.6**	**330**	ND	ND	**170**	**1.18**
	Aug. 08	ND	ND	ND	ND	ND	0	**2.8**	**410**	**0.20**	ND	**200**	NA
MW-19	May 07	ND	ND	ND	ND	ND	0	**0.58**	**370**	ND	ND	**110**	**12**
	Sept. 07	ND	ND	ND	ND	ND	0	**1.5**	**400**	**0.19**	ND	**100**	**31**
	Nov. 07	ND	ND	ND	ND	ND	0	**1.8**	**400**	ND	ND	**110**	**39**
	Jan. 08	ND	ND	ND	ND	ND	0	**1.1**	**420**	ND	ND	**85**	**31**
	Aug. 08	ND	ND	**1.3**	ND	ND	**1.3**	**2.6**	**390**	**0.22**	ND	**110**	**42**
MW-20	May 07	**1.2 J**	**1.3 J**	**25**	ND	**4 J**	**31.5**	**0.92**	**350**	**0.3**	ND	**120**	**14.5**
	Sept. 07	ND	**7.3**	**140 D**	ND	**6.1**	**153**	**1.6**	**390**	**0.20**	ND	**90**	**30**
	Nov. 07	**11**	**7.2**	**93 D**	ND	**10**	**121**	**3.2**	**350**	**0.23**	ND	**190**	**33**
	Jan. 08	**19**	**6**	**60**	ND	ND	**85.0**	**2.1**	**230**	**0.34**	ND	**160**	**23**
	Aug. 08	**10**	**8.5**	**330 D**	**0.96 J**	**8.2**	**358**	**4.8**	**330**	**0.20**	**0.11**	**250**	**39**
MW-21	May 07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sept. 07	ND	ND	ND	ND	ND	0	**1.4**	**290**	**0.44**	ND	**310**	**28**
	Nov. 07	ND	ND	ND	ND	ND	0	**6.1**	**190**	**0.23**	ND	**34**	**4.7**
	Jan. 08	ND	ND	ND	ND	ND	0	**2.1**	**280**	**0.55**	ND	**110**	**11**
	Aug. 08	ND	**2.6**	**6**	ND	ND	**9**	**6.3**	**260**	**0.2**	**0.5**	**110**	**7.3**
MW-22	May 07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sept. 07	ND	ND	**24**	ND	ND	**24.0**	**19**	**360**	ND	ND	**440**	**54**
	Nov. 07	**2.2 J**	ND	**13**	ND	ND	**15.2**	**4.7**	**360**	**0.22**	ND	**470**	**47**
	Jan. 08	**14**	**5.5**	**22**	ND	**15**	**56.5**	**5.3**	**300**	**0.22**	ND	**340**	**58**
	Aug. 08	**2.5**	**6.8**	**390 D**	**4.2 JD**	**35**	**439**	**6.7**	**380**	**0.20**	**0.03**	**330**	**61**
MW-23/ MW-13	May 07	**310 D**	**15 JD**	**190 D**	ND	ND	**515**	**1.4**	**290**	**0.31**	ND	**130**	**11**
	Sept. 07	ND	ND	**140**	ND	**3.1 J**	**143**	**27**	**620**	ND	**0.12**	**2.4**	**56**
	Nov. 07	**9.8 J**	**3.7 J**	**29**	ND	**3.0 J**	**45.5**	**3.7**	**280**	ND	ND	**200**	**36**
	Jan. 08	**21**	ND	**11**	ND	ND	**32.0**	**3.1**	**180**	**0.54**	ND	**150**	**14**
	Aug. 08	**3.5**	**3**	**45 D**	**1.6**	**27**	**80.1**	**7.2**	**380**	**0.20**	**0.68**	**250**	**32**
MW-24	May 07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sept. 07	ND	**11**	**28**	ND	ND	**39.0**	**17**	**370**	**0.22**	ND	**320**	**65**
	Nov. 07	ND	**11**	**28**	ND	ND	**39.0**	**13**	**260**	**3.1**	ND	**370**	**58**
	Jan. 08	ND	**5.8**	**16**	ND	ND	**21.8**	**9.9**	**180**	**4.7**	ND	**420**	**79**
	Aug. 08	ND	**14**	**42**	**0.68 J**	ND	**56.7**	**14**	**200**	**2.1**	**0.01**	**280**	**27**
MW-25	May 07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sept. 07	ND	ND	**590 D**	ND	**7.8**	**598**	**22**	**600**	ND	ND	**3.4**	**56**
	Nov. 07	**4.3**	ND	**34**	ND	**15**	**53.3**	**5.8**	**340**	**0.48**	ND	**450**	**39**
	Jan. 08	**3.1 J**	**1.8 J**	**82**	ND	**60**	**147**	**4.0**	**280**	**1.13**	ND	**500**	**42**
	Aug. 08	**2**	**1.8**	**370 D**	ND	**580 D**	**954**	**6.4**	**330**	ND	**0.67**	**430**	**31**
MW-26	May 07	NA	NA	NA	NA	NA	**NA**	NA	NA	NA	NA	NA	NA
	Sept. 07	ND	ND	**55**	ND	ND	**55.0**	**8.3**	**410**	ND	ND	**110**	**36**
	Nov. 07	ND	ND	**120**	ND	**87**	**207**	**5.8**	**360**	ND	ND	**370**	**50**
	Jan. 08	**5.1**	**1.6 J**	**22**	ND	**5.6**	**34.3**	**4.2**	**270**	**0.56**	ND	**370**	**22**
	Aug. 08	**6**	**3.5**	**37**	**0.64 J**	**8.6**	**55.7**	**7.2**	**370**	**0.24**	**0.8**	**340**	**27**
MW-27S	May 07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sept. 07	ND	ND	ND	ND	ND	0	**15**	**650**	**0.20**	ND	**6.28**	**15**
	Nov. 07	ND	ND	ND	ND	ND	0	**14**	**610**	**0.19**	ND	**54**	**14**
	Jan. 08	ND	ND	ND	ND	ND	0	**7.5**	**360**	ND	ND	**180**	**10**
	Aug. 08	ND	ND	ND	ND	ND	0	**0.86**	**400**	**0.21**	**0.77**	**240**	**9.37**
MW-27D	May 07	NA	NA	NA	NA	NA	NA	NA	**NA**	NA	NA	**NA**	NA
	Sept. 07	ND	ND	ND	ND	ND	0	**2.0**	**370**	ND	ND	**18**	**29**
	Nov. 07	ND	ND	ND	ND	ND	0	**1.5**	**330**	ND	ND	**18**	**32**
	Jan. 08	ND	ND	ND	ND	ND	0	**1.1**	**260**	ND	ND	**27**	**25**
	Aug. 08	ND	ND	ND	ND	ND	0	**2.0**	**320**	ND	ND	**18**	**33**

NOTES:

AGWQS = NYS Ambient Water Quality Standards (TOGS 1.1.1, June 1998 with June 2004 Addendum).
ND = Analyte not detected above the listed Detection Limit
NA = not analyzed
D = Result of diluted sample
J = Estimated Concentration
TOC = total organic carbon
Bold = indicates results exceeding listed Detection Limit
Highlighted cells indicate values exceeding AWQS
mg/L = milligrams per liter
µg/L = micrograms/liter

Table 2: Contaminants of Concern and Cleanup Criteria

Contaminant of Concern	Cleanup Critieria	Maximum Detected (Sample Location)
Soil (mg/kg)		
Tetrachloroethene	1.3	3.4 (EX-6-1-SW-07)
Xylenes	0.26	5.8 (Creek Bank B)
Groundwater (ug/L)		
Tetrachlorethene	5	10 (MW-20)
Trichloroethene	5	14 (MW-24)
Cis-1,2-Dichloroethene	5	390 (MW-22)
Vinyl Chloride	2	580 (MW-25)

Maximum detected concentration for groundwater based on August 2008 sample results

mg/kg – milligrams per kilogram

µg/l – micrograms per liter

Table 3: Remedial Action Alternatives Cost Estimates Summary

Item Description	Alt 1 No Action	Alt 2 Monitored Natural Attenuation	Alt 3 Hydraulic Containment	Alt 4 In Situ Remediation
CAPITAL COSTS				
Site Preparation	$ -	$ -	$ 2,000.00	$ -
Year 1 Groundwater Removal and Treatment	$ -	$ -	$ 40,000.00	$ -
Year 1 EOS Injection	$ -	$ -	$ -	$ 104,000.00
Year 1 Quarterly Discharge Monitoring	$ -	$ -	$ 5,000.00	$ -
Year 1 Annual groundwater Monitoring	$ -	$ 20,000.00	$ 9,000.00	$ 20,000.00
Subtotal Capital Costs	$ -	$ 20,000.00	$ 56,000.00	$ 124,000.00
Engineering (20% capital costs)	$ -	$ 4,000.00	$ 11,200.00	$ 24,800.00
Contingency (20% capital costs)	$ -	$ 4,000.00	$ 11,200.00	$ 24,800.00
TOTAL CAPITAL COSTS	$ -	$ 2,400.00	$ 78,400.00	$ 173,600.00
ANNUAL O&M COSTS				
Operation and Maintenance	$ -	$ -	$ 25,000.00	$ -
Discharge Monitoring	$ -	$ -	$ 13,000.00	$ -
Long-Term Groundwater Monitoring	$ -	$ 11,000.00	$ 4,800.00	$ 13,000.00
Five-Year Groundwater Monitoring	$ -	$ 3,300.00	$ 3,300.00	$ 4,000.00
Subtotal Annual O&M Costs	$ -	$ 14,300.00	$ 46,100.00	$ 17,000.00
Present Worth O&M Costs	0	$ 220,000.00	$ 356,000.00	$ 74,000.00
TOTAL PRESENT WORTH OF COST TO IMPLEMENT ALTERNATIVE				
Total Capital Costs	$ -	$ 24,000.00	$ 78,400.00	$173,600.00
Total Present Worth O&M Costs	$ -	$ 220,000.00	$356,000.00	$ 74,000.00
TOTAL COST	$ -	$ 250,000.00	$440,000.00	$250,000.00

All total costs rounded up to the nearest $10,000.
A Pre-Design investigation required to refine estimated quantities and costs.
Present worth rate of 5% for O&M assumed from NYSDEC guidance range of 3%-10%.

Table 4: Summary of Comparative Analysis for Site 6 Groundwater

Evaluation Criteria	Site 6 Groundwater Alternatives			
	A1	A2	A3	A4
Overall Protection of Human Health and the Environment	***	***	**	*
Compliance with ARARs	***	***	**	*
Long-Term Effectiveness and Permanence	***	***	**	*
Reduction of Mobility, Toxicity, or Volume	***	***	**	*
Short-Term Effectiveness	***	***	**	**
Implementability	*	*	**	**
Cost	*	**	**	**
State Acceptance	***	***	**	*

NOTES:
* = alternative effectively satisfies criterion
** = alternative moderately satisfies criterion
*** = alternative poorly satisfies criterion
Alternative 1 (A1) - No Further Action
Alternative 2 (A2) - Natural Attenuation
Alternative 3 (A3) - Hydraulic Containment
Alternative 4 (A4) - In situ Remediation

Figures

LEGEND

AIR NATIONAL GUARD FACILITIES BOUNDARIES

0 1,000 2,000 FEET

DATA SOURCES:
AERIAL: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
DESIGN: EARTH TECH / AECOM (2008)
ROADS: ESRI (2010)

NEW YORK AIR NATIONAL GUARD
109TH AIRLIFT WING
SCOTIA, NEW YORK

RECORD OF DECISION
FOR SITES 3 & 6

FIGURE: 1
SITE LOCATION MAP

PROJECT No.: 07-ANG21CNEF

DATE: OCTOBER 2011

CREATED BY: A.M.

U:\Projects\Schenectady_ANG\Report_Specific\ROD\MXD\Figure1_SiteLocationMap_ROD_ANGSchenectady_20111003_11x17.mxd

LEGEND

- AIR NATIONAL GUARD FACILITIES BOUNDARIES
- SITE 3
- SITE 6

0 500 1,000 FEET

DATA SOURCES:
AERIAL: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
DESIGN: EARTH TECH / AECOM (2008)
ROADS: ESRI (2010)

NEW YORK AIR NATIONAL GUARD
109TH AIRLIFT WING
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RECORD OF DECISION
FOR SITES 3 & 6

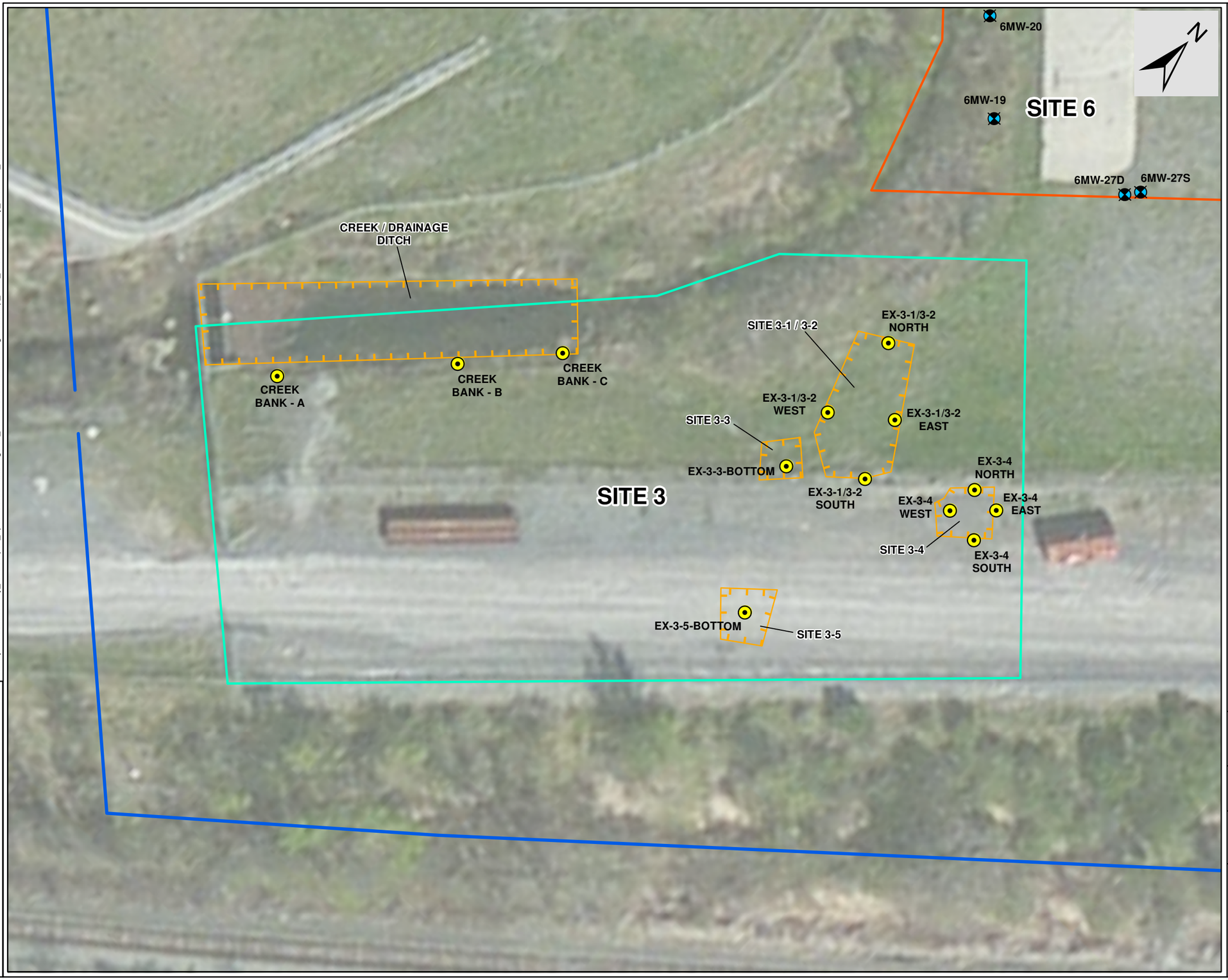
FIGURE: 2
SITE FEATURES MAP

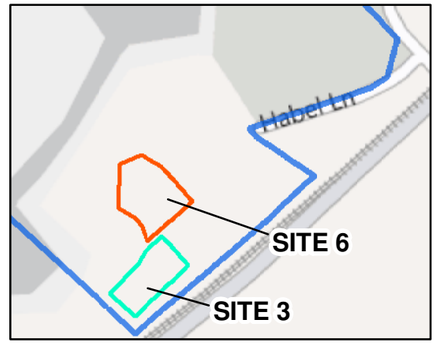
PROJECT No.: 07-ANG21CNEF

DATE: OCTOBER 2011

CREATED BY: A.M.

U:\Projects\Schenectady_ANG\Report_Specific\ROD\MXD\Figure2_SiteFeaturesMap_ROD_ANGSchenectady_20111003_11x17.mxd





LEGEND

- EXISTING MONITORING WELL
- FORMER SOIL BORING
- AIR NATIONAL GUARD FACILITIES BOUNDARIES
- SITE 3
- SITE 6
- FORMER SOIL EXCAVATION

0 30 60 FEET

DATA SOURCES:
AERIAL: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
ROADS: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
DESIGN: EARTH TECH / AECOM (2008)

NEW YORK AIR NATIONAL GUARD
109TH AIRLIFT WING
SCOTIA, NEW YORK

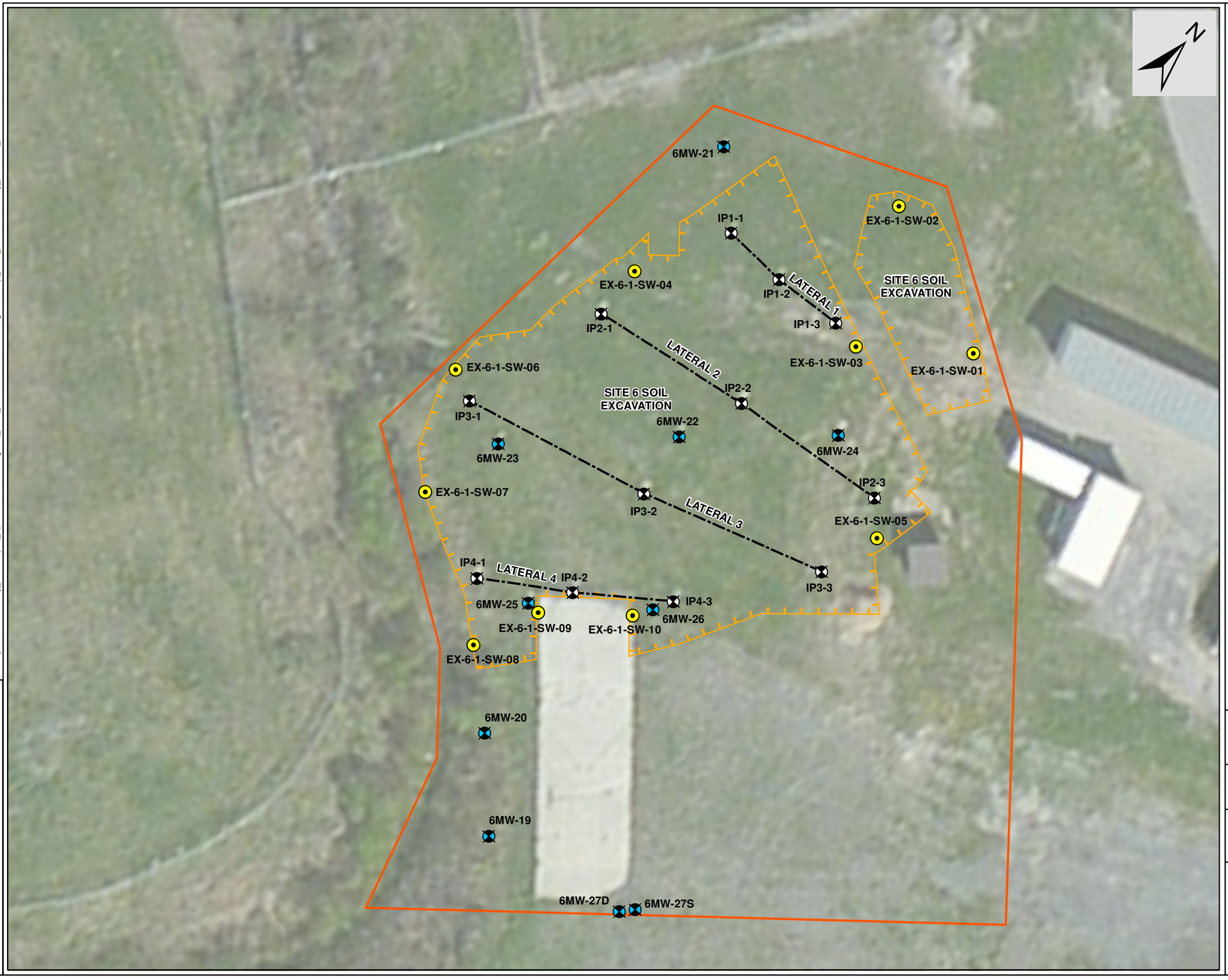
RECORD OF DECISION
FOR SITES 3 & 6

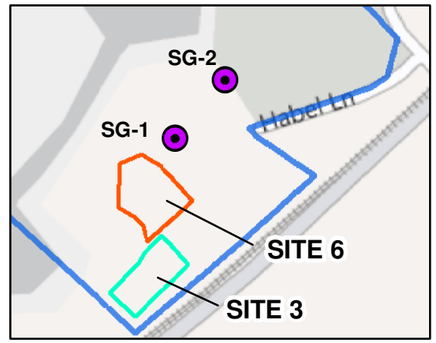
FIGURE: 3
SITE 3 PREVIOUS REMEDIAL INVESTIGATION FEATURES

PROJECT No.: 07-ANG21CNEF

DATE: OCTOBER 2011

CREATED BY: A.M.





LEGEND

- EXISTING INFUSION WELL
- EXISTING MONITORING WELL
- FORMER SOIL GAS
- FORMER SOIL BORING
- HORIZONTAL INFUSION WELL
- AIR NATIONAL GUARD FACILITIES BOUNDARIES
- FORMER SOIL EXCAVATION
- SITE 6

0 30 60 FEET

DATA SOURCES:
AERIAL: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
ROADS: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
DESIGN: EARTH TECH / AECOM (2008)

NEW YORK AIR NATIONAL GUARD
109TH AIRLIFT WING
SCOTIA, NEW YORK

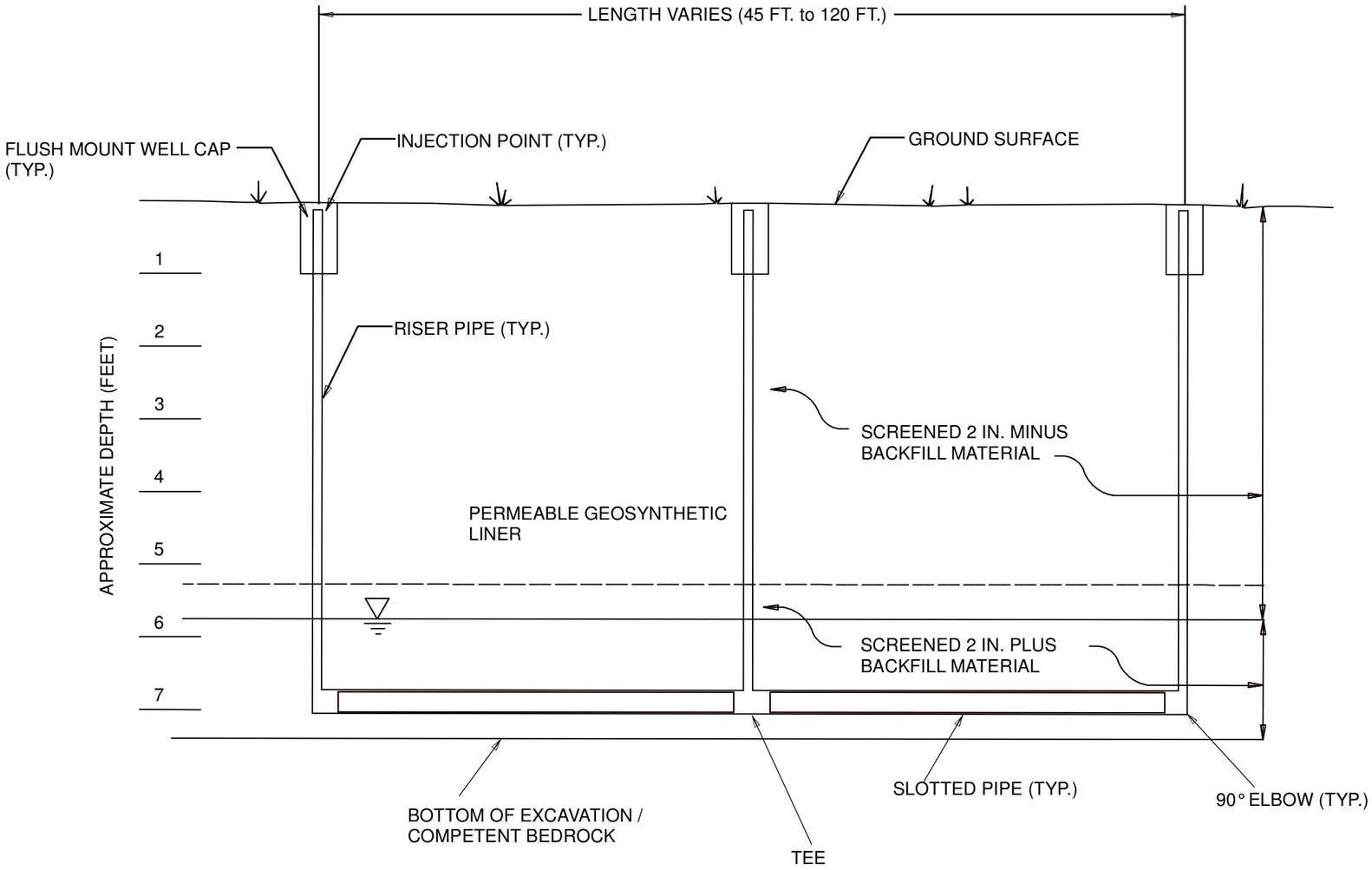
RECORD OF DECISION
FOR SITES 3 & 6

FIGURE: 4
SITE 6 PREVIOUS REMEDIAL INVESTIGATION FEATURES

PROJECT No.: 07-ANG21CNEF

DATE: OCTOBER 2011

CREATED BY: A.M.



NOTE:

DEPTHS SHOWN ARE APPROXIMATE. WELL DEPTH BASED ON ELEVATION OF COMPETENT BEDROCK.

DATA SOURCES:
DESIGN: EARTH TECH / AECOM (2008)

NEW YORK AIR NATIONAL GUARD
109TH AIRLIFT WING
SCOTIA, NEW YORK

RECORD OF DECISION
FOR SITES 3 & 6

FIGURE: 5
INFUSION GALLERY DETAILS

PROJECT No.: 07-ANG21CNEF

DATE: OCTOBER 2011

CREATED BY: A.M.

Attachment

New York State Department of Environmental Conservation
Division of Environmental Remediation
Office of the Director, 12th Floor
625 Broadway, Albany, New York 12233-7011
Phone: (518) 402-9706 • **Fax:** (518) 402-9020
Website: www.dec.ny.gov

Joe Martens
Commissioner

Sent Via Email Only

March 14, 2012

Ms. Jody Ann Murata (jody.murata@ang.af.mil)
Program Manager
NGB/A70R, Shepperd Hall
3501 Fetchet Avenue
Joint Base Andrews, MD 20762-5157

RE: Air National Guard Stratton
Site No. 447022
Draft Record of Decision, Site 3 and Site 6

Dear Ms. Murata:

The New York State Department of Environmental Conservation (Department) and the New York State Department of Health (NYSDOH) have reviewed the Draft Record of Decision (ROD) dated February 2012 for Site 3 and Site 6 at the New York Air National Guard's Schenectady Air National Guard Base, Site No. 447022 ("Stratton Air National Guard Site").

The Department and NYSDOH concur with the selected remedy, alternative #4, as stated in the draft ROD. The selected remedy for Installation Restoration Program (IRP) Site 3 (Drum Burial Area) is no further action for soils associated with the five interim removal action excavation areas, removal of xylene contaminated soil associated with the "Creek Bank B" drainage ditch sample, and installation of a non-permeable geomembrane along the southern bank of the drainage ditch. The selected remedy for IRP Site 6 (Suspected Spill Area) is a limited soil removal, use of enhanced bioremediation or chemical oxidation to treat dissolved phase chlorinated volatile organic compounds, groundwater monitoring, institutional controls (if needed) following implementation of the selected remedy, and an evaluation of the potential for vapor intrusion if the site use changes and or buildings are developed on the site.

Should you have any questions, please contact Mr. John B. Swartwout of Remedial Bureau A at (518) 402-9625.

Sincerely,

Robert W. Schick, P.E.
Acting Director
Division of Environmental Remediation

ec: K. Kotkoskie – ANG (Kimberly.kotkoskie@ang.af.mil)
J. Harrington
J. Swartwout
B. Jankauskas
K. Goertz
K. Anders - NYSDOH
J. Crua - NYSDOH
M. Schuck – NYSDOH