FINAL

COLONIE FUSRAP SITE
MAIN SITE SOILS REMEDIAL INVESTIGATION
SUMMARY REPORT

Colonie FUSRAP Site
Colonie, New York

September 2013

U. S. Army Corps of Engineers

New York District Office

Formerly Utilized Sites Remedial Action Program

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AEC	Atomic Energy Commission
ALM	Adult Lead Model
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
ASP	Analytical Services Protocol
bgs	below ground surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CSF	Cancer Slope Factor
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
ELAP	Environmental Laboratory Approval Program
EPA	U.S. Environmental Protection Agency
FSS	Final Status Survey
ft	foot (feet)
HI	Hazard Index
HHRA	Human Health Risk Assessment
IEUBK	Integrated Exposure Uptake Biokinetic

RI	Remedial Investigation
FIDLER	Field Instrument for Detection of Low Energy Radiation
FUSRAP	Formerly Utilized Sites Remedial Action Program
IEUBK	Integrated Exposure Uptake Biokinetic
mg/kg	milligram per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NL	National Lead
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSGQSs	New York State Groundwater Quality Standards
OU	Operable Unit
PRAR	Post Remedial Action Report
pCi/g	picocuries per gram
QA/QC	quality assurance/quality control
RAGS	Risk Assessment Guidance for Superfund
RfC	Reference Concentration
RfD	Reference Dose
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SPDES	State Pollutant Discharge Elimination System
SUNY	State University of New York
the Site	The U.S. Government owned Colonie FUSRAP property at 1130 Central Avenue in Colonie, New York

^{232}Th	Thorium-232
^{238}U	Uranium-238
UCL	95% Upper Confidence Limit
USACE	U. S. Army Corps of Engineers
VOC	Volatile Organic Compound
VP	Vicinity Property

EXECUTIVE SUMMARY

This Remedial Investigation (RI) summary report documents current conditions at Colonie Formerly Utilized Sites Remedial Action Program (FUSRAP) Site. This summary report is designed to meet the requirements of an RI in a technically-compliant abbreviated form and specifically addresses contaminants in soil at the 11.2 acre Federal Government-owned parcel located at 1130 Central Avenue in Colonie, New York (hereafter referred to as the "Site").

The U.S. Army Corps of Engineers (USACE) is executing response actions for the Site under the FUSRAP Program. On 13 October 1997, responsibility for the administration and execution of FUSRAP was transferred to USACE pursuant to the Energy and Water Development Appropriations Act of 1998 (Public Law 105-62). Furthermore, Public Law 105-245 and 106-60 clarified Congressional intent that response actions taken by USACE under FUSRAP should be performed subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

USACE completed a large scale removal action at the Site involving excavation and offsite disposal of over 135,000 cubic yards of contaminated soil. The goal of the removal action was to achieve the removal action objectives described in the December 2001 Action Memorandum (AM). The cleanup goals applied to meet the removal action objectives were derived in the 2001 Final Technical Memorandum (USACE, 2001a).

The removal action goals were identified as:

- The excavation and off-site disposal of site material(s) with ^{238}U levels greater than or equal to 35 picoCuries/gram (pCi/g), regardless of the depth at which these materials are encountered.
- The excavation and off-site disposal of site material(s) with ^{232}Th levels greater than or equal to 2.8 pCi/g, regardless of the depth at which these materials are encountered.
- The excavation and off-site disposal of site material(s) with total lead levels greater than or equal to 450 mg/kg encountered at depths of nine (9) feet or less below original grade.
- The excavation and off-site disposal of site material(s) with total copper levels greater than or equal to 1,912 mg/kg encountered at depths of nine (9) feet or less below original grade.
- The excavation and off-site disposal of site material(s) with total Arsenic levels greater than or equal to 7.4 mg/kg encountered at depths of nine (9) feet or less below original grade.
- The excavation of a minimum of six inches of material from the entire site, fenceline to fenceline, prior to the execution of Final Status Survey(s) over the entire site.

- The placement of a minimum of six inches and an average of two (2) feet of clean backfill soil over the site.

Following the removal action, radionuclide concentrations at all Site locations met the removal action cleanup goals. Metals met removal action cleanup goals at 23 of the 27 survey units. The four metals exceedances were due to the presence of semi-permanent physical obstructions. Volatile organic compound (VOC) impacted soils were discovered during the Groundwater Remedial Investigation. The VOC impacted soils were addressed ancillary to the radionuclide and metals contamination and were removed to eliminate a potential source of groundwater contamination. Following the removal action, VOC concentrations at all Site locations met the New York State criteria for soil clean-up levels for ground water protection.

Virtually all contaminated soil was removed, disposed of offsite, and replaced with certified backfill soil during the removal action. Metals exceeding removal action cleanup goals in Site soils are limited to four small areas in the shallow subsurface and some portions of the deeper subsurface (greater than 12 feet in depth). The four shallow subsurface areas were not excavated during the removal action due to the presence of semi-permanent physical obstructions including high voltage power line support poles, a rail line, and a fire hydrant/water main. Deep subsurface soils were not removed during the removal action because there is no complete exposure pathway to those soils.

Potential current or future human health risk from the residual metals contaminants present after the removal action at the Site was evaluated. The most probable future land use at the Site is considered to be urban residential. The results of this evaluation indicate that the Site-related constituents that have been identified as Contaminants of Potential Concern (COPCs). Lead, arsenic and copper, are all Contaminants of Concern (COCs) that pose hypothetical risks to the future residential receptor in several of the exposure units. The identified COCs do not pose a risk to the hypothetical future site worker.

The risk from COCs resulted in a cancer risk to future residents that was at the top end of the EPA identified target risk range of 1E-06 to 1E-04 for exposure unit 104. All other calculated carcinogenic risks for the other 3 exposure units were either within or below the target risk range (including for site workers). Exposure unit 104 was the only exposure unit that had a calculated non-cancer hazard index (HI) above 1.0 for the future resident child (at 1.4). The primary risk driver was arsenic in soil. Additionally, lead in Site soils in exposure units 124 and the North Lawn contained mean concentrations that posed a future risk to child residents should the soils become accessible.

The metals contaminants in Site soils are limited, relative to historical NL disposal practices of onsite landfilling, existing in discrete subsurface locations. It has been established that these contaminants have limited potential to significantly impact other environmental media in or around the Site. The risk assessment concluded that there is unacceptable risk from metals contaminants in soils at shallow depths if they were brought to the surface to be accessible at exposure units 104, 124 and the North Lawn. Based on the risk assessment results, further CERCLA response actions at the Site should be considered to address metals contaminants in soil specifically at the three discrete exposure units described herein.

1.0 INTRODUCTION

This Remedial Investigation (RI) summary report documents current conditions at Colonie Formerly Utilized Sites Remedial Action Program (FUSRAP) Site. This summary report is designed to meet the requirements of an RI in a technically-compliant abbreviated form and specifically addresses contaminants in soil at the 11.2 acre Federal Government-owned parcel located at 1130 Central Avenue in Colonie, New York (hereafter referred to as the "Site").

The U.S. Army Corps of Engineers (USACE) is executing cleanup of the Site under the FUSRAP Program. On 13 October 1997, responsibility for the administration and execution of FUSRAP was transferred to USACE pursuant to the Energy and Water Development Appropriations Act of 1998 (Public Law 105-62). Furthermore, Public Law 105-245 and 106-60 clarified Congressional intent that response actions taken by USACE under FUSRAP should be performed subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

USACE completed a large scale removal action at the Site involving excavation and offsite disposal of over 135,000 cubic yards of soil contaminated with metals, volatile organic compounds (VOCs), and radionuclides. Samples collected following the removal action indicate that soil radionuclide concentrations at all Site locations met the removal action cleanup goals. Post removal action soil samples also indicate that all Site locations meet the New York State groundwater protection criteria for VOCs. Metals contaminants, specifically lead, arsenic, and copper, exceed chemical specific removal action cleanup goals at four shallow subsurface locations and some portions of the deeper subsurface (greater than 12 feet below ground surface). The four shallow subsurface areas were not excavated during the removal action due to the presence of semi-permanent physical obstructions including high voltage power line support poles, a rail line, and a fire hydrant/water main. Deep subsurface soils were not removed during the removal action because there is no complete exposure pathway to those soils, based on the 2001 Action Memorandum.

This RI summary report is primarily focused on metals contaminants in soil on the Government owned Site. It does not address metals contaminants on Vicinity Properties (VPs), as FUSRAP authority for remediation of metals contaminants is limited to the Government owned property. Radionuclides are not a primary focus of this summary report because their concentrations at all locations on the Site meet the removal action cleanup goals. Volatile organics are not a primary focus of this summary report, as post excavation sampling results indicate that all Site locations meet New York State criteria for protection of groundwater.

Groundwater is not addressed as part of this RI because it is a separate operable unit (OU) and a signed Record of Decision (ROD) is in place for the groundwater.

1.1 Purpose of Report

The purpose of this summary report is to address the requirements of an RI by: 1) presenting data that reflects the current condition of Site soils post removal action and 2) documenting a baseline risk assessment based on that data. The information presented in this document is intended to describe the current nature and extent of residual metals in Site soils in sufficient detail to determine risk and aid in the development and evaluation of alternatives consistent with the CERCLA process.

The primary documents utilized in preparing this RI summary are listed below:

- *Technical Memorandum: June 1, 2001, Final Technical Memorandum in Support of a Proposed Action Memorandum,* (USACE, 2001a);
- *Action Memorandum: October 10, 2001, Revising Department of Energy Action Memorandum, dated February 14, 1997: Soil Removal at the Colonie Site,* (USACE, 2001b);
- *Final Post Remedial Action Report, Colonie FUSRAP Site, Formerly Utilized Site Remedial Action Program Colonie New York* (PRAR) (Shaw, 2010); and
- *Post Remedial Action Report Addendum, Main Site Sampling, Colonie FUSRAP Site, Colonie, NY, DRAFT,* (Shaw, 2013).

1.2 Site Background

The Federal Government has been cleaning up the Colonie FUSRAP Site and its affected VPs for many years. Authority for remediating the Site was assigned to the U.S. Department of Energy (DOE) by Congress through the *Energy and Water Development Appropriations Act* of 1984. In October 1997, authority for executing FUSRAP remediation activities was transferred from DOE to USACE by further Congressional action. Numerous investigation and response actions have occurred since inception of the cleanup activities.

1.2.1 Site Description

The Colonie FUSRAP Site is composed of the 11.2 acre main Site and 56 VPs. The main Site is located at 1130 Central Avenue (New York State Route 5) in the Town of Colonie, Albany County, New York (Figure 1). In October 1983, DOE performed detailed radiological surveys designed to locate those VPs on which uranium concentrations exceeded the cleanup guidelines agreed upon by the State of New York and DOE. These surveys identified 56 VPs that required cleanup. DOE conducted soil removal activities at 53 of the 56 VPs in 1984, 1985 and 1988. Two of the three remaining three VPs (Town of Colonie Property and the CSX (formerly Conrail) Railroad Property) were subsequently cleaned up during removal actions conducted by

USACE, along with the main Site soils. The third remaining VP, Niagara Mohawk Electrical Power Substation, did not require remediation.

The 11.2 acre Site is bounded by a heavily wooded lot on the west (7 Railroad Ave), CSX (formerly Conrail) rail tracks on the southwest and south, active commercial properties on the east and northeast, New York State Route 5 (Central Avenue) on the north, and a Niagara Mohawk electrical substation on the northwest. The surrounding area consists of residential and commercial properties. Maximum topographic relief across the Site is about 15 feet (ft), with the highest point on the property being approximately 235 ft above mean sea level (amsl). The land slopes gently from the northwest to the south-southeast. Figure 2 provides a topographic map of the Site as it exists today.

An unnamed tributary of Patroon Creek, (a portion of which is an underground culvert), crosses the Site from the west to the south and east, ultimately discharging into Patroon Creek south of the Site. The unnamed tributary drains an area of approximately 300 acres in the Town of Colonie. During the early 1900s, a dam was constructed on the tributary to form Patroon Lake, which was later removed.

Patroon Creek is a perennial stream that drains an area of approximately 13 square miles in Colonie and Albany. The drainage basin is mostly urban with commercial and residential properties. The creek is approximately 7 miles long, from its headwaters to its discharge into the Hudson River.

During facility operations, the Site could be divided into two separate drainage areas. The eastern drainage area covered approximately 37% of the Site and drained into a storm sewer that discharged directly into Patroon Creek. The western drainage area covered the remaining 63% of the Site flowed into the unmanned tributary of Patroon Creek.

1.2.2 Site History

Industrial operations began in approximately 1923 when the Embossing Company purchased a portion of the present day site to construct a facility to manufacture wood products and toys. In 1927, Magnus Metal Company, Inc. purchased the property and converted the facility to a brass foundry for manufacturing railroad components. Magnus Metal Company, Inc. cast the brass components in sand molds and manufactured brass bearing housings with surfaces of babbitt metal (an alloy of lead, copper and antimony).

In 1937, National Lead Industries (NL) purchased the facility and continued the brass foundry operations initiated by Magnus Metal Company, Inc. At some point before 1941, NL purchased an adjacent lot that contained a portion of Patroon Lake and began filling Patroon Lake with used casting sand, which contained high levels of lead and other metals. After World War II, the plant began casting aluminum parts and frames for aircraft. In 1958, the nuclear division of NL began producing items manufactured from uranium and thorium under a license issued by the Atomic Energy Commission (AEC). NL discontinued its brass foundry operations in 1960.

From 1958 through 1984, NL carried out a number of processes using radioactive materials consisting primarily of depleted uranium but also of thorium and enriched uranium. The plant handled enriched uranium from approximately 1960 to 1972. From 1966 to 1972, NL held several contracts to manufacture fuel from enriched uranium for experimental nuclear reactors. Operations were conducted at the plant to reduce depleted uranium-tetrafluoride to depleted uranium metal, which was then fabricated into shielding components, ballast weights for airplanes, and armor piercing projectiles.

In 1980, the DOE surveyed the VPs surrounding the NL plant and determined that uranium released into the air during former operations deposited on nearby residential and commercial properties and structures. They found the preponderance of the deposition in the direction of the area's prevailing winds (from the northwest and the southeast). In October 1983, the DOE performed more detailed radiological investigations of the individual VPs, with the objective of locating where uranium concentrations exceeded the remedial action guidelines agreed upon by the State of New York and DOE. The DOE identified 56 VPs requiring remedial action.

New York State officials closed NL in 1984 at which time Congress authorized DOE to remediate the property. In February 1984, the Secretary of Energy accepted an offer from NL to donate the land, buildings, and equipment to the DOE in order to help expedite the cleanup.

In 1984, 1985 and 1988, 53 of the VPs were remediated, Certification Dockets were prepared attesting to their radiological status, and all contaminated materials from remediation activities was staged on the Colonie Site pending disposal.

In 1985 the DOE acquired a portion of the Niagara Mohawk property bordering the Colonie Site and subsequently designated it as part of the Colonie Site.

From 1992 to 1996, the remaining NL Site buildings were demolished by DOE. Authority for remediating the Site was assigned to the DOE by Congress through the *Energy and Water Development Appropriations Act* of 1984. In October 1997, authority for executing FUSRAP remediation activities was transferred from DOE to USACE by further Congressional action. By the end of 2007, USACE had completed the removal of contaminated soils at the main Site and the remaining three VPs.

1.2.3 Previous Investigations

The Site and its VPs have been the subject of numerous investigations over the years, as the FUSRAP program has been conducting field investigations and removal activities in support of Site cleanup for over three decades. The most relevant past investigations to this RI are the confirmatory sampling conducted in as part of the recent large scale removal action and the post removal action sampling conducted in January 2013. The confirmatory sampling included collection and offsite laboratory analysis of hundreds of soil samples for radiological constituents, metals constituents, and VOCs (VOC samples were collected in eastern portions of the Site, where VOCs were encountered during removal actions). The January 2013 post removal action sampling included the collection and metals analysis of over 70 samples from soil borings performed at fourteen locations to a depth of 20 feet below ground surface (bgs). This RI summary report makes use of the removal action confirmatory sampling and January 2013 post removal action data to describe the nature and extent of contamination and to support the risk assessment.

Other investigations and remedial actions that occurred prior to the recent removal action served as the basis for the design of the removal action. Information that can be gained from these investigations primarily describes past (pre-removal action) Site conditions, as the removal action eliminated the vast majority of soil contamination at the Site. For this reason, these investigations are not summarized in detail herein. A brief summary of historic investigation activities occurring at the Site from 1978 through 1997 at the Site (excluding VPs) is presented below.

Atcor Survey (Atcor, 1978)

In 1978, Atcor conducted a radiological survey of the National Lead Industries building and equipment to assess plant operations being conducted at the time. High levels of beta-gamma radiation and external gamma radiation were found on essentially all floor areas that were surveyed.

Teledyne Isotopes Survey (Teledyne Isotopes, 1980)

The purpose of the 1980 Teledyne Isotopes survey was to determine the extent of surface soil contamination on the NL property and its vicinity resulting from stack emissions from the plant. Samples were collected from various quadrants surrounding the plant and from low-lying areas where contamination could have collected. Contamination was detected on all portions of the NL property that could be surveyed.

Teledyne Isotopes Survey (Teledyne Isotopes, 1981)

In 1981, Teledyne Isotopes conducted a second survey of the NL site to determine the extent of subsurface soil contamination. The survey identified three subsurface contaminated areas on the NL property. Daughter isotopes of ^{232}Th are identified in an area of the former Patroon Lake northwest of the building footprint.

Bechtel National Inc (BNI) Geological and Hydrogeological Investigation (1984)

This investigation consisted of stratigraphic characterization, field permeability tests and geotechnical analysis. Five stratigraphic units and the two groundwater systems were identified. The tests also set hydraulic conductivity values and established primary hydrogeologic characteristics such as groundwater flow direction and gradients.

Oak Ridge National Laboratory Survey (ORNL, 1988)

The ORNL survey determined that some radiological measurements of the adjacent Conrail property were in excess of Department of Energy's original cleanup criteria.

Characterization Report for the Colonie Site (BNI, 1992)

The Characterization Report summarized existing data from previous investigation efforts. The information presented in the Characterization Report was used in developing the Engineering Evaluation and Cost Analysis (EE/CA) alternatives.

Engineering Evaluation and Cost Analysis (DOE, 1995)

An EE/CA was performed to identify, develop, and evaluate remedial action alternatives for the site, based on the nature and extent of contamination documented in the 1992 Characterization Report. The report also evaluated the potential environmental consequences of the various removal action alternatives identified. Seven alternatives were evaluated, ranging from no action to complete excavation with offsite disposal. This document established the initial site residual contaminant guidelines for ^{238}U at 35 pCi/g (up to 100 pCi/g in intermittent locations) and ^{232}Th at 15 pCi/g. The document established contaminant guidelines of 500 mg/kg for lead and 10,000 mg/kg for copper based on a mixture of residential and industrial/commercial future land use of the Site (DOE, 1995; USACE, 2001).

Baseline Risk Assessment (BNI, 1997)

A baseline risk assessment (BRA) was conducted which presented the findings of an assessment to determine the human health and ecological risks posed by the presence of radioactive and associated chemical contamination. The BRA concluded that radioactive and chemical contaminants at the Colonie Site could result in risks to human health and ecological resources. Major potential human radiation exposure pathways identified were direct external radiation and inhalation of particulates.

Groundwater Remedial Investigation Report (Shaw, 2003)

The groundwater RI Report was completed in 2003 and summarized data collected from previous investigation efforts (by DOE) and new information collected by USACE between 1999 and 2002. Two areas of soils impacted with VOCs were identified during the ground water remedial investigation efforts. The NYSDEC considered these soils potential sources for groundwater contamination at the time.

2.0 PHYSICAL CHARACTERISTICS OF STUDY AREA

This section provides summary information regarding the physical characteristics of the Site. This information has been compiled from the results of previous investigations conducted in support of FUSRAP cleanup activities.

2.1 Geologic Setting

The primary geologic feature in the vicinity of the Site is the Colonie Channel, which is a buried, glacially-scoured valley that occupies the Hudson-Champlain Lowlands of east-central New York. Like the Hudson River Valley of today, the Colonie Channel was the main artery of the river system draining the lowlands of eastern New York during pre-glacial times. Most of the unconsolidated sediments above the bedrock present at the Site were deposited in glacial Lake Albany created during continental glacier advances and retreats in the Hudson Valley.

A brief description of the geological units, from the uppermost unit to the lowermost unit, is provided below.

Artificial Fill and Flood Plain Sediments: This unit consists of fill materials placed at the Site, including Patroon Lake, and consists of gravel, sand, brick fragments, metal barrels, glass, foundry tools, foundry slag, and disturbed sediment. The Flood Plain Sediments unit represents thin deposits of materials related to sedimentation in the former Patroon Lake and from floods of the unnamed tributary of Patroon Creek.

Dune Sand: This unit is fine-grained sand that is light yellow-brown and cross-laminated. Regionally, it is the unit that makes up the Pine Bush Aquifer. Based on lithologic logs, this unit thins from northwest to southeast across the Site and occurs near the ground surface predominantly above the water table.

Upper Silt: Previously referred to as the Upper Sand. This unit is composed of lake silt and sand. Grain size analyses consistently show significant silt fractions in samples collected from this unit.

Upper Clay: This unit is most easily identified in conductivity logs and consists of a varied sequence of clay and silt.

Lower Silt: Previously referred to as Lower Sand. This unit consists predominantly of silt with some clay and lies above the Lower Clay.

Lower Clay: At the Site, the Lower Clay is approximately 100 feet thick. The clay is observed to be olive gray and very homogenous, showing few signs of silt or sand interbeds. Based on geophysical surveys, it was determined that no major channel cut features or apparent topographic divides were apparent along the top of the Lower Clay. The apparent absence of these features further supports geological background information and geotechnical testing that identify the Lower Clay as the basal hydrogeologic boundary.

Till: This unit is described as dark gray and poorly sorted (10 percent sand, 40 percent gravel, and 50 percent clay). One Site borehole penetrated the till at a depth of 160 feet below grade. Bedrock underlies this till.

2.2 Groundwater Hydrology

The Upper Silt forms the shallow saturated zone at the Site and will be hereafter referred to as the upper groundwater zone. The Lower Silt forms the lower groundwater zone at the Site. The Upper Clay separates the upper and the lower groundwater zones.

Generally, water in the upper groundwater zone at the Site is encountered at a depth of less than 10 feet below grade. Water level measurements indicate that the saturated thickness of the upper groundwater zone ranges from over 20 feet in the north to less than 15 feet in the south near the property line. The base of the upper groundwater zone is defined by the top of the Upper Clay and ranges from elevations of approximately 202 to 205 feet amsl. The thickness of the Upper Clay ranges from approximately 12 to 15 feet. The top surface of the Lower Silt, in which the lower groundwater zone is present, is typically encountered at approximately 190 feet amsl. The thickness of the lower groundwater zone ranges from 10 feet to approximately 15 feet (Shaw, 2003).

A review of the water level measurements indicates that the lower groundwater zone is a confined water bearing unit, with depth to groundwater less than 10 feet below grade, comparable to the upper groundwater zone. Water in the lower groundwater zone is under confining pressure and rises in the monitoring wells to elevations higher than the top of the zone.

Groundwater flow across the Site is to the southeast in both groundwater zones. There is a downward vertical gradient over the northern portions of the Site, with an upward vertical gradient near the unnamed tributary and toward Patroon Creek. The upper zone groundwater likely drains to the unnamed tributary and to Patroon Creek (Shaw, 2003).

Permeabilities obtained from field tests conducted in 1984 and 1988 ranged from 0.04 to 109 feet/day in the upper groundwater zone (mean and median of 1.5 and 1.3 feet/day, respectively), and 0.29 to 31 feet/day in the lower groundwater zone (mean and median of 6.4 and 0.68 feet/day, respectively) [Shaw, 2003].

To support excavation activities on the eastern portion of the Site, approximately 260 linear feet of sheet pile wall was installed near the CSX railroad tracks in July 2005 to depths varying between 30 and 50 feet below ground surface (URS, 2008). Along with providing structural stability, the sheet pile wall retards groundwater flow to the southeast, creating a zone of stagnation directly behind the wall as groundwater levels equilibrate with up-gradient points.

Groundwater at the Colonie Site is classified as Class III groundwater (EPA, 1986). The NYSDEC has previously stated that, in their view, all groundwaters in the state of New York are considered to be potential drinking water sources and not Class III. Class III groundwater is considered non-potable due to salinity or otherwise contaminated by naturally occurring conditions in excess of levels that would allow use for drinking or other beneficial purposes. In the case of the Colonie Site and adjacent areas, groundwater is non-potable due to high background concentrations of naturally occurring metals in excess of the corresponding New York State Groundwater Quality Standards (NYSGQSs). The non-potability of groundwater beneath and adjacent to the Colonie Site is a regional groundwater quality issue regarding the aesthetic and chemical characteristics of the water, and is not site related. City water is provided and available to all properties in the vicinity of the Site. A well canvass conducted in 1992 located records for eight wells within a 2-mile radius of the Site, with two of the eight wells yielding water suitable for drinking. The radius for the well canvass was based on the EPA's Classification Review Area specifications. The two wells were used mainly for domestic/irrigation purposes or industrial use. A follow-up survey conducted as part of the 2003 RI indicated that the two wells were no longer active, and no other public water supply wells were found within the 2-mile radius review area (Shaw, 2003).

There is no residential use of surface water at the Colonie Site. Creeks and drainages have historically been used only to channel and divert storm water runoff and to convey treated effluent.

2.3 Meteorology

The climate at the Site is typical of upstate New York. The average annual daily maximum temperature is 57.6 degrees Fahrenheit (°F), and the average daily minimum is 36.8 °F. The highest average monthly temperature is 83.2 °F (July), and the lowest is 11.9 °F (January). Average precipitation is 35.7 inches, with an average annual snowfall of 65.1 inches. Winds in the area blow predominantly out of the south-southeast to south sector and west to west north-west sector. The mean wind speed from these sectors is 10 miles per hour. Light winds (0 to 3 miles per hour) blowing in no specified direction area also generally prevalent (BNI, 1992).

2.4 Current and Future Land Use

The Site is situated in an urban area consisting of both residential and commercial properties, located in the Industrial F zoning district. The definition of the Industrial F district states that prohibited uses include "any use which produces radiation, light, smoke, fumes, or odors of a noxious or harmful nature carrying beyond the limits of the premises."

Current land use is somewhat more residential, with population estimates indicating that there were approximately 80,000 people living in the Town of Colonie in 1998 and 292,006 persons living in Albany County in 1999 (U.S. Census Bureau, 2000).

The most probable future land use at the Site is considered to be urban residential. In accordance with EPA guidance for selecting a site's potential future land use, current land use, site setting, zoning laws/maps, and comprehensive community master plans were examined. The Town's master plan indicating future commercial use for the Central Avenue strip, coupled with the fact that residential property currently borders the Site on two sides, supports the use of urban residential cleanup criteria. Future projected use will result in concentrated mixed use development with high population characteristics of an urban residential scheme.

Homes and businesses in the area around the Site are provided with public water from the Latham Water District in the Town of Colonie. The water sources are the Mohawk River, several supply wells, and several reservoirs.

2.5 Ecology

The Colonie Site lies within the northern hardwood forest section of the Laurentian mixed forest. Aspen, fire cherry, ash and hawthorne are the various types of trees commonly found in old field habitats and other disturbed areas. However, the Colonie Site is located in an urban setting with little or no actual forest habitat.

At the industrial and railroad properties adjoining the Main Site, the flora consists of grasses and weeds, scattered shrubs, and trees. The flora in residential areas consists primarily of species common to landscaped lawns, such as grasses, evergreen shrubs, and trees (oak, maple, elm, and spruce).

Fauna population in the area is limited because of the lack of suitable habitat. The species that do inhabit the area have adapted to urban/suburban encroachment. Bird species found in the area include the house sparrow, cardinal, common crow, robin, pigeon, starling, and common grackle. Mammal species include the Norway rat, the domestic mouse, the eastern cottontail rabbit, and the eastern gray squirrel.

Aquatic habitat is limited to a small, unnamed stream that flows onto the Main Site and enters an underground conduit that passes beneath the Site; its receiving stream (Patoon Creek) lies approximately 0.25 miles to the south. The biota of the unnamed creek consists of species typical of small, generally degraded streams in urban areas, including midge and mosquito larvae, aquatic beetles and bugs, isopods, aquatic worms, snails and backfly larvae. Patroon Creek contains similar species, plus minnows, suckers, and fish tolerant of water quality conditions typical of urban streams.

3.0 REMOVAL ACTION SUMMARY AND FIELD SAMPLING

This section summarizes the nature and extent of the recent CERCLA removal action implemented at the Site. These removal action activities and their bases are important to this RI summary report because current Site conditions are largely a result of the removal action. In addition, the final confirmatory sampling performed as removal actions were completed and post removal action sampling are used in this RI summary report to describe the nature and extent of residual metals in Site soils. The sheer number and density of confirmatory/post removal action soil samples provide a much more comprehensive coverage of current site conditions than a standard Remediation Investigation would normally provide.

Removal activities were first initiated in 1999 and were based upon the results of a 1995 EE/CA report and the original DOE Action Memorandum (DOE, 1997). The EE/CA and the DOE Action Memorandum documents selected Alternative 3B, Moderate Excavation and Cap and Cover. Due to subsequent uncertainties regarding implementability, physical constraints of the Site, and local community resistance, the alternative was re-evaluated when USACE assumed responsibility for the Site. The Action Memorandum was revised based on this re-evaluation, and issued as Final in December 2001, to document selection of Alternative 2B, Large-Scale Excavation and Disposal (rather than Alternative 3B) (USACE, 2001b). Removal activities were performed in accordance with the revised 2001 Action Memorandum resulting in the removal and offsite disposal of over 135,000 cubic yards of soil contaminated with radionuclides and metals.

3.1 Removal Action Objectives

A technical memorandum, *Final Technical Memorandum in Support of a Proposed Action Memorandum*, dated June 1, 2001 (USACE, 2001a), was prepared to provide the technical basis for revising the original DOE Action Memorandum issued in February 1997. A change in the selected removal action was necessary due to uncertainties regarding the implementability of the action, the physical constraints of the Site, and local community resistance to the selected alternative.

The general removal action objectives cited in the Technical Memorandum were to mitigate further release of radiological and hazardous material to the surrounding environmental media, and minimize risk to human health and the environment. More specifically, the removal action objective was to protect human health and the environment by altering the waste source (i.e., uranium, thorium, lead, copper, and arsenic in soil) or otherwise reducing the potential for human or environmental exposure in the following ways:

- Minimize the potential for humans to ingest or come into dermal contact with, or inhale, contaminants of concern present in soil.

- Minimize the potential exposure to external gamma radiation.
- Minimize potential contaminant migration by controlling/minimizing surface water runoff, leaching, and erosion processes through removal, stabilization, and/or environmental isolation of soil contaminants.
- Prevent exposures to radioactivity that would result in a dose in excess of 25 millrem (mrem) per year and exposure to metals that would exceed risk-based standards.
- Achieve proposed cleanup criteria for ^{238}U, ^{232}Th, and metals in soil based on site-specific analyses and projected future uses of the Site.

The 2001 Action Memorandum contained three potential Applicable or Relevant and Appropriate Requirements (ARARs) to be satisfied by the removal action. The chemical-specific ARAR, Subpart E of 10 Code of Federal Regulations (CFR) 20, *Radiological Criteria for Unrestricted Use* set forth the allowable unrestricted use radiological dose limit of 25 millirem per year for radionuclide contaminants. The remaining ARARs were specific to treatment standards for hazardous waste and permitting requirements under the State Pollutant Discharge Elimination System (SPDES). There were no chemical-specific ARARs specified for arsenic, lead, or copper. Location-specific ARARs were not specified for any contaminants.

3.2 Removal Action Cleanup Goals

The goal of the removal action was to achieve the removal action objectives described in the December 2001 Action Memorandum. The cleanup goals applied to meet the removal action objectives were derived in the 2001 Final Technical Memorandum (USACE, 2001a).

Potential future exposure scenarios at the Site were based on historical, current, and projected future land uses and the physical characteristics of the Site. Based on local land uses, the following exposure scenarios were evaluated for Site soils: Resident Farmer, Urban Resident, and Industrial Worker. The Final Technical Memorandum evaluated the results of each scenario and recommended the Urban Resident as the exposure scenario for the Site. The Urban Resident scenario provides future land use for both residential and industrial development and is the one most consistent with the existing land use in the vicinity of the Site (USACE, 2001a). The cleanup goals established for the removal action are based on an Urban Resident receptor.

Lead cleanup goals were determined using the U.S. Environmental Protection Agency's (EPA) Integrated Exposure Uptake Biokinetic (IEUBK) and Adult Lead models. Copper cleanup goals were determined using EPA methodology (Soils Screening Level Guidance [EPA, 1996], Risk Assessment Guidance for Superfund [RAGS; EPA, 1989], and Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities [EPA, 1998]). The arsenic cleanup goal was based on regional background soil concentrations (from Shaklette and Boerngen, 1984).

The following Site specific guidelines for metals cleanup were derived for the Site using these approaches:

- 450 mg/kg lead,
- 1,912 mg/kg for copper, and
- 7.4 mg/kg for arsenic.

The December 2001 Action Memorandum established that metals-impacted soils would be removed only if present between 0-9 ft bgs. Metals impacted soil below 9 ft would not be removed, since there is no complete exposure pathway and leaving that soil in place would be protective of human health and the environment. This conclusion is based, in part, on the assumption that hypothetical potential future residences would have basements that extend no greater than eight feet bgs; one foot was added because the excavation necessary to construct such a basement would need to extend an additional foot in depth (USACE, 2001b).

The removal action goals were identified as:

- The excavation and off-site disposal of site material(s) with ^{238}U levels greater than or equal to 35 picoCuries/gram (pCi/g), regardless of the depth at which these materials are encountered.
- The excavation and off-site disposal of site material(s) with ^{232}Th levels greater than or equal to 2.8 pCi/g, regardless of the depth at which these materials are encountered.
- The excavation and off-site disposal of site material(s) with total lead levels greater than or equal to 450 mg/kg encountered at depths of nine (9) feet or less below original grade.
- The excavation and off-site disposal of site material(s) with total copper levels greater than or equal to 1,912 mg/kg encountered at depths of nine (9) feet or less below original grade.
- The excavation and off-site disposal of site material(s) with total Arsenic levels greater than or equal to 7.4 mg/kg encountered at depths of nine (9) feet or less below original grade.
- The excavation of a minimum of six inches of material from the entire site, fenceline to fenceline, prior to the execution of Final Status Survey(s) over the entire site.
- The placement of a minimum of six inches and an average of two (2) feet of clean backfill soil over the site.

During early implementation of the removal action in 2002, the process for applying the metals cleanup goals to individual sample results was refined to address the high density of confirmatory sampling. The confirmatory sampling grid resulted in a sample collection density of about one per 0.04 acres. A land mass as small as 0.04 acres (1,700 square feet) is considerably smaller than the size of the exposure unit applied in derivation of the cleanup goals. In order to provide an approximation of metals concentrations over a land area closer in size to the risk assessment exposure unit, a sample result averaging method was implemented. This method provided more appropriate metals concentrations for comparison to cleanup goals, while maintaining a high level of conservatism. When a sample metals result exceeded a cleanup goal, it was averaged with its two nearest neighbors. If the average was less than the cleanup goal, no further removal action was considered necessary. In addition, a maximum lead concentration of 650 mg/kg for any single sample result was applied as part of this process for conservatism. The State of New York Department of Environmental Conservation (NYSDEC) was involved with the development of this approach and concurred with its application, considering it "protective of human health and the environment" (Shaw, 2010).

3.3 Removal Action Confirmatory Sampling Program

As the removal action progressed, the site was divided into 27 discrete parcels of land to facilitate confirmatory sampling in accordance with the Final Status Survey Plan (USACE, 2002). The parcels were based on radiological Final Status Survey sampling requirements and are referred to as survey units, as shown in Figure 3. Each of the survey units was limited to a maximum size of 2,000 square meters and included nine or more sample locations (see Appendix A for survey sample locations in each survey unit). Sample density was approximately one sample every 200 square meters. Over 280 samples were collected and analyzed as part of the confirmatory sampling program.

The confirmatory samples were collected following completion of the removal action in each survey unit. These samples were analyzed for radionuclides and total arsenic, total copper, and total lead in accordance with EPA Method SW-846 Methods 6010B and 6020A. In addition, in select portions of the Site, soil samples were collected and analyzed for VOCs after the excavation of metals contaminated soils was confirmed complete. The results of the confirmatory samples are used in this RI summary report to establish the nature and extent of metals in Site soils and are presented in Section 4.0.

Samples were collected in accordance with the removal action Sampling and Analysis Plan (Shaw, 2005). Quality Assurance Project Plans were prepared and implemented to supplement the site-specific Sampling and Analysis Plans for the Site. The overall objective was to identify procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective actions (if required). The plan presented the field and laboratory quality assurance/quality control (QA/QC) policies and procedures that were followed during the implementation of the project. Specific QA/QC procedures employed and the results of QA/QC evaluations/surveillance are provided in the sampling and analysis plan (Shaw, 2005) and the post removal action closure report (Shaw, 2010).

3.4 Post Removal Action Soil Sampling

In January 2013, an additional sampling effort was conducted at the Site to provide better delineation of metals contaminants in excess of removal action cleanup goals. The primary intent of the effort was to provide better vertical delineation and bound the depth of metals contaminated soils.

Sample locations were established at the ten locations where removal action confirmatory sample results were above the removal action cleanup goal values. In addition, four sample locations were biased to provide better horizontal and vertical delineation. Sample locations are identified on Figure 5.

Soil cores were collected at each location with a direct push Geoprobe® sampling method to a depth of 20 feet bgs. Discrete samples for laboratory analyses were collected at two foot intervals starting below the removal action clean fill depth to 20 feet bgs (71 samples total). These samples were analyzed for total arsenic, total copper, and total lead in accordance with EPA Method SW-846 Methods 6010B and 6020A. The results of these sample analyses are used in this RI summary report, along with confirmatory sample results, to establish the nature and extent of metals in Site soils and are presented in Section 4.0.

3.5 Removal Action Results

Excavation activities began on 30 March 1999 and were completed on 23 January 2007. A total of 135,244 cubic yards contaminated soils and debris were excavated from the Site. Figure 4 is a topographic map identifying the depth of excavation prior to backfill. Figure 2 is a current topographic map generated after backfill activities.

In accordance with the removal action goals, all radioactively-contaminated soils exceeding cleanup criteria were removed from the Site regardless of depth, and all metals-contaminated soils exceeding cleanup criteria were excavated to maximum depths of 9 ft below original grade. Once a soil excavation unit was confirmed clean, the area was backfilled with certified clean fill material and restored (i.e., graded and seeded).

With the exception of a few small areas on the Site, the removal action was successful in achieving the objectives described in Section 3.1. In some cases, the presence of semi-permanent structures (i.e., fire hydrant and main, high voltage power line support poles, and rail lines) prevented soil removal. As a result, metals concentrations exceeded removal action cleanup goals in some isolated locations. A data summary of the locations exceeding cleanup goal values is presented in Table 2. It should be noted that radionuclide concentrations in these inaccessible soils were below removal action cleanup goals.

Two areas of soils impacted with VOCs were identified during the ground water remedial investigation efforts. Soils impacted by VOCs were encountered during excavation activities in five final status survey units (Unit 109, Unit 114, Unit 116, Unit 117 and Unit 119). After the removal of radiological and metals contaminated soils, any soils impacted with VOCs were removed to eliminate the potential source of groundwater contamination. During the final status survey sampling phase for each of these units, samples from the final excavated surface were collected from impacted areas with VOCs utilizing an En Core® Sampler. Data indicates that the final excavated surfaces are compliant with the recommended soil clean-up levels for ground water protection published by New York State in their Technical and Guidance Memorandum #4046. VOC confirmatory sampling data is shown in Table 4.

4.0 NATURE AND EXTENT OF CONTAMINATION

With the completion of the removal action, the vast majority of contaminated soil was removed, disposed of offsite, and replaced with certified clean backfill soil. Currently, all surface soil and the much of the shallow subsurface soil at the Site consist of this certified clean backfill.

Characterization of the Site soils in this RI summary report is based on the removal action confirmatory sampling data and January 2013 post removal action sampling. This comprehensive dataset is of sufficient quality and quantity to support decisions regarding remedial response activities.

Confirmatory samples were collected following completion of the removal action in each survey unit. These samples were analyzed for radionuclides, VOCs (in select areas), total arsenic, total copper, and total lead. A total of 281 final confirmation soil samples were collected and analyzed as part of the removal action (over 20 samples were collected per acre). These samples were collected from the base of the excavation prior to backfill and represent the current subsurface conditions at the Site (all current Site surface soil consists of certified clean backfill). Table 3 lists each of the sample metals and radionuclide results. Table 4 lists the VOC results. Figure 3 identifies the survey unit locations and boundaries on the Site. Appendix A provides maps of each survey unit and the sample locations within each survey unit.

In January 2013, an additional sampling effort was conducted at the Site to provide better delineation of metals contaminants in excess of removal action cleanup goals. The primary intent of the effort was to provide better vertical delineation and bound the depth of metals contaminated soils. Soil cores were collected at 14 locations with a direct push Geoprobe® sampling method to a depth of 20 feet bgs. Discrete samples for laboratory metals analyses were collected at two foot intervals starting below the removal action clean fill depth to 20 feet bgs. A total of 71 samples were collected. Table 5 lists the sample results and sample locations are identified on Figure 5.

4.1 Radionuclides and VOCs

As a result of the removal action, radionuclide concentrations at all Site locations are less than the removal action cleanup goals and VOC concentrations meet New York State guidance. Radionuclide and VOC contaminants are no longer considered to be COCs in Site soils.

The average post-removal action radionuclide results, based on averages of all removal action confirmatory samples collected across the Site, are as follows:

- 3.11 for ^{238}U (cleanup goal 35 pCi/g), and
- 0.45 for ^{232}Th (cleanup goal 2.8 pCi/g).

4.2 Metals Contaminants

Existing metals contamination in Site soils is limited to four small areas in the shallow subsurface and some portions of the deeper subsurface (greater than 12 feet in depth). The four shallow subsurface areas were not excavated during the removal action due to the presence of semi-permanent physical obstructions including high voltage power line support poles, a rail line, and a fire hydrant/water main. Deep subsurface soils were not removed because it was not authorized in the 2001 Action Memorandum, as there is no complete exposure pathway to those soils.

The average post-removal action metals results, based on averages of all removal action confirmatory samples collected across the Site, are as follows:

- 4.3 mg/kg for arsenic (cleanup goal 7.4 mg/kg),
- 326 mg/kg for copper (cleanup goal 1,912 mg/kg), and
- 262 mg/kg for lead (cleanup goal 450 mg/kg).

Figures 6 through 8 provide a visual, two-dimensional, representation of the removal action confirmatory sampling results for arsenic, lead, and copper, respectively. Each figure is a color coded posting plot and includes contours of areas estimated to be in excess of cleanup goal values (regardless of contaminant depth). Contour boundaries were estimated using inverse distance weighting with a search radius of 75 feet. Fault lines are used during interpolation along property outer borders to blank regions beyond the Main Site boundary.

Soil sample results from four locations shallower than 9 ft below original grade exceeded the metals cleanup goals (even when averaged with neighboring locations). These discrete locations were not excavated, as they were inaccessible for additional soil removal. A data summary of the locations exceeding cleanup criteria is presented in Table 2 and the location of each area is shown on Figure 3. The results of the January 2013 post removal action sampling (Table 5) indicate that the layer of contamination at each of these shallow subsurface locations is quite thin, being less than a few feet thick. A brief summary of each location is provided below:

- Survey Unit 104 (1.82 ft depth) – arsenic 85.4 mg/kg (cleanup goal 7.4 mg/kg). The sample was located between active power poles. Additional vertical and horizontal excavation would impact power pole support soils.
- Survey Unit 109 (2.4 ft depth) – arsenic 10.5 mg/kg (cleanup goal 7.4 mg/kg) and lead 630 mg/kg (cleanup goal 450 mg/kg). The sample was located on the property boundary adjacent to an active rail line. Additional excavation would impact the rail support soils.

- Survey Unit 124 (5.3 ft depth) – copper 2,450 mg/kg (cleanup goal 1,912 mg/kg) and lead 734 mg/kg (cleanup goal 450 mg/kg). The sample was located adjacent to an active power pole. Additional vertical and horizontal excavation would impact the power pole support soils.
- North Lawn (3.9 ft depth) – copper 4,340 mg/kg (cleanup goal 1,912 mg/kg) and lead 3,370 mg/kg (cleanup goal 450 mg/kg). The sample was located adjacent to the main fire hydrant for commercial and residential properties along Central Avenue. The local Fire Chief stated that full time access to the hydrant was required, and additional excavation would impact the stability of the hydrant.

It should also be noted that soil sample results for six locations in deeper subsurface soils (shallowest is 12 feet bgs) were in excess of the metals cleanup goals applicable to soil less than nine feet bgs. The six locations are confined to a single portion of the Site where past NL Industries landfill operations in the former Patroon Lake occurred. These deep subsurface soils were not removed because there is no complete exposure pathway to those soils. The removal action confirmatory sample results are summarized in Table 2 and the location of each area is shown on Figure 3. The results of the January 2013 post removal action sampling (Table 5) indicate that the layer of contamination at each of these deep subsurface locations ranges from less than a few feet thick to an approximate maximum thickness in excess of ten feet.

5.0 CONTAMINANT FATE AND TRANSPORT

Unlike organic constituents, the inorganic metals do not undergo appreciable degradation once released into the environment and will persist over time, particularly in soil. Potential transport pathways by which the metals contaminants can migrate within and between the various environmental media are discussed briefly below.

5.1 Soil to Air

For non-volatile metals such as lead, copper and arsenic, the only method for transport of contaminants from soil to air is as fugitive dust via adherence to particulate matter that then becomes airborne and is dispersed by wind. Once airborne, gravitational settling and dry and/or wet deposition will return the contaminants to the ground surface. Factors influencing the likelihood for this manner of transport include frequency and amount of precipitation, moisture content of the soil, soil type, soil particle size, wind velocities, and vegetation density in contaminated areas.

Currently, all surface soil and the much of the shallow subsurface soil at the Site consists of certified clean backfill. The soil was seeded after backfill with vegetation appropriate for the area and currently has a fairly dense vegetative layer. The current presence of the clean cover soil and vegetation virtually eliminates the soil to air transport mechanism for Site metals contaminants. In addition, the highest concentrations of metals contaminants at the Site are present at substantial depth, more than 12 feet bgs.

Significant disturbance of the soil through excavation or other earthmoving could create a mechanism for the limited areas of shallow subsurface contaminated soils to be dispersed via air. However, such earthmoving activities would substantially dilute metals concentrations in the soil due to the mixing with the clean backfill soils. Based on reasonable projected future uses of the Site, it is considered highly improbable that any excavation activities would encounter the metals contaminants that exist in the deeper subsurface (greater than 12 feet bgs).

5.2 Soil to Surface Water

A combination of weathering (e.g., scour from wind and overland surface water flow) and a slightly acidic environment related to the infiltration of acidic rainwater can create conditions that are favorable to the leaching of metals from surface soil to surface water. Upon contact with surface water, contaminants may remain in the dissolved phase or sorb to suspended sediments.

Surface water only exists on a small portion of the western side of Site where the unnamed tributary of Patroon Creek enters, and is conveyed approximately 150 ft to the south and east within a channel lined with rip rap before it enters a culvert headwall and is directed underground across the Site in a 48-inch concrete culvert. The culvert drainage exit is located south of the Colonie FUSRAP Site, directly south of the CSX railroad tracks (see Figure 3). Downstream from the railroad track and Yardboro Avenue, the stream is an open channel, approximately 600 ft long, before it intersects Patroon Creek. Based on surface water elevations measured at two staff gauges located at the Colonie FUSRAP Site, and in the upward gradients observed in nearby wells, it appears that shallow groundwater discharge occurs along the stream (USACE, 2004).

None of the locations where elevated metals concentrations exist at the site are in close proximity to the surface water at the Site and all locations are subsurface. All surface soil and much of the shallow subsurface soil at the Site consists of certified clean backfill. The location and depth of existing contamination, and presence of the clean cover soil and vegetation, virtually eliminates the soil to surface water transport mechanism for Site metals contaminants.

Significant disturbance of the soil through excavation or other earthmoving could create a mechanism for the limited areas of shallow subsurface contaminated soils to be brought to or near the surface and available for transport to surface water. However, the significant dilution that would occur during excavation would eliminate any significant affects to surface water.

5.3 Soil to Groundwater

The primary mechanism of release of metals contaminants in soil to groundwater is via leaching of contaminants from soil that comes into contact with acidic water. This can include either rainwater or surface water that percolates through contaminated material from above or groundwater when the water table rises up high enough to engulf source areas as part of seasonal water table elevation variations.

Groundwater has been addressed as a separate OU at the Site and a ROD was issued and signed in 2010 (USACE, 2010). The selected remedy for groundwater is monitored natural attenuation with land use controls to address the presence of volatile organic compounds in the groundwater (VOCs are the only COCs in groundwater and the soils removal action removed the VOC groundwater source from the soils). As part of the CERCLA investigation of groundwater, an RI was developed in 2003. The RI included collection and analysis of samples from Site wells, upgradient wells, and downgradient wells. At the time these samples were collected, the removal action was less than twenty percent complete and much of the Site metals contamination was still in place. A comparison of the total and dissolved metals detected in onsite and offsite monitoring wells with those detected in four upgradient wells showed no discernible difference in the metals concentrations (Shaw, 2003).

The removal action resulted in the elimination of virtually all metals contamination from the Site shallow subsurface soils. Analyses of metals impacts to groundwater prior to completion of the removal action did not identify any discernible Site impacts. Based on these facts, any impacts to groundwater from metals present in Site soils are expected to be insignificant or nonexistent.

6.0 BASELINE RISK ASSESSMENT

A quantitative human health risk assessment (HHRA) was performed in accordance with EPA's *Risk Assessment Guidance for Superfund (RAGS): Volume 1, Human Health Evaluation Manual (Part A)*, and *RAGS: Volume 1, Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments)* (EPA, 1989 and 2001). The HHRA is summarized in this section. Details of the HHRA are presented in Appendices B, C and D. A baseline ecological risk assessment did not need to be undertaken as all contaminated soil samples were at such depths in the soil to be unavailable to ecological receptors. For this reason there was no ecological risk presented in this remedial investigation.

The HHRA evaluation includes:

1. Data evaluation,
2. Exposure assessment,
3. Toxicity assessment, and
4. Risk characterization and uncertainty analysis.

6.1 Data Used in the HHRA

As described in Section 4.0, confirmation samples were collected at the final base of excavation as removal actions were completed in each survey unit. Following sample collection and regulatory acceptance/acknowledgement, all areas were backfilled. In nearly all cases, the depths of the samples taken were greater than nine feet. Those sample points that were greater than nine feet were not used in this risk assessment as it is unreasonable to assume that future soils would be available to contact for any length of time for any possible future receptor. Therefore, this risk assessment incorporates only those sample points that were in the subsurface, were closer to the surface than nine feet, and contain soils above cleanup goals (see Table 2 and explanation in Section 4.2). The only such soils are those found in "shallow" subsurface samples located in survey units 104 (sample CFS-104-002), 109 (sample CFS-109-009), 124 (sample CFS-124-011R) and the North Lawn (area CFS-NLF-012R).

Additional subsurface soil samples were collected in 2013 (see Section 3.4) to further characterize the extent (depth) of contamination within subsurface soils. Those sample results are found in Table 5 and were added to the four data points referred to above for quantification of risk (specifically, borings 1, 2, 13 and 14). No other media were considered for this assessment (surface soils are currently clean fill) and groundwater is a separate Operable Unit with a ROD in place. Figure 9 shows the locations of the data points used in this assessment.

6.2 Exposure Assessment

The exposure assessment estimates the magnitude, frequency, duration, and routes of exposure. The exposure assessment includes current and future exposures. Exposure assessment involves three distinct processes: 1) characterizing the exposure setting, 2) identifying exposure pathways, and 3) quantifying exposure.

6.2.1 Exposure Setting Characterization

The Site consists of 11.2 acres in Colonie, New York (population: 7,775 in July 2011: U.S. Census Bureau). As shown in Figure 1, the 11.2 acre Site is bounded by a heavily wooded lot on the west (7 Railroad Ave), CSX (formerly Conrail) rail tracks on the southwest and south, active commercial properties on the east and northeast, New York State Route 5 (Central Avenue) on the north, and a Niagara Mohawk electrical substation on the northwest. The surrounding area consists of residential and commercial properties. Maximum topographic relief across the Site is about 15 feet (ft), with the highest point on the property being approximately 235 ft amsl. The land slopes gently from the northwest to the south-southeast.

An unnamed tributary of Patroon Creek, (a portion of which is an underground culvert), crosses the Site from the west to the south and east, ultimately discharging into Patroon Creek south of the Site. The unnamed tributary drains an area of approximately 300 acres in the Town of Colonie. During the early 1900s, a dam was constructed on the tributary to form Patroon Lake.

Patroon Creek is a perennial stream that drains an area of approximately 13 square miles in Colonie and Albany. The drainage basin is mostly urban with commercial and residential properties. The creek is approximately 7 miles long, from its headwaters to its discharge into the Hudson River.

6.2.2 Potential Exposure Pathways

Health risks may occur when there is contact with a chemical by a receptor population. Exposed populations must ingest, inhale, or dermally absorb a COPC to complete an exposure pathway and potentially experience an adverse health risk. Exposure pathways are determined by the locations of sources, types of release mechanisms, types of contaminants, fate and transport mechanisms, and the locations and activities of the receptors. The potential exposure pathways for the Site are described below and summarized in Appendix B, Table 1.

6.2.2.1 Current Receptor Scenarios

Under current site conditions there is exposure to surface soils which entirely consist of certified clean backfill soil; therefore, there are no risks from the surface soils that are currently in place. The only remaining media to address within this assessment are shallow subsurface soils that were not removed (for reasons elaborated in Section 4.0). Considering that there are no impacted surface soils and there are no current receptors that are exposed to subsurface soils, no current receptors are being considered for this assessment. The subsurface soils that did exceed clean up goals but were not removed, are not considered accessible by current receptors as they are largely inaccessible at present (i.e., below active power pole, within railroad embankment, etc.).

6.2.2.2 Future Receptor Scenarios

The most probable future land use at the Site is considered to be urban residential. In accordance with EPA guidance for selecting a site's potential future land use, current land use, site setting, zoning laws/maps, and comprehensive community master plans were examined. The Town's master plan indicating future commercial use for the Central Avenue strip, coupled with the fact that residential property currently borders the Site on two sides, supports this future use. Projected future use will result in concentrated mixed use development with high population characteristics of an urban residential scheme.

This assessment considers possible future exposure to subsurface soils by residents that may live on this property or workers that may work on this property on a daily basis in the future. Specifically, the risk would be from soils at shallow depths that might be brought to the surface and become available for contact by future receptors. Potential property development activities could bring these shallow subsurface soils to the surface as excavation is performed for construction of foundations and footers and general grading. The residents or workers may be exposed to constituents in this excavated soil through direct contact (incidental ingestion and dermal absorption) and inhalation of fugitive dust emissions. This risk assessment also assumes that there would be no mixing of the currently clean surface soil with any subsurface soils that are brought to the surface; in this way, the results are conservative and health protective.

The future construction worker would be an adult and future residents may include both adults and children. While the non-cancer hazards for the child resident are the most conservative receptor, the non-cancer hazards to adult residents were also estimated. For carcinogenic risk, the most conservative approach is to use the age-adjusted resident. With this approach, it is assumed that the resident lives 70 years at the site (NYSDEC, 2006), 6 years as a child and 64 years as an adult (Because cancer risks were calculated for the age-adjusted resident, the HHRA did not quantify separately the cancer risks for the child resident and the adult resident). The potentially complete exposure routes for the receptors are identified in Appendix B, Table 1.

6.2.3 Quantifying Exposure

This process is conducted in three steps: 1) selection of chemicals of potential concern, 2) estimation of exposure point concentrations, and 3) calculation of chronic daily intakes. The analytical data were evaluated to determine the exposure point concentration for each COPC. Intake equations (or concentrations) were developed for each potential receptor, exposure pathway, and intake route for each of 4 exposure units.

The exposure units are undefined but they are split into four distinct areas that correspond with the survey units where they were originally sampled within. These survey units were used to divide the site for purposes of the removal actions and are found in Figure 2. Survey units that contained a soil sample that exceeded one or more of the COPCs (lead, arsenic or copper) above cleanup goals or were identified for additional sampling for delineation purposes in 2013 (see Section 3.0), were used in this assessment (see Section 6.1). The survey units that met the criteria for possible future exposure were the following: 104, 109, 124, and the North Lawn. However, it is acknowledged that if the data points that are shown within Figure 9 were to be included in a future residential development, they may be of any size, but would most likely be similar to the sizes of surrounding properties. Many properties in the immediate vicinity of the Site are quite small, having lot sizes that are 0.1 acres or less.

6.2.3.1 Selection of Chemicals of Potential Concern

This risk assessment is unique in that the COPCs have been chosen previously by all stakeholders prior to the removal activities that took place within the past 12 years. Therefore, tables that are outlined in USEPA's Risk Assessment Guidance (RAGS) for Superfund Part D that deal with the selection of COPCs are not contained herein. The non-radionuclides that were chosen for site soils as COPCs were lead, arsenic and copper.

6.2.3.2 Estimation of Exposure Point Concentrations

The Technical Guide for ProUCL Version 4.1 indicates that a minimum of 8 to 10 detections are required to support a robust statistical analysis of the data distribution. This criterion was not met for each of the exposure units as there were too few data points. Therefore, the maximum concentrations were used as exposure point concentrations for arsenic and copper and for lead, the mean value was used. The exposure point concentration for each COPC is presented in Tables 2 through 5 of Appendix B.

6.2.3.3 Calculation of Chronic Daily Intakes

All exposure parameters were obtained either from EPA guidance documents or from a NYDEC Brownfields Technical Support Document (EPA, 1989; EPA, 1991; EPA, 1992; EPA, 2002; and EPA, 2004; NYSDEC 2006). The ambient air concentrations associated with volatile and fugitive dust emissions generated by non-excavation and excavation activities were modeled in accordance with the approach provided in the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA, 2002).

Intake rates for all COPCs were quantified using pathway-specific equations from EPA RAGS guidance. Intakes are not derived for inhalation quantification, rather, exposure concentrations are derived (RAGS, Part F, 2009). These equations are presented in Table 13, Appendix B. Intake variables were established specifically to result in a "Reasonably Maximally Exposed" or

RME estimate. An RME estimate represents a high-end exposure situation, but one still within the realm of probable exposures. Exposure assumptions used for each receptor exposed to soil via ingestion, dermal contact, and inhalation are presented in Table 6, Appendix B.

6.3 Toxicity Assessment

Toxicity assessment consists of two stages: hazard identification and dose-response assessment. Hazard identification evaluates whether a particular chemical can cause a particular health effect (such as cancer or birth defects) and if the adverse health effect occurs in humans. Hazard identification also evaluates the nature and strength of the evidence of causation. Dose-response assessment quantitatively evaluates toxicity information for a chemical to determine the relationship between the administered dose of that chemical to the incidence of a particular adverse effect in the exposed population. Toxicity values for carcinogens, also known as cancer slope factors (CSFs), are expressed in units of cancer incidence per unit dose of chemical. For non-carcinogens, the toxicity values or reference doses (RfDs) are expressed in terms of a threshold value below which adverse effects are not expected to be observed.

Reference doses, reference concentrations, cancer slope factors, and inhalation unit risks were obtained from various sources, EPA and non-EPA, in accordance with the hierarchy outlined in OSWER Directive 9285.7-53. Dermal reference doses and cancer slope factors were estimated from oral values in accordance with RAGS Part E, Supplemental Guidance for Dermal Risk Assessment (EPA, 2004) and the dermal absorption factors are contained in Table 7, Appendix B.

Non-cancer toxicity information and RfD values are presented in Tables 8 and 9 of Appendix B.

Carcinogenic toxicity information and CSFs are presented in Tables 10 and 11 of Appendix B.

6.3.1 Lead

In accordance with EPA guidance, potential health effects associated with lead exposure were evaluated using the EPA Adult Lead Model (ALM) and Integrated Exposure Uptake Biokinetic (IEUBK) Model. ALM predicts the allowable level of lead in soil, assuming ingestion by a pregnant female receptor, which will not cause the fetal blood concentration to exceed 10 micrograms per deciliter (μg/dL). Above this level, adverse health effects to the fetus are expected. Considering the time necessary for blood lead concentrations to stabilize, ALM is applicable only if the exposure duration exceeds 90 days and the exposure frequency is greater than one day per week. The exposure scenarios assumed for both the future resident and future worker meet these criteria.

Input values for the ALM were selected based on recommendations found in EPA guidance and on the website: http://www.epa.gov/superfund/health/contaminants/lead/almfaq.htm. The exposure frequency value for the adult worker exposed to lead in site soils of 124 days per year was obtained from New York DEC guidance (NYDEC, 2006). Values for the baseline blood level and the geometric standard deviation were obtained from the National Health and Nutrition Evaluation Survey (EPA, 2006).

The IEUBK model (EPA, 1994) for young children is used to evaluate health impacts from exposure to lead in residential settings. Young children are more susceptible to the toxic effects of lead, and generally receive the highest exposures to lead in soil and dust. From a risk management perspective, protection of young children from the impacts of exposure to lead will also protect adult residents exposed in the same environment. As a result, current and future residential exposures are evaluated solely through lead exposure for young children using the IEUBK model. This approach is consistent with the Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil (EPA, 2003).

6.4 Cancer Risk and Hazard Estimates

The following subsections summarize the results of the risk characterization for the populations evaluated at Colonie. The detailed risk characterization, including the calculation of chemical intakes, is provided in Tables 12 through 27, and Table 36 of Appendix B.

6.4.1 Future Site Resident (Child, Adult, and Age-Adjusted)

The non-cancer hazards for the future child resident exposed to Site soils are summarized in Tables 13, 17, 21, and 25 for each of the 4 exposure units respectively. The total HI for the future child resident exceeds unity only for exposure unit 104 (HIs of 1.4). Therefore, the risk assessment quantified the HI on a target organ basis. Because different chemicals have different target organs and modes of action, a target organ analysis provides a more refined evaluation of whether a site poses a non-cancer hazard to a receptor. The HIs for the skin (arsenic) exceeded 1 and the results are presented in Table 28 of Appendix B.

The IEUBK Model estimated a geometric mean blood lead concentration of 1.32 µg/dL with only 0.001 percent of the population predicted to have a blood lead concentration greater than the target value of 10 µg/dL for exposure unit 104. The IEUBK Model estimated a geometric mean blood lead concentration of 2.87 µg/dL with only 0.391 percent of the population predicted to have a blood lead concentration greater than the target value of 10 µg/dL for exposure unit 109. The IEUBK Model estimated a geometric mean blood lead concentration of 7.07 µg/dL with 23.05 percent of the population predicted to have a blood lead concentration greater than the target value of 10 µg/dL for exposure unit 124. The IEUBK Model estimated a geometric mean blood lead concentration of 10.45 µg/dL with 53.71 percent of the population predicted to have a blood lead concentration greater than target value of 10 µg/dL for the North Lawn exposure unit.

The IEUBK output is provided in Appendix C. In summary, Lead in subsurface soil if brought to the surface in exposure units 124 and North Lawn may pose a threat to future resident receptors.

The non-cancer hazards for the future adult resident exposed to Site soils are summarized in Tables 14, 18, 22 and 26 for each of the four exposure units. The total HI for the future adult resident does not exceed 1 at any of the exposure units.

The cancer risks for the age-adjusted resident exposed to Site soils are summarized in Tables 12, 16, 20 and 24 for each of the four exposure units respectively. In exposure unit 104 the total cancer risk of 1E-04 falls at the upper end of the EPA target risk range of between 1E-06 and 1E-04. Tables 12 and 28 indicate that the cancer risk may be above the risk range, however, RAGS Part A is very insistent in stating that cancer risk estimates be expressed using only one significant digit due to uncertainties with the toxicity values. Therefore, Table 36 presents these risks appropriately, rounded to one significant digit.

6.4.2 Future Site Worker

The non-cancer hazards and the carcinogenic risks for the future adult worker exposed to Site soils are summarized in Tables 15, 19, 23 and 27 for each of the 4 exposure units. The total HI for the future adult worker does not exceed 1 at any of the exposure units. Also, the carcinogenic risks either fall below the EPA target risk range of between 1E-06 and 1E-04 (exposure unit 124) or falls within the EPA risk range (three exposure units). These results indicate that there are no unacceptable risks posed by Site soils to a future Site worker.

The average lead concentration at each of the survey units was less than the preliminary remedial goal generated by the Adult Lead Model (ALM) of 3,955 mg/kg in soil (see Appendix D). Based on this Adult Lead Model run, exposure of a pregnant Site worker should not result in fetal blood concentrations above the target value of 10 µg/dL.

6.4.3 Summary of Risk Characterization

The Site-related constituents that have been identified as COPCs, lead, arsenic and copper, are all Contaminants of Concern (COCs) that pose hypothetical risks to the future residential receptor in three of the four exposure units. The identified COCs do not pose a risk to the hypothetical future Site Worker. The COCs resulted in a cancer risk that was at the top end of the EPA identified target risk range of 1E-06 to 1E-04 for exposure unit 104. All other calculated carcinogenic risks for all other exposure units were either within or below the target risk range (including for Site Workers). Exposure unit 104 had a calculated non-cancer HI above 1.0 for the future child resident. The primary risk driver was arsenic in soil. Additionally, lead in Site soils in exposure units 124 and North Lawn contained mean concentrations that posed a future risk to child residents should the soils become accessible.

6.5 Uncertainty Assessment

Conducting a risk assessment requires making a number of assumptions that introduce uncertainty in the risk and hazard estimates. The following sections discuss the uncertainties resulting from chemical identification, exposure assessment, and toxicity assessment.

6.5.1 Chemical Identification Uncertainty

At any site, it is possible that there are more individual chemical substances present than identified in the sampling and analysis effort. The selection of media to be sampled, number of samples, and analyses requested are determined by a review of the history of the site, information on current conditions, and an evaluation as to which chemicals potentially could be present. At the Site, because of the extensive amount of soil removal and confirmatory sampling that has been accomplished in the past twelve years, there is minimal uncertainty concerning characterization of the Site. Substantial historical Site data were used to select sample locations and to maximize the potential of encountering contamination during the most recent sampling effort (2013).

The large amount of previous investigative efforts prior to the removal efforts provides confidence that the chemical residuals potentially present at the site have been identified. Given the nature of the site and the level and identity of the chemicals analyzed in the sampling efforts, it is unlikely that significant chemical contamination went undetected. Further, the application of QC throughout the sampling, analysis, and data validation phases reduced uncertainty in the results. Therefore, the chemical identification phase of the risk assessment does not appear to have introduced substantial uncertainty.

6.5.2 Exposure Assessment Uncertainty

When evaluating exposure, probable scenarios are developed to estimate conditions and duration of human contact with COPCs. Scenarios are based on observations or assumptions about the current or potential activities of human populations that could result in direct exposure. To prevent underestimations of risk, scenarios incorporate exposure levels, frequencies, and durations at or near the top end of the range of probable values. This approach is sometimes termed a "reasonably maximal estimate", one that may be at the high end of a range of exposures but still probable.

Default values, such as ingestion rates, are used in the exposure calculations to quantify intakes. Although these values are based on EPA-validated data, there is uncertainty in the applicability of such values to any particular exposed population or individual. To address this uncertainty, default values are typically selected to err on the side of conservatism.

Exposure concentrations of COPCs are developed from the analytical results. It was assumed the contaminant levels used in the exposure calculations remained constant throughout the exposure period with no reduction due to chemical attenuation, depletion or degradation. This assumption is conservative and most likely results in overestimation of exposure. At the Colonie Site, all of the known exceedances of past remedial goals in soils were at depth, sometimes considerable depth (exceeding twelve feet). Only shallow subsurface soil is considered in this risk assessment and no dilution via mixing of soil is considered. Soil at depths greater than nine feet are not considered, as reasonable potential future Site use would not cause their excavation to surface soils. Such assumptions add considerably to the risk assessment uncertainty, but are considered prudently conservative.

The uncertainty associated with the exposure assessment is appreciable. However, the uncertainty is generally from conservative overestimation of exposure variables. This approach is protective of potentially exposed populations. All of these factors contribute to a substantial but not unusually high level of uncertainty in the estimates of risk for all exposure pathways. The uncertainty is generally that risk has been overestimated.

6.5.3 Toxicity Assessment Uncertainty

For some chemical substances, there is little or no toxicity information available and for many chemicals, the available data are typically from animal studies. The relative strength of the available toxicological information generates some uncertainty in the evaluation of possible adverse health effects and the exposure level at which they may occur. To provide for a margin of error, EPA applies conservative adjustments to the toxicity values.

For non-carcinogenic substances, RfD and RfC values are typically established only after uncertainty and/or modifying factors are applied. These factors may result in an RfD/RfC that is as little as a thousandth or less of the "safe" dose level determined through animal studies. Numerical toxicity values for dermal exposure have not been developed by EPA. To quantitatively assess risk from dermal exposure, route to route extrapolation of the oral toxicity value to a dermal toxicity value was used. Because of potential differences in patterns of distribution, metabolism, and excretion between oral and dermal routes of exposure, use of oral toxicity values for dermal exposure may overestimate or underestimate risk, depending on the chemical.

For carcinogens, the slope factor represents the 95 percent UCL of an extrapolated low dose response curve. The actual carcinogenic potency of a substance at low doses is almost certainly less. In the case of arsenic, there is a fair amount of information related to the carcinogenicity in human receptor populations such that the uncertainty is reduced as to the use of the toxicity factor.

7.0 SUMMARY AND CONCLUSIONS

This RI summary report addresses contaminants in soil at the Colonie FUSRAP Site, Federal Government-owned parcel, located at 1130 Central Avenue in Colonie, New York. USACE completed a large scale removal action at the Site involving excavation and offsite disposal of over 135,000 cubic yards of contaminated soil. Following the removal action, lead, arsenic, and copper exceeded chemical specific removal action cleanup goals at some subsurface locations. Radionuclide concentrations at all Site locations meet applicable removal action cleanup goals. VOC concentrations at all Site locations meet the New York State criteria for protection of groundwater.

Virtually all contaminated soil was removed, disposed of offsite, and replaced with certified backfill soil during the removal action. Existing metals contamination in Site soils is limited to four small areas in the shallow subsurface and some portions of the deeper subsurface (greater than 12 feet in depth). The four shallow subsurface areas were not excavated during the removal action due to the presence of semi-permanent physical obstructions including high voltage power line support poles, a rail line, and a fire hydrant/water main. Deep subsurface soils were not removed during the removal action because there is no complete exposure pathway below 9 feet to those soils based on the 2001 Action Memorandum.

The potential for metals contamination in Site soils to impact other media (air, surface water, and groundwater) was evaluated. Impacts to these media under current or reasonable future Site uses are considered insignificant or nonexistent. Some supporting facts include:

- The presence of significant quantities of certified clean backfill soil over all portions of the Site limits environmental or manmade affects to contaminated soil.
- The depth and/or location of contaminated soil prevent significant environmental transport to some media.
- Potential future disturbance of the soil though excavation would significantly dilute metals concentrations or would not affect contaminated areas at significant depth.
- Data collected prior to completion of the removal action indicates no discernible impacts of metals to groundwater; the removal action eliminated the vast majority of metals contamination.

Potential current or future human health risk from the metals contaminants present at the Site was evaluated. The most probable future land use at the Site is considered to be urban residential. The results of this evaluation indicate that the Site-related constituents that have been identified as COPCs, lead, arsenic and copper, are all COCs that pose hypothetical risks to the future residential receptor in several of the exposure units. The identified COCs do not pose a risk to the hypothetical future site worker. The COCs resulted in a cancer risk that was at the top end of the EPA identified target risk range of 1E-06 to 1E-04 for exposure unit 104. All other calculated carcinogenic risks for all other survey units were either within or below the target risk range (including for Site Workers). Exposure unit 104 exhibited a calculated non-cancer HIs above 1.0 for the future child resident. The primary risk driver was arsenic in soil. Additionally, lead in Site soils in exposure units 124 and North Lawn contained mean concentrations that posed a future risk to child residents should the soils become accessible.

7.1 Conclusion

The metals contaminants in Site soils are limited in distribution, existing in discrete subsurface locations. It has been established that these contaminants have limited potential to significantly impact other environmental media in or around the Site. The most probable future land use at the Site is considered to be urban residential. A risk assessment was performed and the results contained herein assumed that future receptors, including a resident child and adult as well as a site worker could be exposed to Site COPCs. Of the Site-related constituents that have been identified as COPCs, lead, arsenic and copper, only arsenic and lead were found to be COCs that pose hypothetical risks to the future residential receptor in three of the exposure units. The identified COCs do not pose a risk to the hypothetical future site worker.

Based on the unacceptable risk to hypothetical future Site residents, further CERCLA response actions should be considered to address metals contaminants.

8.0 REFERENCES

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TABLES

Table 1: Comparison of DOE Goals vs. USACE Selected Goals

Contaminant	1995 DOE Goals [1]	Selected Cleanup Goals [2]
U-238 (pCi/)[3]	35	35
Th-232 (pCi/g)[3]	15	2.8
Lead total (mg/kg)	500	450
Copper total (mg/kg)	10,000	1,912
Arsenic total (mg/kg)	*NIA*	7.4

[1] The DOE goals are based on a mixture of residential and industrial/commercial land use.
[2] The USACE cleanup goals are based on urban residential land use.
[3] Cleanup goals represent values in excess of background.

Table 2: Confirmatory Sample Results above Cleanup Goals

Unit	Sample ID	Northing (ft)	Easting (ft)	Depth (ft bgs)	Elevation (ft amsl)	Arsenic (ppm)	Copper (ppm)	Lead (ppm)
104	CFS-104-002	1,775	1,078	1.82	228.50	**85.4**	234	232
104	CFS-104-009	1,439	1,078	13.30	207.30	**243**	**6,490**	**5,270**
105	CFS-105-001R	1,454	1,130	13.35	208.80	6.1	**2,060**	**1,780**
106	CFS-106-001R	1,436	1,229	12.50	210.90	3.3	1,340	**1,430**
106	CFS-106-003R	1,394	1,205	12.30	208.30	3.8	**5,840**	**5,440**
108	CFS-108-005	1,374	1,311	17.00	208.40	**9.3**	**7,910**	**8,020**
109	CFS-109-006	1,344	1,358	14.20	210.00	7.3	**23,400**	**23,000**
109	CFS-109-009	1,344	1,510	2.40	220.40	**10.5**	895	**630**
124	CFS-124-011R	1,098	1,109	5.30	220.00	3.1	**2,450**	**734**
NL	CFS-NLF-012R	1,938	1,285	3.90	232.00	7.3	**4,340**	**3,370**
					Cleanup Goal Above 9 feet:	7.4	1,912	450

Notes: 1) Sample CFS-104-002 was located between active power poles. Additional vertical and horizontal excavation would impact the power pole support soils.

2) Sample CFS-109-009 is located on the property boundary adjacent to the active rail tracks. Additional excavation would impact the rail support soils.

3) Sample CFS-124-011R was located adjacent to an active power pole. Additional vertical and horizontal excavation would impact the power pole support soils.

4) Sample CFS-NLF-012R is located adjacent to the main fire hydrant for commercial and residential properties along Central Avenue. Coordination with local Fire Chief required full time unlimited access and additional excavation would impact the stability of the hydrant.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-101-001	7/9/2002	11	0.384	6.8	630	623	CFS-101-Duplicate Surveyed depth 2.58 ft. below original grade.
CFS-101-002	7/9/2002	21.6	0.702	5.1	281	268	Surveyed depth 4.78 ft. below original grade.
CFS-101-003	7/9/2002	2.53	0.904	4.4	19	16.6	NYSDEC and USACE Split. Surveyed depth 6.0 ft. below original grade.
CFS-101-004	7/9/2002	0.94	0.895	1.5	4.2	3.1	Surveyed depth 7.36 ft. below orignal grade.
CFS-101-005	7/9/2002	24.9	0.696	4.2	272	226	USACE Split Sample. Surveyed depth 0.6 ft. below original grade.
CFS-101-006	7/9/2002	1.05	0.764	1.9	11.5	12.9	USACE Split Sample. Surveyed depth 4.2 ft. below original grade.
CFS-101-007	7/9/2002	4.14	0.422	8.7	231	221	Surveyed depth 5.35 ft. below original grade.
CFS-101-008	7/9/2002	1.37	0.414	4	32.6	24.7	NYSDEC and USACE Split. Surveyed depth 15.88 ft. below original grade.
CFS-101-009	7/9/2002	8.38	0.603	8.2	303	271	Surveyed depth 10.90 ft. below original grade.
CFS-101-010	7/9/2002	12.1	0.853	5.7	603	405	USACE Split Sample. Surveyed depth 15.30 ft. below original grade.
CFS-102-001	7/9/2002	0.569	0.382	4	26.8	14	NYDEC Split sample. Surveyed depth 13.7 ft. below original grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-102-002	7/9/2002	1.2	0.375	2.5	691	208	Surveyed depth 7.25 ft. below original grade.
CFS-102-003	7/9/2002	2.83	0.544	4.5	1010	544	Surveyed depth 5.5 ft. below original grade.
CFS-102-004	7/9/2002	1.34	0.755	3.3	77.7	51.4	Surveyed depth 10.1 ft. below original grade.
CFS-102-005	7/9/2002	3.47	0.5	11.7	649	490	NYSDEC and USACE Split. Surveyed depth 4.05 ft. below original grade.
CFS-102-006	7/9/2002	1.27	0.792	2.4	126	61.3	Surveyed depth 8.62 ft. below original grade.
CFS-102-007	7/9/2002	1.23	0.711	2.9	39.6	27.1	Surveyed depth 6.87 ft. below original grade.
CFS-102-008	7/9/2002	0.929	0.966	4.9	56.7	30.5	Surveyed depth 6.94 ft. below original grade.
CFS-102-009	7/9/2002	1.47	0.451	3.2	150	106	CFS-102-Duplicate. Surveyed depth 12.62 ft. below original grade.
CFS-102-010	7/9/2002	0.72	0.961	5.3	52.7	28.2	Surveyed depth 8.2 ft. below original grade.
CFS-103-001	8/20/2002	0.569	0.714	4.4	77.7	42.8	Surveyed depth 9.65 ft. below original grade.
CFS-103-002	8/20/2002	0.788	0.807	6.9	19.5	6.3	Surveyed depth 9.88 ft. below original grade.
CFS-103-003	8/20/2002	24	0.682	4.3	68.4	30.2	Surveyed depth 7.96 ft. below original grade.
CFS-103-004	8/20/2002	1.08	0.629	6	52.5	31.1	Surveyed depth 7.86 ft. below original grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-103-005	8/20/2002	1.57	0.353	2.2	6.2	3	Surveyed depth 3.09 ft. below original grade.
CFS-103-006	8/20/2002	0.733	0.522	3.8	396	238	NYSDEC split sample. Blind Duplicate (CFS-103-Duplicate. Surveyed depth 10.6 ft. below original grade.
CFS-103-007	8/20/2002	1.2	0.545	4.1	186	89.9	Surveyed depth 11.35 ft. below original grade.
CFS-103-008	8/20/2002	0.5	0.35	4.4	16.3	5.2	USACE split sample
CFS-103-009R	8/28/2002	0.706	0.331	2.6	207	74.7	Resample from CFS-103-009 after excavation. Surveyed depth 6.8 ft. below original grade.
CFS-103-010	8/20/2002	1.1	0.637	5.5	34.9	16.4	Surveyed depth 4.25 ft. below original grade.
CFS-104-001	9/4/2002	3.78	0.911	2.5	27.7	48.3	NYSDEC QA split sample. Surveyed depth 2.55 ft. below original grade.
CFS-104-002	9/4/2002	31.2	0.549	85.4	234	232	Surveyed depth 1.82 ft. below original grade.
CFS-104-003	9/4/2002	2.95	0.766	2.1	32.3	16.2	Surveyed depth 2.3 ft. below original grade.
CFS-104-004	9/4/2002	4.35	0.508	2.3	57.1	46.5	Surveyed depth 2.1 ft. below original grade.
CFS-104-005	9/4/2002	5.14	0.498	1.7	41.7	22.6	Surveyed depth 2.4 ft. below original grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-104-006	9/4/2002	7.99	0.068	2.3	48.6	79	Surveyed depth 2.59 ft. below original grade.
CFS-104-007	9/4/2002	11.6	0.987	2.2	199	148	NYSDEC QA split sample. Surveyed depth 7.95 ft. below original grade.
CFS-104-008	9/4/2002	6.54	0.664	2.6	248	180	USACE QA split sample Surveyed depth 12.67 ft. below original grade.
CFS-104-009	9/4/2002	11.4	0.655	243	6490	5270	Surveyed depth 13.3 ft. below original grade.
CFS-105-001R	9/13/2002	2.48	0.429	6.1	2060	1780	Surveyed depth 13.35 ft. below original grade after re-excavation per USACE direction.
CFS-105-002	9/10/2002	3.44	0.225	2.1	157	121	Surveyed depth 10.52 ft. below original grade.
CFS-105-003	9/10/2002	3.35	0.31	2.7	167	105	CFS-105-Duplicate. Surveyed depth 5.4 ft. below original grade.
CFS-105-004	9/10/2002	2.82	0.281	2.3	137	79.7	USACE QA Split Sample. Surveyed depth 3.2 ft. below original grade.
CFS-105-005	9/10/2002	3.15	0.346	2.2	103	38.9	Surveyed depth 2.65 ft. below original grade.
CFS-105-006	9/10/2002	0.687	0.284	2.4	13.5	6.2	Surveyed depth 2.72 ft. below original grade.
CFS-105-007	9/10/2002	2.39	0.37	2.6	43.6	27	NYSDEC QA split sample. Surveyed depth 2.58 ft. below original grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-105-008	9/10/2002	30.2	0.255	7.3	631	420	Surveyed depth 2.6 ft. below original grade.
CFS-105-009	9/10/2002	1.18	0.275	2.4	20.5	11.1	Surveyed depth 2.4 ft. below original grade.
CFS-106-001 R	9/26/2002	0.7	0	3.3	1340	1430	NYSDEC QA Split Depth below orig. grade = 12.5'
CFS-106-002 R	9/26/2002	1	0	6.4	132	94.9	NYSDEC Split Depth below orig. grade = 14.0'
CFS-106-003 R	9/26/2002	0.8	0	3.8	5840	5440	USACE and NYSDEC Split Depth below orig. grade = 14.0'
CFS-106-004 R	9/26/2002	0.6	0	5.6	54.7	41.1	Depth below orig. grade = 12.1'
CFS-106-005 R	9/26/2002	1.1	0	1.6	12.9	19.6	Depth below orig. grade = 12.2'
CFS-106-006 R	9/26/2002	1	0	2.7	66.2	59.3	Depth below orig. grade = 8.2'
CFS-106-007 R	9/26/2002	0.7	0	2.5	14	5.5	Depth below orig. grade = 9.1'
CFS-106-008	9/20/2002	0.6	0.566	2.3	63.7	61.3	Depth below orig. grade = 4.1'
CFS-106-009	9/20/2002	0.6	0.723	1.4	100	81.5	Depth below orig. grade = 3.3'
CFS-106-010	9/20/2002	1	0.852	2.3	338	231	Depth below orig. grade = 4.3'
CFS-107-001	10/29/2002	0.9	0.574	5.7	122	115	Surveyed depth 13.3 ft. below original grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-107-002	10/29/2002	1.7	0.583	1.7	33.9	18.5	Surveyed depth 9.48 ft. below original grade.
CFS-107-003	10/29/2002	1.1	0.462	5.7	144	106	USACE Split Sample. Surveyed depth 8.19 ft. below original grade.
CFS-107-004	10/29/2002	1	0.385	5.2	47.7	23.5	Surveyed depth 7.91 ft. below original grade.
CFS-107-005R	11/11/2002	0.7	0.488	3.5	10.2	6.9	Resample of CFS-107-005.
CFS-107-006	10/29/2002	1	0.57	4.9	44	20.5	Surveyed depth 13.49 ft. below original grade.
CFS-107-007	10/29/2002	1	0.418	6.3	705	280	Surveyed depth 6.30 ft. below original grade.
CFS-107-008	10/29/2002	0.8	0.437	4.1	154	107	Surveyed depth 1.47 ft. below original grade.
CFS-107-009	10/29/2002	0.7	0.367	3	634	463	NYSDEC Split Sample. Surveyed depth 6.92 ft. below original grade.
CFS-107-010	10/29/2002	0.8	0.669	15.3	584	354	NYSDEC Split Sample. Surveyed depth 1.42 ft. below original grade.
CFS-108-001	11/14/2002	0.8	0.272	2	249	233	Surveyed depth below grade 8.8 ft.
CFS-108-002	11/14/2002	0.5	0.206	2.7	185	152	Surveyed depth below grade 14.3 ft.
CFS-108-003	11/14/2002	0.7	0.221	3.4	12.5	15	Surveyed depth below grade 11.0 ft.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-108-004	11/14/2002	1.2	0.36	2.9	225	219	Surveyed depth below grade 11.3 ft.
CFS-108-005	11/14/2002	0.6	0.255	9.3	7910	8020	USACE QA Split Sample. NYSDEC QA Split Sample. Surveyed depth below grade 17.0 ft.
CFS-108-006	11/14/2002	0.7	0.224	2.8	219	174	Surveyed depth below grade 12.4 ft.
CFS-108-007	11/14/2002	0.9	0.176	1.6	13.7	6	CFS-108-Duplicate. Surveyed depth below grade 6.5 ft.
CFS-108-008	11/14/2002	0.6	0.122	1.8	236	191	NYSDEC QA Split Sample. Surveyed depth below grade 4.8 ft.
CFS-108-009	11/14/2002	0.6	0.141	2	34.4	25.6	Surveyed depth below grade 9.3 ft
CFS-108-010	11/14/2002	1.1	0.175	1.9	31.6	17.1	Surveyed depth below grade 3.6 ft.
CFS-109-001	8/13/2003	1.1	0.09	1.4	93.7	69.6	Elev.~220.6; Depth = 6.3'
CFS-109-002	8/13/2003	0.5	0.07	1.2	8.2	3.6	Elev.~220.4; Depth = 5.6'
CFS-109-003	8/13/2003	1.7	0.11	3.5	356	264	Elev.~217.5; Depth = 8.6' USACE Split
CFS-109-004	8/13/2003	1.2	0.06	3.4	319	254	Elev.~212.4; Depth = 16.3' NYSDEC Split
CFS-109-005	8/13/2003	1	0.02	2.4	34.3	20.7	Elev.~213.0; Depth = 14.8'

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-109-006	8/13/2003	0.9	0.2	7.3	23400	23000	Elev.~212.4'; Depth = 14.2'
CFS-109-007R	8/20/2003	1	0.05	4.1	43.8	40.7	Elev.~216.2'; Depth = 13.7'
CFS-109-008	8/13/2003	0.8	0.14	2.1	163	87.8	Elev.~218.3; Depth = 8.3'USACE Split
CFS-109-009	8/13/2003	1.4	0.22	10.5	895	630	Elev.~221.0'; Depth = 2.4' NYSDEC Split
CFS-109-010	8/13/2003	1.2	0.16	2.6	125	83.8	Elev.~215.3; Depth =8.2'
CFS-110-001	4/23/2003	0.6	0.105	1.1	5.9	16	Sample depth = 4.7'
CFS-110-002	4/23/2003	0.7	0.172	0.8	353	287	USACE and NYSDEC Split Sample depth = 5.0'
CFS-110-003	4/23/2003	0.6	0.27	1.6	23.8	38.5	Sample depth = 4.6'
CFS-110-004	4/23/2003	0.9	0.125	2.1	583	511	Ave. of CFS-110-004,-007 and -003 is 218 mg/kg; Sample depth = 4.2'
CFS-110-005	4/23/2003	0.9	0.109	0.71	3.8	14.7	Sample depth = 5.7'
CFS-110-006	4/23/2003	0.7	0.13	1.2	242	239	Sample depth = 3.9'
CFS-110-007	4/23/2003	1.1	0.152	2	90.8	104	USACE Split, Sample depth = 4.5'
CFS-110-008	4/23/2003	0.8	0.0515	5.7	421	392	Duplicate data point (CFS-110-DUP); Sample depth = 1.4'

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-110-009	4/23/2003	1.1	0.138	2.6	32.2	49.6	NYSDEC Split, Sample depth = 1.3'
CFS-110-010	4/23/2003	1.3	0.116	5.5	90.3	138	Sample depth = 1.6'
CFS-110-011	4/23/2003	0.7	0.0825	1.1	5.6	15.6	Sample depth = 4.3'
CFS-111-001	7/17/2003	1.6	0.13	2.4	9.7	5.3	
CFS-111-002	7/17/2003	0.9	0.059	3.3	80.8	62.9	
CFS-111-003	7/17/2003	0.8	0.082	4.7	496	369	
CFS-111-004	7/17/2003	0.8	0.135	2.2	9.1	7.1	USACE split
CFS-111-005	7/17/2003	0.7	0.042	1.4	4.9	7.4	
CFS-111-006	7/17/2003	0.5	0.094	2.5	6.7	2.7	
CFS-111-007	7/17/2003	0.5	0.031	2	6	4.5	NYSDEC split
CFS-111-008	7/17/2003	0.4	0.036	2	6	5.3	USACE split
CFS-111-009	7/17/2003	0.7	0.059	1.3	5.6	2.6	NYSDEC split
CFS-111-010	7/17/2003	0.5	0.059	1.8	10.4	3.3	

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-111-011	7/17/2003	0.6	0.035	1.7	42.4	34.9	
CFS-111-012	7/17/2003	0.6	0.075	1.4	9.3	4.1	
CFS-112-001	9/16/2003	0.7	0.0884	0.41	9.7	4.6	
CFS-112-002	9/16/2003	0.9	0.0245	1.3	13.6	10.6	
CFS-112-003	9/16/2003	0.7	0.112	1.2	227	177	USACE split
CFS-112-004	9/16/2003	0.7	0.0704	1.3	20.7	15.4	
CFS-112-005	9/16/2003	0.8	0.0188	1.7	2.8	3.3	NYSDEC split
CFS-112-006	9/16/2003	0.8	0.053	1.5	9.3	5.3	USACE split
CFS-112-007	9/16/2003	0.6	0.154	1.1	25.7	13.8	NYSDEC split
CFS-112-008	9/16/2003	1.6	0.0322	1.5	37	18.4	
CFS-112-009	9/16/2003	1	0.116	1.4	361	241	
CFS-113-001	10/23/2003	0.8	0.13	2	32.1	36.6	
CFS-113-002	10/23/2003	1.2	0.26	2.5	233	156	NYSDEC split

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-113-003	10/23/2003	1.1	0.11	2.6	161	216	
CFS-113-004	10/23/2003	0.8	0.12	3.2	65.5	67	USACE split
CFS-113-005	10/23/2003	1	0.13	1.7	1.3	4.5	
CFS-113-006	10/23/2003	1.2	0.1	5.2	85.1	76.4	
CFS-113-007	10/23/2003	1	0.18	4.4	12.3	16.1	USACE split
CFS-113-008	10/23/2003	1.3	0.075	3.1	108	181	
CFS-113-009	10/23/2003	1.7	0.17	2.3	16.2	12.3	
CFS-113-010	10/23/2003	0.6	0.13	1.3	5.8	9.9	NYSDEC split
CFS-114-001	6/15/2004	1.6	0.42	1.5	5.7	2.4	
CFS-114-002	6/15/2004	0.9	0.46	1.3	12.1	4.6	
CFS-114-003	6/15/2004	1	0.53	3.8	20.4	6.5	NYSDEC split
CFS-114-004	6/15/2004	1.6	0.62	3.4	44.8	29.9	
CFS-114-005	6/15/2004	0.6	0.47	1.2	5	2.3	

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-114-006	6/15/2004	0.7	0.45	1.2	6.2	2.1	
CFS-114-007	6/15/2004	1.4	0.49	1.6	16.5	13.5	USACE split
CFS-114-008	6/15/2004	1.4	0.46	1.6	4.4	3.1	
CFS-114-009	6/15/2004	1	0.54	1.4	5.5	4.1	NYSDEC split
CFS-115-001	8/4/2004	1	0.54	1.7	12	7.4	NYSDEC Split
CFS-115-002	8/4/2004	1.1	0.51	1.3	7.7	2.4	
CFS-115-003	8/4/2004	0.7	0.3	1.2	9.9	2.6	
CFS-115-004	8/4/2004	0.8	0.75	1.9	7.3	2.5	
CFS-115-005	8/4/2004	1.7	0.62	1.8	8.5	3.4	USACE Split
CFS-115-006	8/4/2004	1.6	0.48	1.6	9.5	2.8	
CFS-115-007	8/4/2004	1.1	0.3	1.3	11.4	5.7	
CFS-115-008	8/4/2004	0.9	0.44	1.6	6.4	2	Duplicate
CFS-115-009	8/4/2004	1	0.5	2.1	7.7	2.5	

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-115-010	8/4/2004	0.9	0.35	1.2	7.5	2.3	
CFS-115-011	8/4/2004	1.3	0.43	1.6	8.3	2.5	NYSDEC Split
CFS-115-012	8/4/2004	0.9	0.74	1.9	138	95.2	
CFS-116-001	11/9/2004	0.9	0.67	1.6	20.3	14.6	
CFS-116-002	11/9/2004	0.9	0.73	1.4	6.3	2.9	NYSDEC Split Sample
CFS-116-003	11/9/2004	0.7	0.73	1.2	21.8	9.8	USACE Split Sample
CFS-116-004	11/9/2004	0.6	0.71	1.8	5.9	2.6	
CFS-116-005	11/9/2004	0.8	0.9	2.5	6.7	2.4	
CFS-116-006	11/9/2004	1.3	0.59	1.4	5.8	2.2	
CFS-116-007	11/9/2004	0.8	0.61	1.7	11.7	6.1	NYSDEC Split Sample
CFS-116-008	11/9/2004	0.8	0.81	2.1	18	14.5	
CFS-116-009	11/9/2004	0.6	0.3	2.2	5.9	2.6	
CFS-117-001	11/21/2005	1.7	0.7	1.5	49.4	34.4	

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-117-002	11/21/2005	0.7	0.5	2.3	6.6	2.9	NYSDEC Split Sample
CFS-117-003	11/21/2005	0.9	0.61	1.7	196	240	
CFS-117-004	11/21/2005	0.8	0.56	1.3	152	142	
CFS-117-005	11/21/2005	1.4	0.61	0.8	2.8	3.5	
CFS-117-006	11/21/2005	1.6	0.73	0.9	8.2	7.5	USACE Split Sample
CFS-117-007	11/21/2005	1.3	0.59	0.9	4.3	4.9	NYSDEC Split Sample
CFS-117-008	11/21/2005	1	0.36	1.6	11.9	9.4	USACE Split Sample
CFS-117-009	11/21/2005	1	0.55	2.1	183	104	
CFS-118-001	3/21/2006	1.1	0.58	1.8	5.6	3.8	
CFS-118-002	3/21/2006	1.3	0.39	1.5	7.3	4.1	
CFS-118-003	3/21/2006	1.7	1.3	1.5	20.9	20.7	NYSDEC Split Sample
CFS-118-004	3/21/2006	1.4	0.63	1.7	6.6	5.3	USACE Split Sample
CFS-118-005	3/21/2006	1	0.58	1.6	6.3	2.5	NYSDEC Split Sample

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-118-006	3/21/2006	1.3	0.71	1.8	17.4	10.6	
CFS-118-007	3/21/2006	1	0.49	1.2	4.8	3.3	
CFS-118-008	3/21/2006	1.1	0.43	2	7.9	3.4	
CFS-118-009	3/21/2006	1.2	0.63	1.3	8.3	3.8	NYSDEC Split Sample
CFS-118-010	3/21/2006	1.1	0.243	1	15.5	11	
CFS-118-011	3/21/2006	0.4	0.51	1.4	5.5	2.6	
CFS-119-001	6/14/2006	0.8	0.59	2.1	9.1	4.8	NYSDEC Split Sample
CFS-119-002	6/14/2006	0.7	0.44	1.2	10.4	7.6	
CFS-119-003	6/14/2006	0.7	0.86	1.3	31.2	20	
CFS-119-004	6/14/2006	1	0.48	4.3	1040	615	
CFS-119-005	6/14/2006	0.7	0.48	3.4	18.2	7.7	
CFS-119-006	6/14/2006	1	0.59	1.8	24	10.9	
CFS-119-007	6/14/2006	0.8	0.39	3.9	13.5	6.5	

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-119-008	6/14/2006	0.9	0.51	0.62	11.3	2.8	USACE Split Sample
CFS-119-009	6/14/2006	0.6	0.41	0.62	61.4	56.3	NYSDEC Split Sample
CFS-120-001	7/7/2006	0.6	0.35	1.7	12.9	10.5	NYSDEC Split Sample
CFS-120-002	7/7/2006	0.6	0.39	1.4	27.4	15.8	USACE Split Sample
CFS-120-003	7/7/2006	0.6	0.4	2.7	33.1	28.4	
CFS-120-004	7/7/2006	0.8	0.71	1.4	7.4	3.9	
CFS-120-005	7/7/2006	0.8	0.47	1.6	14.7	5.1	NYSDEC Split Sample
CFS-120-006	7/7/2006	1.2	0.36	0.7	8	2.9	NYSDEC Split Sample
CFS-120-007	7/7/2006	0.8	0.57	1.6	34.5	27.2	
CFS-120-008	7/7/2006	1.2	0.69	2.3	14	8.2	
CFS-120-009	7/7/2006	0.7	0.38	1.2	8.6	6.8	
CFS-121-001	7/20/2006	0.7	0.64	2.4	21.4	13.2	
CFS-121-002	7/20/2006	0.7	0.46	0.68	12.9	8.3	NYSDEC Split Sample

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-121-003	7/20/2006	0.7	0.42	4.4	142	115	NYSDEC Split Sample
CFS-121-004	7/20/2006	1.1	0.72	1.6	19.1	11.6	
CFS-121-005	7/20/2006	0.9	0.61	2.7	13.6	3.6	NYSDEC Split Sample
CFS-121-006	7/20/2006	0.9	0.72	1	11.9	7.7	
CFS-121-007	7/20/2006	1.4	0.51	0.24	8.5	5.6	USACE Split Sample
CFS-121-008	7/20/2006	1	0.95	0.92	18.3	14	
CFS-121-009	7/20/2006	0.8	0.41	1.3	450	173	
CFS-121-010	7/20/2006	0.7	0.47	1.2	37.7	23.2	
CFS-122-001	8/2/2006	1.1	0.65	0.93	6.5	5.3	
CFS-122-002	8/2/2006	0.6	0.69	2	1.9	2.9	USACE Split
CFS-122-003	8/2/2006	0.8	0.47	1.2	1.3	2.3	NYSDEC Split
CFS-122-004	8/2/2006	1.1	0.67	2.3	9.3	5.3	
CFS-122-005	8/2/2006	0.7	0.41	0.84	3.7	2.1	NYSDEC Split

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-122-006	8/2/2006	1.2	0.47	1.7	67.9	48.2	
CFS-122-007	8/2/2006	1.6	1.14	4.5	27.6	17.9	
CFS-122-008	8/2/2006	1.1	0.81	4.9	22.9	12.3	
CFS-122-009	8/2/2006	1.2	0.76	6.4	23.3	12.8	NYSDEC Split
CFS-123-001	9/20/2006	0.9	0.91	2.2	299	231	
CFS-123-002	9/20/2006	1.4	0.7	5.5	490	133	
CFS-123-003	9/20/2006	1	0.76	4.6	509	451	NYSDEC Split Sample
CFS-123-004	9/20/2006	1.2	0.82	6.2	26	11.3	
CFS-123-005	9/20/2006	1.2	0.58	5.7	161	116	NYSDEC Split Sample
CFS-123-006	9/20/2006	0.9	0.35	2.5	21.4	12.9	
CFS-123-007	9/20/2006	1	0.8	5	29.7	15.4	
CFS-123-008	9/20/2006	0.8	0.64	1.4	5.5	4.7	NYSDEC Split Sample
CFS-123-009	9/20/2006	1.2	0.85	4.1	442	261	USACE Split Sample

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-124-001	9/20/2006	1.2	0.66	3.9	95.4	73.7	
CFS-124-002	9/20/2006	0.8	0.94	5.7	26.3	12.6	NYSDEC Split Sample
CFS-124-003	9/20/2006	1.1	0.57	4.8	171	119	
CFS-124-004	9/20/2006	1.6	0.84	5.4	23.5	12.1	
CFS-124-005	9/20/2006	1	0.77	6.1	23.4	12.8	NYSDEC Split Sample
CFS-124-006	9/20/2006	1.1	0.78	4.3	100	75.3	
CFS-124-007	9/20/2006	1.3	0.76	6.4	25.3	12	USACE Split Sample
CFS-124-008	9/20/2006	1	0.7	5	33.9	19.4	NYSDEC Split Sample
CFS-124-009	9/20/2006	1	0.84	6.6	54.4	27.6	
CFS-124-010	9/20/2006	1	0.75	6.8	435	127	
CFS-124-011R	9/27/2006	1.1	0.51	3.1	2450	734	
Culvert Station +75	8/8/2001	0.9	0.335	3.3	109	67.2	Covers stations 0+51 thru 1+00. Final depth of 13 feet below grade.
Culvert 1+25R	9/13/2001	1.3	0.329	5.5	612	357	Location re-excavated and resampled. Final depth of 12.25 feet below grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
Culvert 1+75R	9/21/2001	1.1	0.254	1.5	1.9	3.6	Location re-excavated and resampled. Final depth of 13 feet below grade.
Culvert 2+25	9/19/2001	1.1	0.415	6	18.1	6.1	Covers stations 2+01 thru 2+50.Final Depth of 15 feet below grade
Culvert 2+75	9/19/2001	1	0.595	33.4	10.2	6	Covers stations 2+51 thru structure 1. Final depth of 16 feet below grade.
NHW-01A	8/16/2001	1	0.424	2.4	226	159	Resample collected after pumping out water and re-establishing grade. Final depth 13 feet below grade.
NHW-02A	8/16/2001	0.8	0.312	2.2	313	207	Resample collected after pumping out water and re-establishing grade. Final depth 13 feet below grade
NHW-03A	8/16/2001	0.6	0.174	1.6	144	67.5	Resample collected after pumping out water and re-establishing grade. Final depth 13 feet below grade
NHW-04A	8/16/2001	1	0.511	2.5	68.7	53	Resample collected after pumping out water and re-establishing grade. Final depth 13 feet below grade
NHW-05A	8/16/2001	1	0.295	3.4	655	430	Resample collected after pumping out water and re-establishing grade. Final depth 13 feet below grade
Channel -1-25	9/27/2001	0.8	0.132	5.5	166	200	Covers stations -1-01 thru 1-50. Depth 4.0 ft. below grade.

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-SWK-01	7/23/2001	1.1	0.491	6.1	378	305	Southwest Keyhole Area. Depth 1.0 ft. below grade.
CFS-SWK-02A	8/2/2001	1.7	0.328	4	17.8	47.5	Resample collected after re-excavation of SWK-02
CFS-SWK-03	7/23/2001	0.9	0.409	5.8	45.8	73.9	Southwest Keyhole Area. Depth 5.9 ft. below grade.
CFS-SWK-04A	8/2/2001	1	0.278	3.8	21.1	28.1	Resample collected after re-excavation of SWK-04
CFS-SWK-05	7/23/2001	0.9	0.336	3.7	96.6	105	Southwest Keyhole Area. Depth 3.0 ft. below grade.
CKS-1	9/7/2001	0.8	0.34	3.7	235	231	Center South Keyhole Area.NYSDEC split sample collected.Duplicate collected at this location. Depth 8.0 ft. below grade.
Channel 0-75	9/27/2001	0.9	0.367	2.4	7.3	5.4	Covers stations -0-50 thru -1-00.Replaces Sample CKS-2 Depth 5.0 ft. below grade.
Channel 0-25	9/27/2001	0.6	0.134	0.47	1.7	1.3	Covers stations 0+00 thru -0-50.Replaces Sample CKS-3Depth 12 ft. below grade.
CKS-4	9/7/2001	0.9	0.197	14.1	195	136	Center South Keyhole Area. NYSDEC split sample collected. Depth 1.0 ft. below grade. Average value from CKS-04, -05 and -06 for Arsenic is 6.11 mg/kg

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy ^{238}U (pCi/g)	Alpha Spectroscopy ^{232}Th (pCi/g)	TAL Metals Arsenic (mg/kg)	TAL Metals Copper (mg/kg)	TAL Metals Lead (mg/kg)	Notes
CKS-5	9/7/2001	0.9	0.128	0.63	16.6	5.7	Center South Keyhole Area.NYSDEC split sample collected.Depth 1.0 ft. below grade.
CKS-6	9/7/2001	0.7	0.158	3.6	440	415	Center South Keyhole Area.NYSDEC split sample collected.Depth 10.5 ft. below grade.
CFS-NLF-001	5/16/2005	1	1.1	8	11.8	26.2	
CFS-NLF-002	5/16/2005	0.9	0.6	1.2	2.4	6.7	USACE Split Sample
CFS-NLF-003	5/16/2005	0.7	0.4	2.6	606	361	
CFS-NLF-004	5/16/2005	0.8	0.7	2.6	183	149	
CFS-NLF-005	5/16/2005	0.9	0.4	3.3	14.3	23.8	
CFS-NLF-006	5/16/2005	1	0.6	3.1	26.1	20.8	NYSDEC Split Sample
CFS-NLF-007	3/17/2005	0.5	0.5	3.5	115	101	
CFS-NLF-008	3/17/2005	0.6	0.4	2.8	23.4	42.8	
CFS-NLF-009	3/17/2005	0.8	0.6	3.6	288	228	NYSDEC Split Sample
CFS-NLF-010	4/13/005	0.9	0.8	2.1	134	94	

Table 3: Confirmatory Sample Results for Metals and Radionuclides

Sample ID	Date Collected	Alpha Spectroscopy		TAL Metals			Notes
		^{238}U (pCi/g)	^{232}Th (pCi/g)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	
CFS-NLF-011	4/13/005	0.8	0.5	1.6	9.7	8.9	NYSDEC Split Sample
CFS-NLF-012	5/16/2005	0.7	0.5	7.3	4340	3370	
CFS-NLF-013	5/16/2005	0.7	0.6	2.1	8.4	4.6	NYSDEC Split Sample
CFS-NLF-014	4/13/005	1.2	0.6	2.3	6	3.4	USACE Split Sample
CFS-NLF-015	4/13/005	0.9	0.6	1.8	41	57.3	NYSDEC Split Sample
CFS-NLF-016	4/13/005	0.9	0.7	2	73.6	57.3	
CFS-NLF-017	4/13/005	0.8	0.6	2.1	35.3	30.6	
CFS-NLF-018	4/13/005	1.1	0.8	2.4	17.7	25.5	

Table 4: Volatile Organic Compound Sampling Summary

Sample date - June 15, 2004

Sample ID	Trichloroethene	Tetrachloroethene	Post Excavation Elevation	Depth of Soil Removed
CFS-114-001	.0001	.0077	221.5	-5.6
CFS-114-002	ND	.0034	222.3	-5.2
CFS-114-003	.0011	.01	215.0	-11.3
CFS-114-004	.021	.042	215.6	-11.7
CFS-114-005	.00061	.0028	217.3	-9.9
CFS-114-006	.00019	.0037	220.1	-7.0
CFS-114-007	.00012	.0039	221.9	-5.5
CFS-114-008	ND	.0092	222.1	-5.1
CFS-114-009	ND	.0087	220.5	-5.8

Sample date – November 15, 2004

Sample ID	Trichloroethene	Tetrachloroethene	Post Excavation Elevation	Depth of Soil Removed
CFS-116-Sidewall	ND	.00077	219.5	-6.7
CFS-116-floor 1	ND	.0024	218.5	-7.7
CFS-116-floor 2	ND	.0016	218.5	-7.7

Sample date – December 5, 2005

Sample ID	Trichloroethene	Tetrachloroethene	Post Excavation Elevation	Depth of Soil Removed
CFS-117-floor 1	.0057	ND	217.8	-11.1
CFS-117-floor 2	ND	ND	215.7	-13.3
CFS-117-floor 3	.0056	ND	217.6	-10.7
CFS-117-floor 4	ND	ND	217.0	-10.0
CFS-117-sidewall 1	ND	ND	219.4	-8.5
CFS-117-sidewall 2	ND	ND	218.2	-8.7

Sample date – June 19, 2006

Sample ID	Trichloroethene	Tetrachloroethene	Post Excavation Elevation	Depth of Soil Removed
CFS-119-001	ND	.00082	217.5	-7.2
CFS-119-002	.0056	**5.3**	218.0	-8.5
CFS-119-003	ND	.002	217.7	-5.5
CFS-119-004	ND	.0013	218.5	-6.7
CFS-119-005	.0027	.013	214.7	-11.8
CFS-119-006	.013	.071	213.4	-13.2
CFS-119-007	ND	.001	215.4	-11.1
CFS-119-008	.0043	.033	212.0	-12.4
CFS-119-009	ND	.00089	213.6	-11.4

Sample date – August 15, 2006

Sample ID	Trichloroethene	Tetrachloroethene	Post Excavation Elevation	Depth of Soil Removed
CFS-119-north wall	.0038	.110	216.3	-9.0
CFS-119-southwall	.0017	.0015	216.3	-9.0
CFS-119-east wall	ND	.016	216.3	-9.0
CFS-119-west wall	ND	.011	216.3	-9.0
CFS-119-floor 1	.068	.990	214.0	-11.2

Notes:

ND is non detect.
The NYSDEC soil cleanup objective for Trichloroethene is 0.7 mg/kg.
The NYSDEC soil cleanup objective for Tetrachloroethene is 1.4 mg/kg.
NYSDEC soil cleanup objectives based on NYSDEC TAGM #4046, Appendix A, Table 1, for VOC, Soil Cleanup Objectives to Protect GW Quality.

Table 5: Post Removal Action Geoprobe® Sample Metals Results

Sample ID	Depth (ft)		Date	Time	Arsenic	Copper	Lead	QC Measure
	Start	End			(mg/kg)	(mg/kg)	(mg/kg)	
SB-1-01	5.5	8	8-Jan-13	15:45	3.5	560	330	
SB-1-02	8	10	8-Jan-13	15:50	1.4	9.4	3.3	
SB-1-03	10	12	8-Jan-13	15:55	4.7	12	4.8	
SB-1-04	12	14	8-Jan-13	16:00	4.4	12	4.6	
SB-1-05	14	16	8-Jan-13	16:05	3.2	16	5.5	
SB-1-06	16	18	8-Jan-13	16:10	1.8	9	2.8	
SB-1-07	18	20	8-Jan-13	16:15	4.8	21	6.7	
SB-2-01	2	4	10-Jan-13	10:15	1.8	11	4.4	
SB-2-02	4	6	10-Jan-13	10:20	0.47	9.8	4.5	
SB-2-03	6	8	10-Jan-13	10:25	0.56	5.7	2.8	
SB-2-04	8	10	10-Jan-13	10:30	3.9	15	5.7	
SB-2-05	10	12	10-Jan-13	10:35	2.1	11	3.4	
SB-2-06	12	14	10-Jan-13	10:40	4	17	5.1	
SB-2-07	14	16	10-Jan-13	10:45	3.5	16	4.7	
SB-2-07 FD	14	16	10-Jan-13	10:45	4.3	24	9.6	
SB-2-08	16	18	10-Jan-13	10:50	3.2	15	4.4	
SB-2-09	18	20	10-Jan-13	10:55	2.4	9.9	2.7	Field Duplicate
SB-3-01	12.5	14	8-Jan-13	13:20	**9**	**19,000**	**15,000**	
SB-3-02	14	16	8-Jan-13	13:25	**12**	**16,000**	**9,600**	
SB-3-03	16	18	8-Jan-13	13:27	**32**	80	49	
SB-3-04	18	20	8-Jan-13	13:30	**10**	48	33	
SB-4-01	12.5	14	8-Jan-13	12:45	**12**	31	33	
SB-4-02	14	16	8-Jan-13	12:50	6	5	3.4	
SB-4-03	16	18	8-Jan-13	12:55	**200**	41	13	
SB-4-04	18	20	8-Jan-13	13:00	**68**	10	3.1	
SB-4-04 FD	18	20	8-Jan-13	13:00	**57**	6	3.7	Field Duplicate
SB-5-01	4.5	6	8-Jan-13	14:10	2.9	3.2	3.1	
SB-5-02	6	8	8-Jan-13	14:15	1.7	12	4.9	
SB-5-03	8	10	8-Jan-13	14:20	**8.1**	18	9.4	
SB-5-04	10	12	8-Jan-13	14:25	**8.5**	14	4.4	
SB-6-01	11.5	12	9-Jan-13	13:10	3.5	19	4.8	
SB-6-02	12	14	9-Jan-13	13:15	2.5	13	3.6	
SB-6-03	14	16	9-Jan-13	13:20	5.1	25	9.2	
SB-6-04	16	18	9-Jan-13	13:25	3.4	14	3.9	
SB-6-05	18	20	9-Jan-13	13:30	2.7	12	3.8	
SB-7-01	12	14	8-Jan-13	11:05	4.6	130	110	
SB-7-02	14	16	8-Jan-13	11:10	**17**	80	37	
SB-7-03	16	18	8-Jan-13	11:15	**22**	30	42	
SB-7-04	18	20	8-Jan-13	11:25	**41**	9.2	3.1	

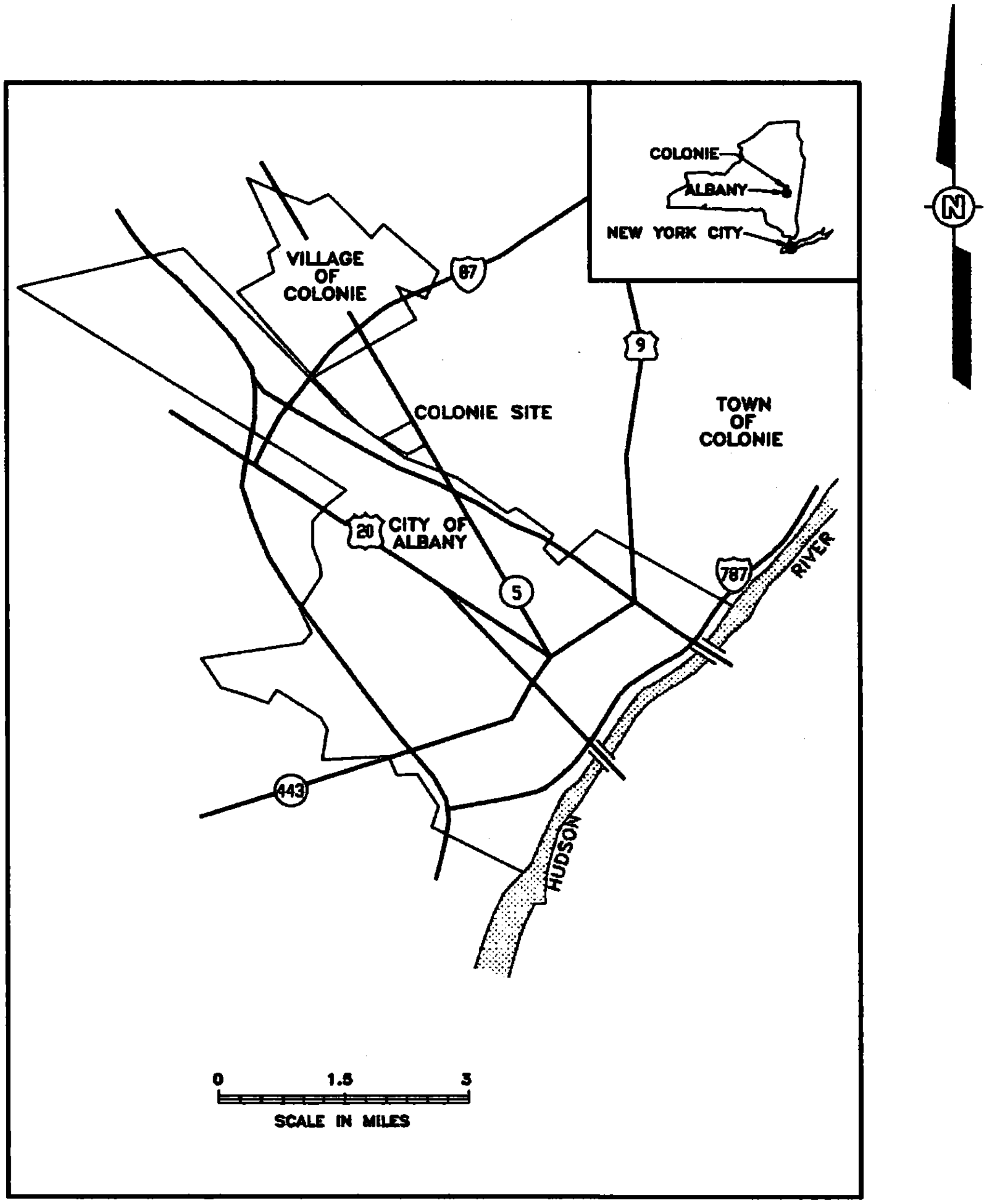
Table 5: Post Removal Action Geoprobe® Sample Metals Results, cont.

Sample ID	Depth (ft) Start	Depth (ft) End	Date	Time	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	QC Measure
SB-8-01	15.5	16.5	9-Jan-13	14:20	3.8	24	27	
SB-8-02	16.5	18	9-Jan-13	14:25	**14**	24	35	
SB-8-03	18	20	9-Jan-13	14:30	**11**	18	17	
SB-9-01	8	10	9-Jan-13	12:25	6.4	18	4.7	
SB-9-02	10	12	9-Jan-13	12:30	1.9	11	3	
SB-9-03	12	14	9-Jan-13	12:35	2.4	16	4.5	
SB-9-04	14	16	9-Jan-13	12:40	2	11	3.2	
SB-9-04 FD	14	16	9-Jan-13	12:40	1.9	11	3	Field Duplicate
SB-9-05	16	18	9-Jan-13	12:45	5.5	26	9.3	
SB-9-06	18	20	9-Jan-13	12:50	2.7	11	3.2	
SB-10-01	12	14	9-Jan-13	15:15	5	25	13	
SB-10-02	14	16	9-Jan-13	15:20	4	1,300	**1,100**	
SB-10-03	16	18	9-Jan-13	15:25	7.3	35	31	
SB-10-04	18	20	9-Jan-13	15:30	1.2	22	3.1	
SB-11-01	8.5	10	9-Jan-13	9:55	6.8	16	4.3	
SB-11-02	10	12	9-Jan-13	10:00	3	12	3.1	
SB-11-03	16	18	9-Jan-13	10:05	2.9	15	3.5	
SB-11-04	18	20	9-Jan-13	10:10	5.5	23	7.7	
SB-12-01	12	14	10-Jan-13	9:15	4.9	**15,000**	**8,000**	
SB-12-02	14	16	10-Jan-13	9:20	5.3	**9,700**	**9,400**	
SB-12-03	16	18	10-Jan-13	9:25	3.2	**3,300**	**3,700**	
SB-12-04	18	20	10-Jan-13	9:30	2.9	1,500	**1,300**	
SB-13-01	5	8	9-Jan-13	8:50	5.2	22	7	
SB-13-01 FD	5	8	9-Jan-13	8:50	5.3	22	7.3	Field Duplicate
SB-13-02	8	10	9-Jan-13	8:55	4.8	24	7.4	
SB-13-03	10	12	9-Jan-13	9:00	3.1	13	3.7	
SB-13-04	12	14	9-Jan-13	9:05	2.1	11	3.1	
SB-13-05	14	16	9-Jan-13	9:10	2.1	12	3.2	
SB-13-06	16	18	9-Jan-13	9:15	1.9	12	3.2	
SB-13-07	18	20	9-Jan-13	9:20	4.8	21	7.2	
SB-14-01	8	10	9-Jan-13	10:50	2	17	7.3	
SB-14-02	10	12	9-Jan-13	10:55	2.6	15	4.4	
SB-14-03	12	14	9-Jan-13	11:00	2.4	19	3.9	
SB-14-04	14	16	9-Jan-13	11:05	5.5	24	8.2	
SB-14-05	16	18	9-Jan-13	11:10	3.2	15	3.8	
SB-14-06	18	20	9-Jan-13	11:15	3.4	17	6	

Note: Bold face values exceed Action Memorandum cleanup goal values (shown below)

Arsenic	7.4	mg/kg
Copper	1,912	mg/kg
Lead	450	mg/kg

FIGURES



Shaw Environmental, Inc.

U.S. ARMY CORPS OF ENGINEERS
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM

FIGURE 1
SITE LOCATION MAP
COLONIE FUSRAP SITE
1130 CENTRAL AVENUE
ALBANY, NY 12205

OFFICE	DRAWN BY		CHECKED BY	APPROVED BY	DRAWING NUMBER
ALBANY, NY	S. SHKOLNIK	02-16-08			837935A5

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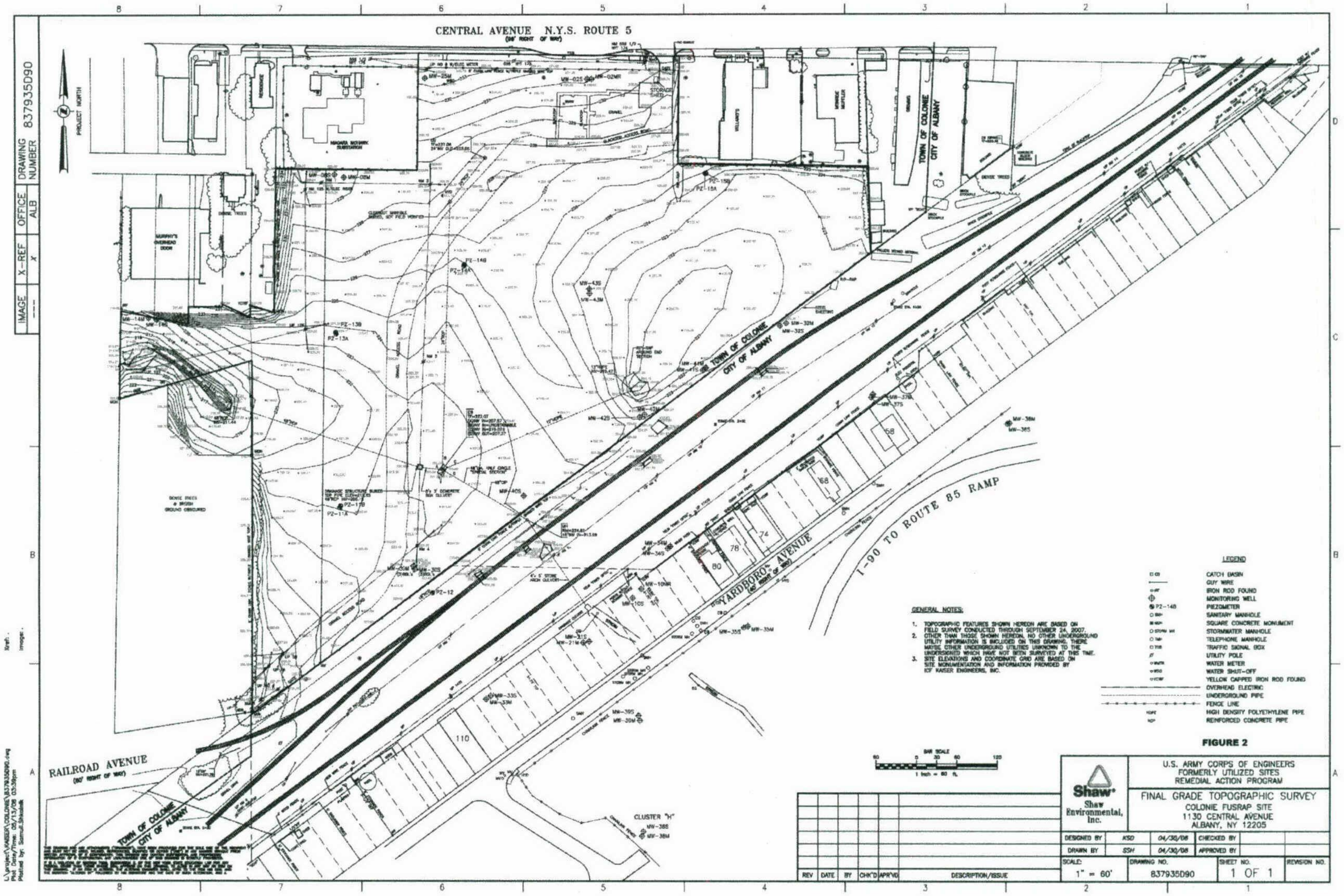
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PROJECT NORTH
IMAGE
X-REF
OFFICE
ALB
DRAWING NUMBER
837935D90
RAILROAD AVENUE
TOWN OF COLONIE
CITY OF ALBANY
YARDBORO AVENUE
I-90 TO ROUTE 85 RAMP
CLUSTER "H"
GENERAL NOTES:
1. TOPOGRAPHIC FEATURES SHOWN HEREON ARE BASED ON FIELD SURVEY CONDUCTED THROUGH SEPTEMBER 24, 2007.
2. OTHER THAN THOSE SHOWN HEREON, NO OTHER UNDERGROUND UTILITY INFORMATION IS INCLUDED ON THIS DRAWING. THERE MAYBE OTHER UNDERGROUND UTILITIES UNKNOWN TO THE UNDERSIGNED WHICH HAVE NOT BEEN SURVEYED AT THIS TIME.
3. SITE ELEVATIONS AND COORDINATE GRID ARE BASED ON SITE MONUMENTATION AND INFORMATION PROVIDED BY ICF KAISER ENGINEERS, INC.
LEGEND
CATCH BASIN
GUY WIRE
IRON ROD FOUND
MONITORING WELL
PIEZOMETER
SANITARY MANHOLE
SQUARE CONCRETE MONUMENT
STORMWATER MANHOLE
TELEPHONE MANHOLE
TRAFFIC SIGNAL BOX
UTILITY POLE
WATER METER
WATER SHUT-OFF
YELLOW CAPPED IRON ROD FOUND
OVERHEAD ELECTRIC
UNDERGROUND PIPE
FENCE LINE
HIGH DENSITY POLYETHYLENE PIPE
REINFORCED CONCRETE PIPE
BAR SCALE
1 Inch = 60 ft.
U.S. ARMY CORPS OF ENGINEERS
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM
Shaw Environmental, Inc.
FINAL GRADE TOPOGRAPHIC SURVEY
COLONIE FUSRAP SITE
1130 CENTRAL AVENUE
ALBANY, NY 12205
DESIGNED BY KSD 04/30/08
DRAWN BY SSH 04/30/08
CHECKED BY
APPROVED BY
SCALE: 1" = 60'
DRAWING NO. 837935D90
SHEET NO. 1 OF 1
REVISION NO.
REV DATE BY CHK'D APR'VD DESCRIPTION/ISSUE
FIGURE 2

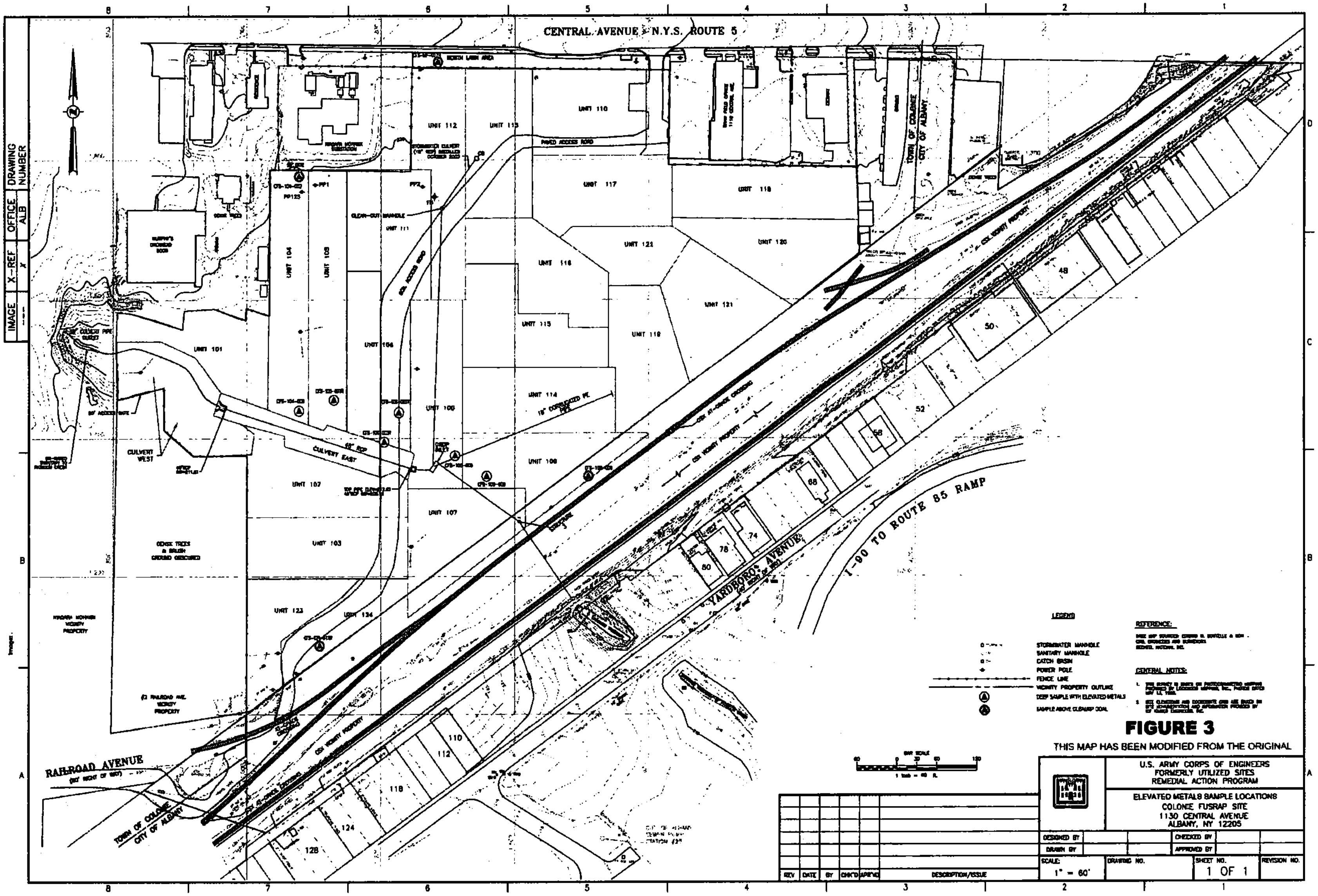
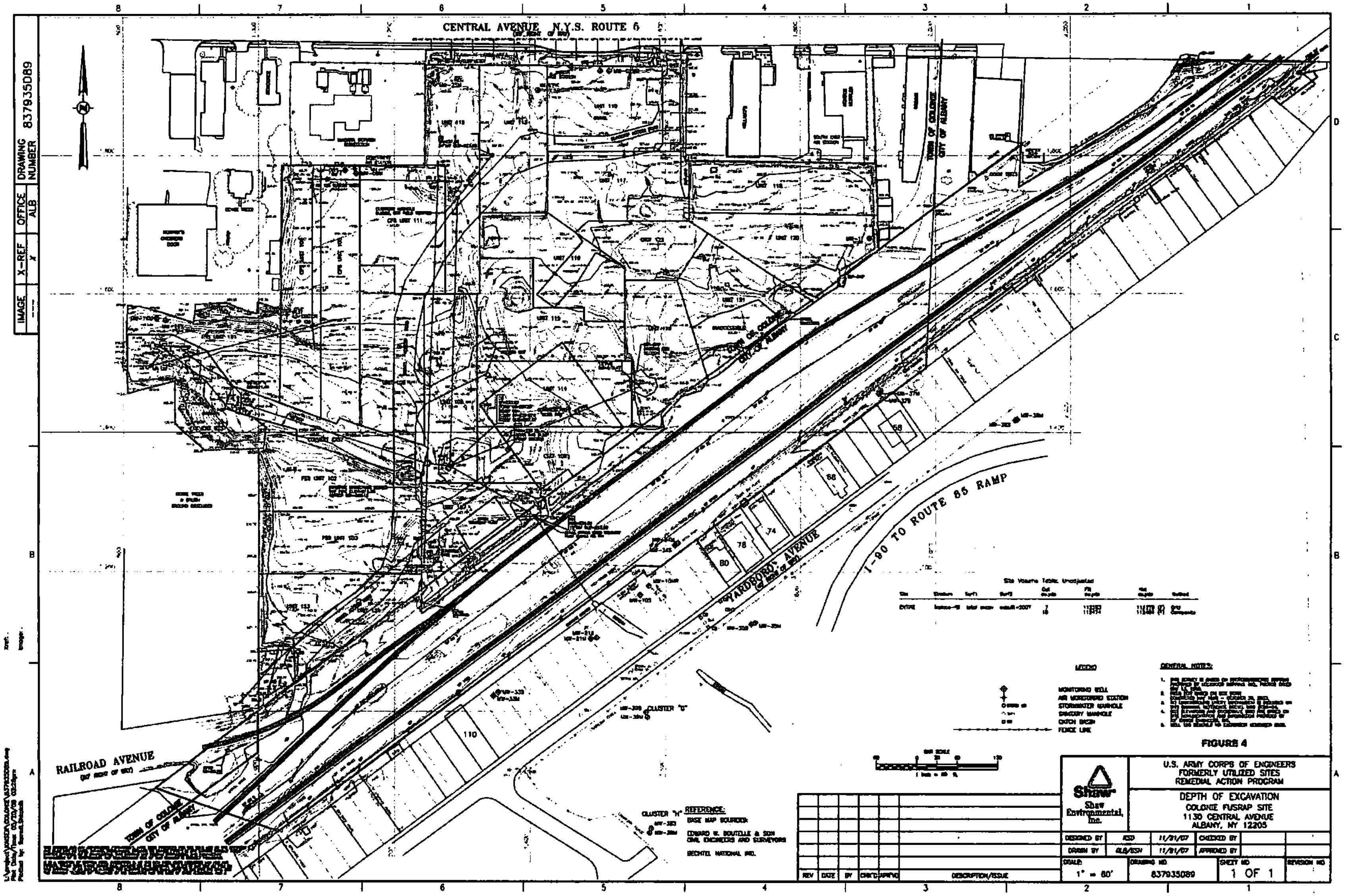


FIGURE 3

THIS MAP HAS BEEN MODIFIED FROM THE ORIGINAL


CENTRAL AVENUE N.Y.S. ROUTE 5
RAILROAD AVENUE
YARDBORO AVENUE
I-90 TO ROUTE 85 RAMP
TOWN OF COLONIE
CITY OF ALBANY
CLUSTER "G"
CLUSTER "H"
REFERENCE:
BASE MAP SOURCES:
EDWARD W. BOUTELLE & SON
CIVIL ENGINEERS AND SURVEYORS
BECHTEL NATIONAL INC.
LEGEND
MONITORING WELL
STORMWATER MANHOLE
CATCH BASIN
FENCE LINE
GENERAL NOTES:
FIGURE 4
U.S. ARMY CORPS OF ENGINEERS
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM
DEPTH OF EXCAVATION
COLONIE FUSRAP SITE
1130 CENTRAL AVENUE
ALBANY, NY 12205
Shaw
Shaw Environmental, Inc.
DESIGNED BY
11/21/07
CHECKED BY
DRAWN BY
11/21/07
APPROVED BY
SCALE
1" = 60'
DRAWING NO.
837935D89
SHEET NO.
1 OF 1
REVISION NO.
DESCRIPTION/ISSUE
IMAGE
X-REF
OFFICE
ALB
DRAWING NUMBER
837935D89

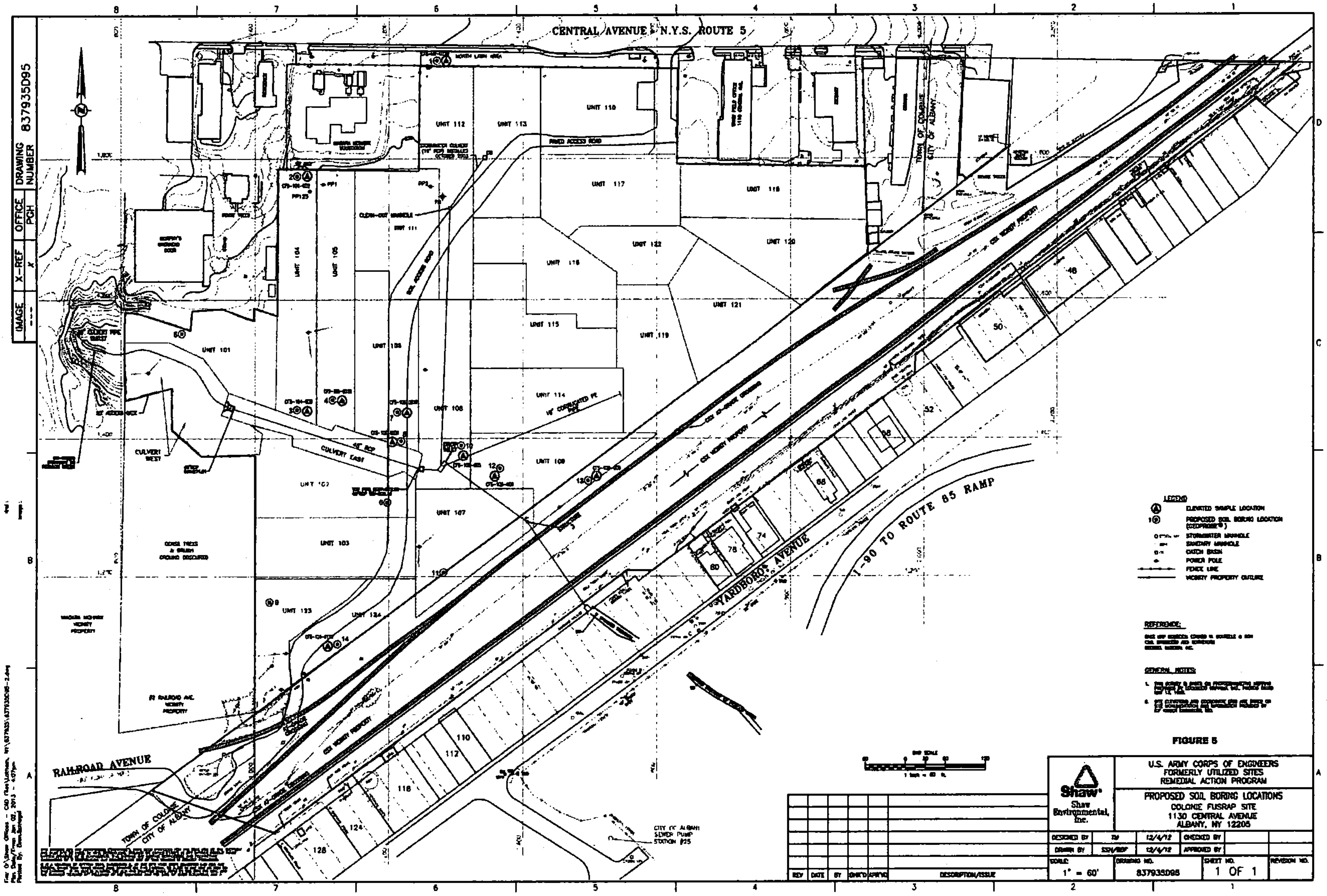

CENTRAL AVENUE N.Y.S. ROUTE 5
UNIT 101
UNIT 102
UNIT 103
UNIT 104
UNIT 105
UNIT 106
UNIT 107
UNIT 108
UNIT 109
UNIT 110
UNIT 111
UNIT 112
UNIT 113
UNIT 114
UNIT 115
UNIT 116
UNIT 117
UNIT 118
UNIT 119
UNIT 120
UNIT 121
UNIT 122
UNIT 123
UNIT 124
PAVED ACCESS ROAD
CLEAN-OUT MANHOLE
CULVERT WEST
CULVERT EAST
DENSE TREES & BRUSH GROUND OBSCURED
RAILROAD AVENUE
YARDBORO AVENUE
I-90 TO ROUTE 85 RAMP
TOWN OF COLONIE
CITY OF ALBANY
CITY OF ALBANY SEWER PUMP STATION #25
LEGEND
ELEVATED SAMPLE LOCATION
PROPOSED SOIL BORING LOCATION (GEOPROBE®)
STORMWATER MANHOLE
SANITARY MANHOLE
CATCH BASIN
POWER POLE
FENCE LINE
VICINITY PROPERTY OUTLINE
REFERENCE:
GENERAL NOTES:
FIGURE 5
U.S. ARMY CORPS OF ENGINEERS
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM
PROPOSED SOIL BORING LOCATIONS
COLONIE FUSRAP SITE
1130 CENTRAL AVENUE
ALBANY, NY 12205
Shaw
Shaw Environmental, Inc.
DESIGNED BY
12/4/12
CHECKED BY
DRAWN BY
12/4/12
APPROVED BY
SCALE
1" = 60'
DRAWING NO.
837935D95
SHEET NO.
1 OF 1
REVISION NO.
REV
DATE
BY
DESCRIPTION/ISSUE
IMAGE
X-REF
OFFICE
PGH
DRAWING NUMBER
837935D95

FIGURE 5

Figure 6: Results of Colonie FSS Arsenic Sampling

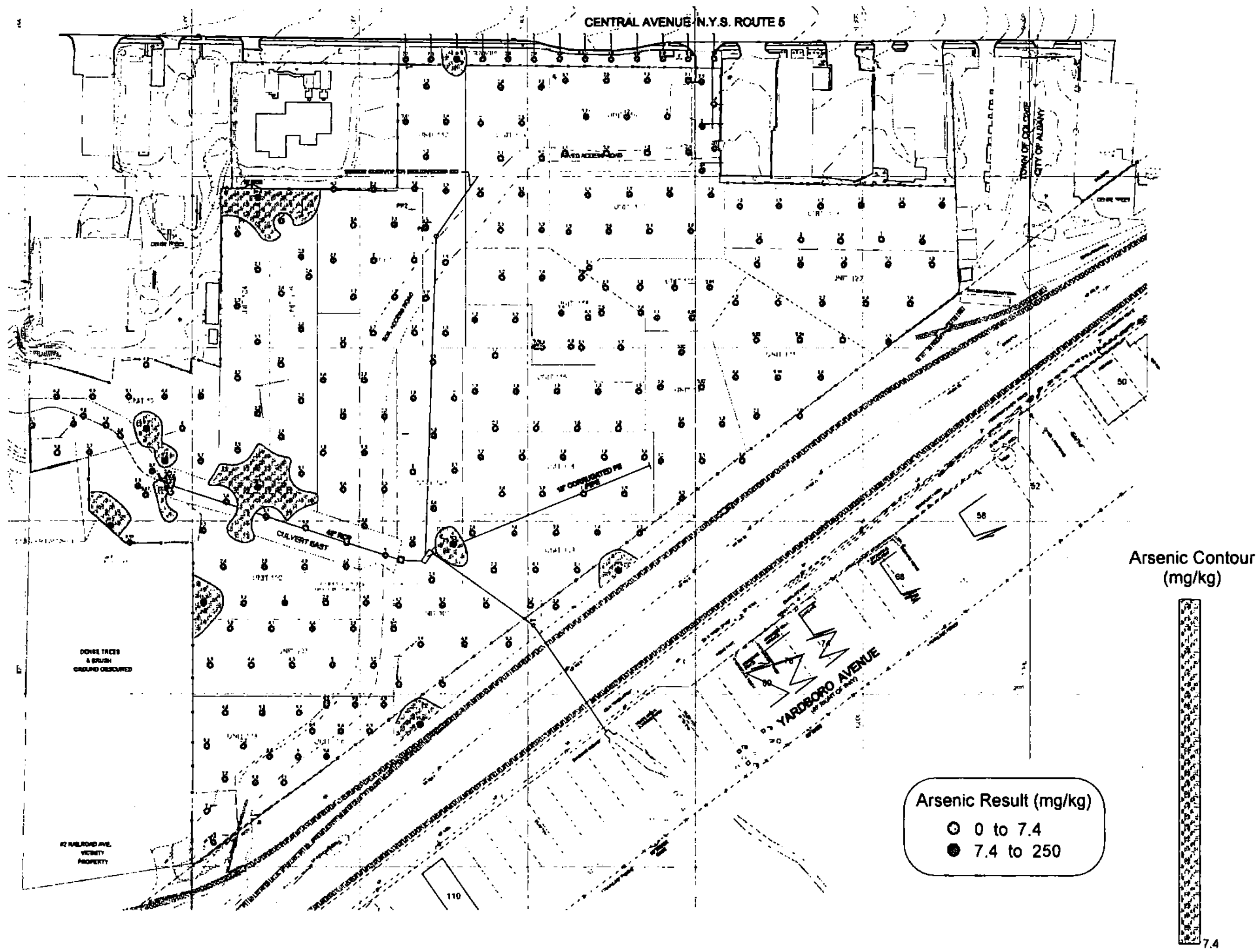


Figure 7: Results of Colonie FSS Lead Sampling

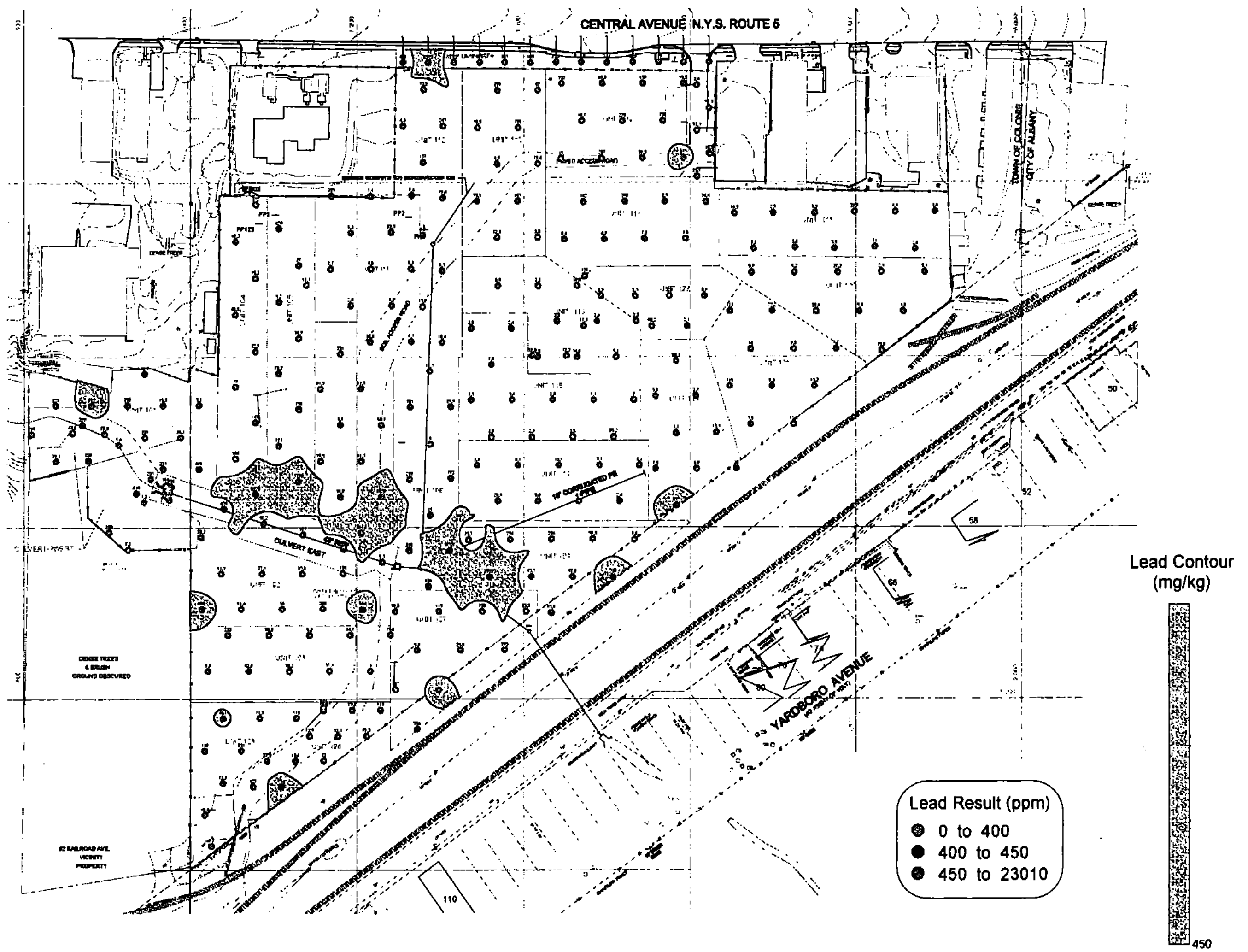
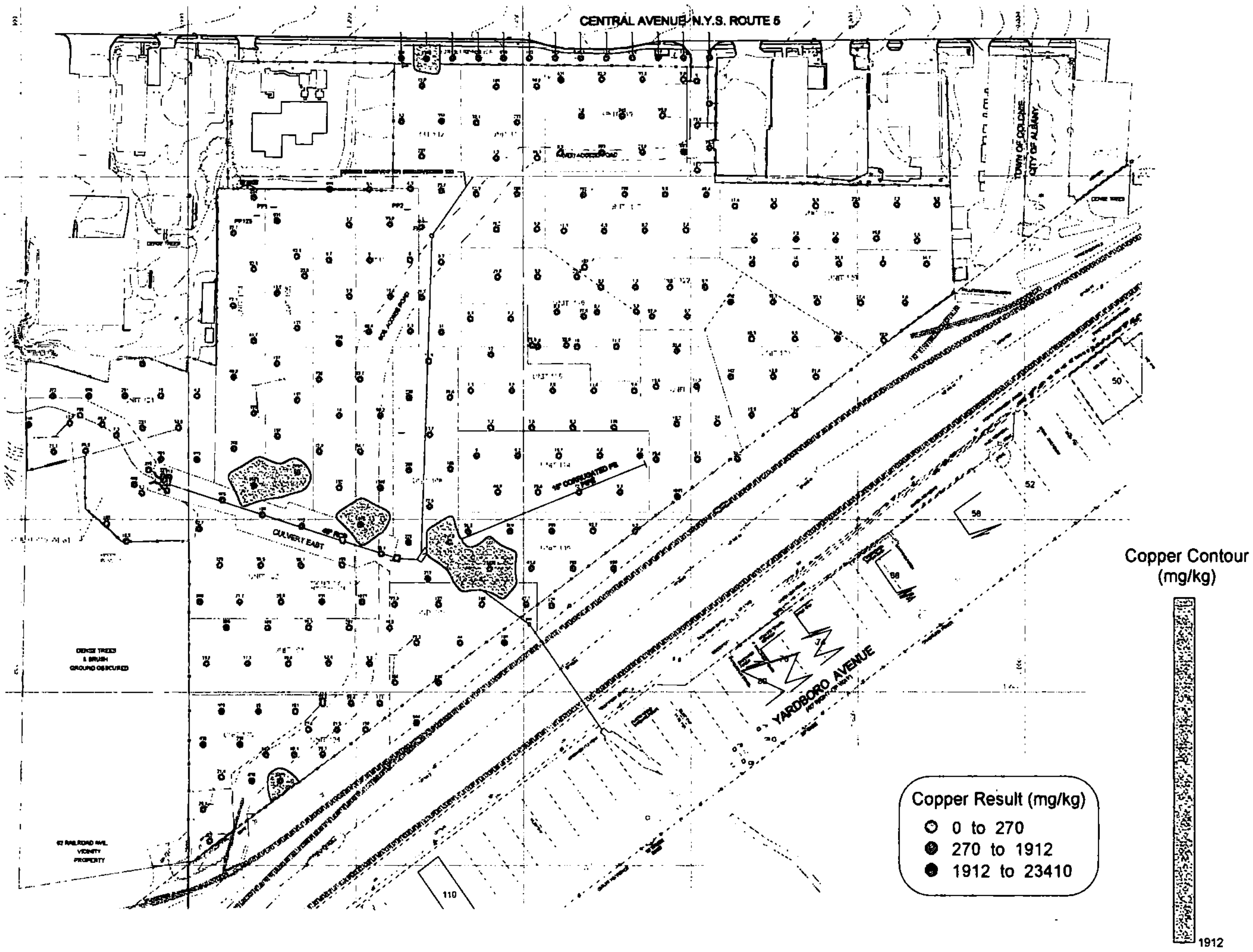
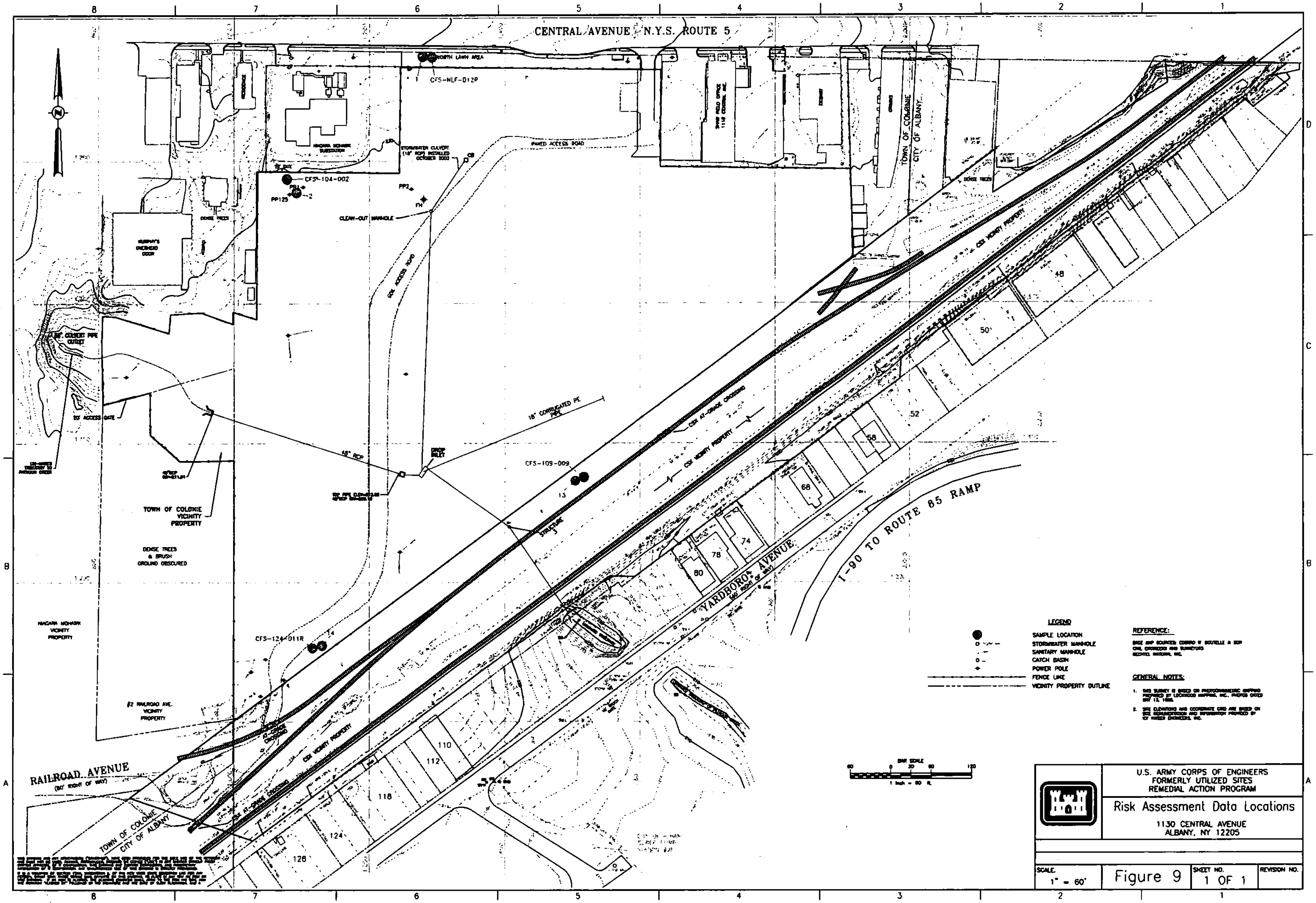


Figure 8: Results of Colonie FSS Copper Sampling

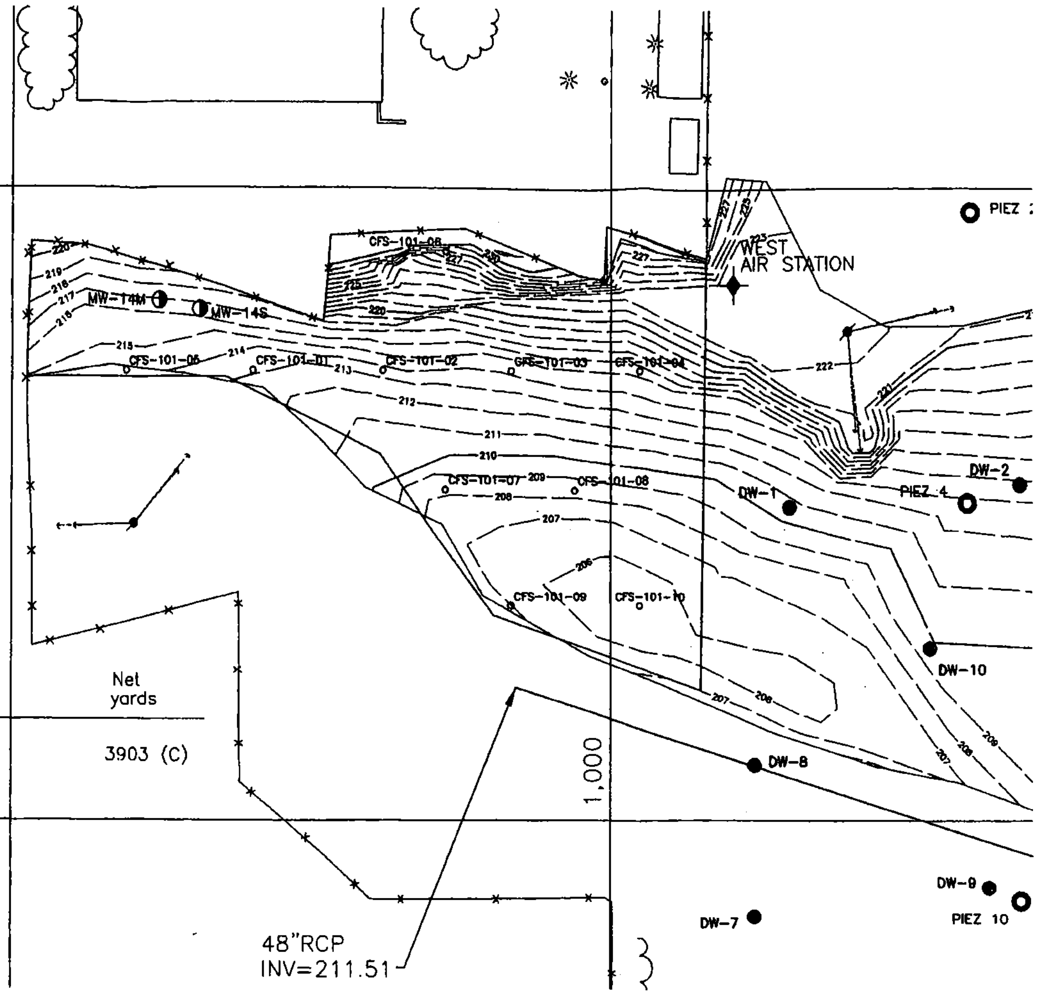




CENTRAL AVENUE N.Y.S. ROUTE 5
CFS-NLF-012P
NORTH LAWN AREA
NIAGARA MOHAWK SUBSTATION
STORMWATER CULVERT (18" RCP) INSTALLED OCTOBER 2003
PAVED ACCESS ROAD
CFS-104-002
PP125
PP2
CLEAN-OUT MANHOLE
MURPHY'S OVERHEAD DOOR
DENSE TREES
TOWN OF COLONIE
CITY OF ALBANY
CSX VICINITY PROPERTY
CSX AT-GRADE CROSSING
18" CORRUGATED PE PIPE
48" RCP
DROP INLET
CFS-109-009
STRUCTURE
TOWN OF COLONIE VICINITY PROPERTY
DENSE TREES & BRUSH GROUND OBSCURED
NIAGARA MOHAWK VICINITY PROPERTY
CFS-124-011R
#2 RAILROAD AVE. VICINITY PROPERTY
RAILROAD AVENUE
YARDBORO AVENUE
I-90 TO ROUTE 85 RAMP
AT-GRADE CROSSING
48
50
52
58
68
74
78
80
110
112
118
124
128
LEGEND
SAMPLE LOCATION
STORMWATER MANHOLE
SANITARY MANHOLE
CATCH BASIN
POWER POLE
FENCE LINE
VICINITY PROPERTY OUTLINE
REFERENCE:
GENERAL NOTES:
BAR SCALE
1 inch = 60 ft.
U.S. ARMY CORPS OF ENGINEERS
FORMERLY UTILIZED SITES
REMEDIAL ACTION PROGRAM
Risk Assessment Data Locations
1130 CENTRAL AVENUE
ALBANY, NY 12205
SCALE 1" = 60'
Figure 9
SHEET NO. 1 OF 1
REVISION NO.

APPENDIX A – SURVEY UNIT SAMPLE LOCATIONS

FSS UNIT 101, AREA=17,090 SQ.FT. OR 0.392±ACRES



Subsite Volume Table: Unadjusted

Subsite	Stratum	Surf1	Surf2	Cut yards	Fill yards	Net yards
FSS-101	ts10	ts-1	ts10	3917	13	3903 (C)

"ONLY COPIES OF THIS MAP SIGNED IN RED INK AND EMBOSSED WITH THE SEAL OF AN OFFICER OF C.T. MALE ASSOCIATES, P.C. OR A DESIGNATED REPRESENTATIVE SHALL BE CONSIDERED TO BE A VALID TRUE COPY".

DATE		REVISIONS RECORD/DESCRIPTION	DRAFTED	CHECK	APPR.
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				

APPROVED
DRAFTED : GLB
CHECKED :
PROJ. NO: 99.5377
SCALE : 1" = 40'
DATE : JULY 15, 2002

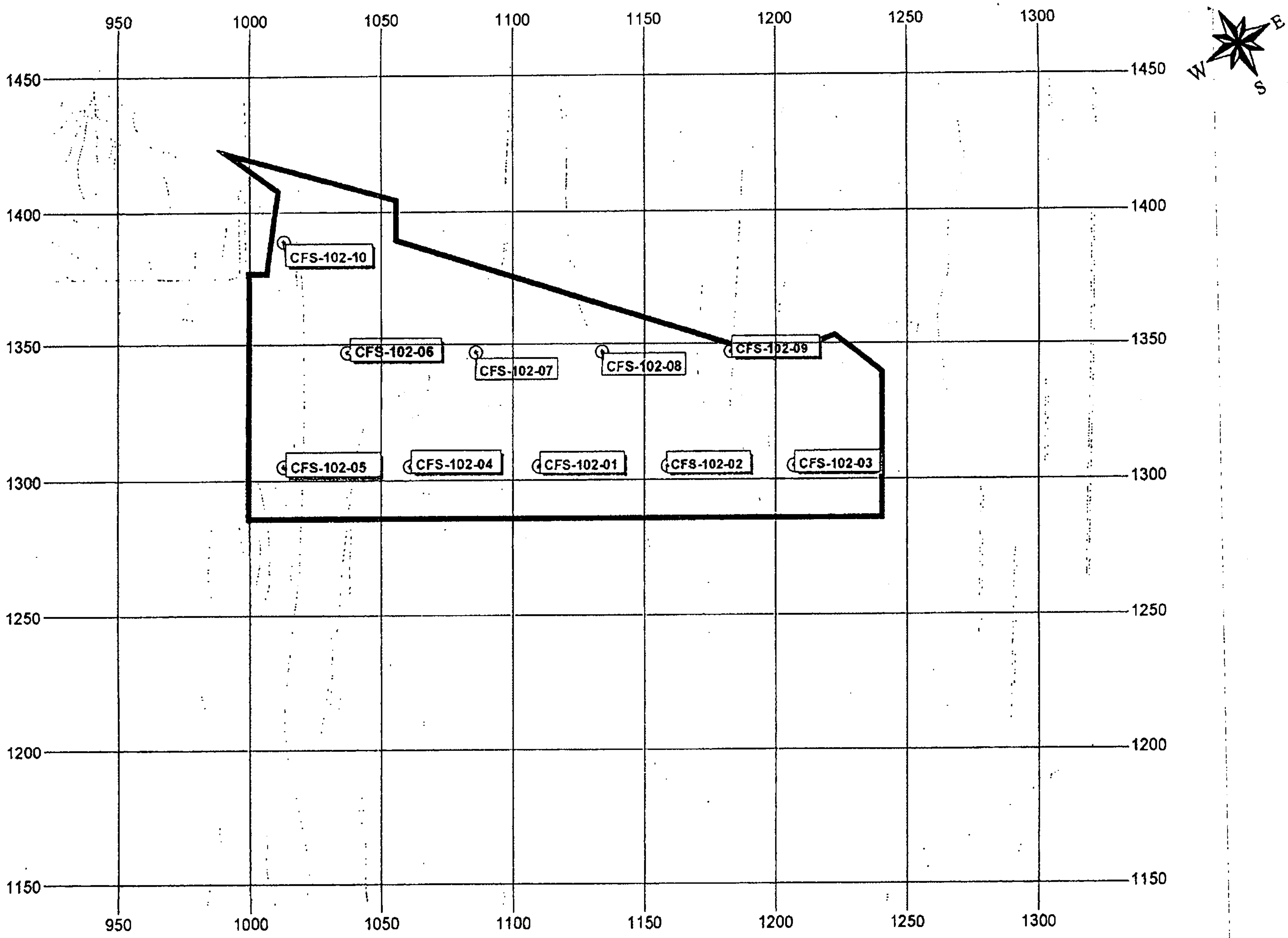
TOPOGRAPHIC SURVEY
FSS-101 UNIT NORTH KEYHOLE

TOWN OF COLONIE — ALBANY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, P.O. BOX 727, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299
ARCHITECTURE & BUILDING SYSTEMS ENGINEERING * CIVIL ENGINEERING
ENVIRONMENTAL SERVICES * SURVEY & LAND INFORMATION SERVICES

SHEET 1 OF 1
DWG. NO: 02-453

NO XREFS
CAD DWG. FILE NAME: T5071102.DWG

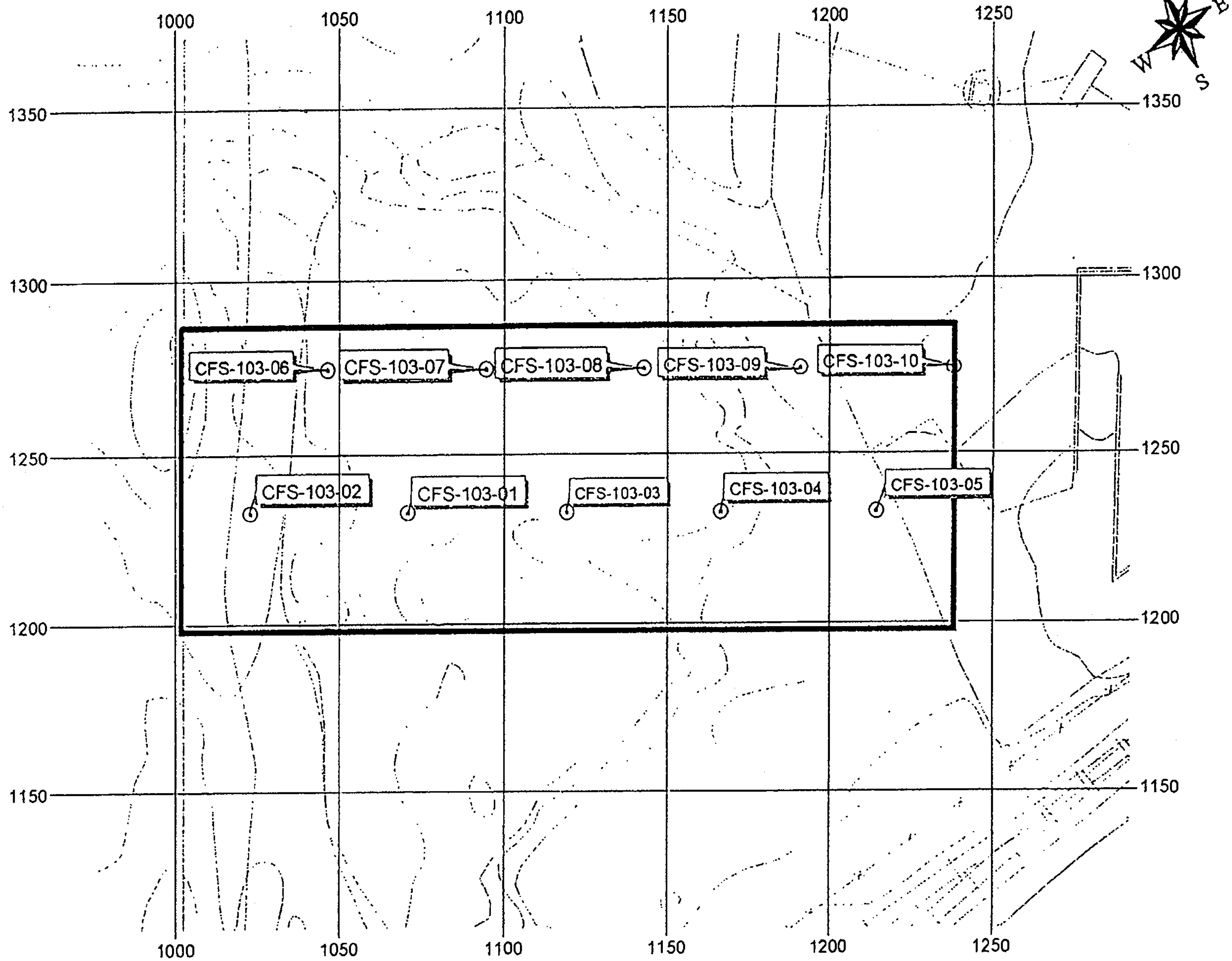


Colonie FUSRAP Site

FSS-102 Sample Locations

139GS02021

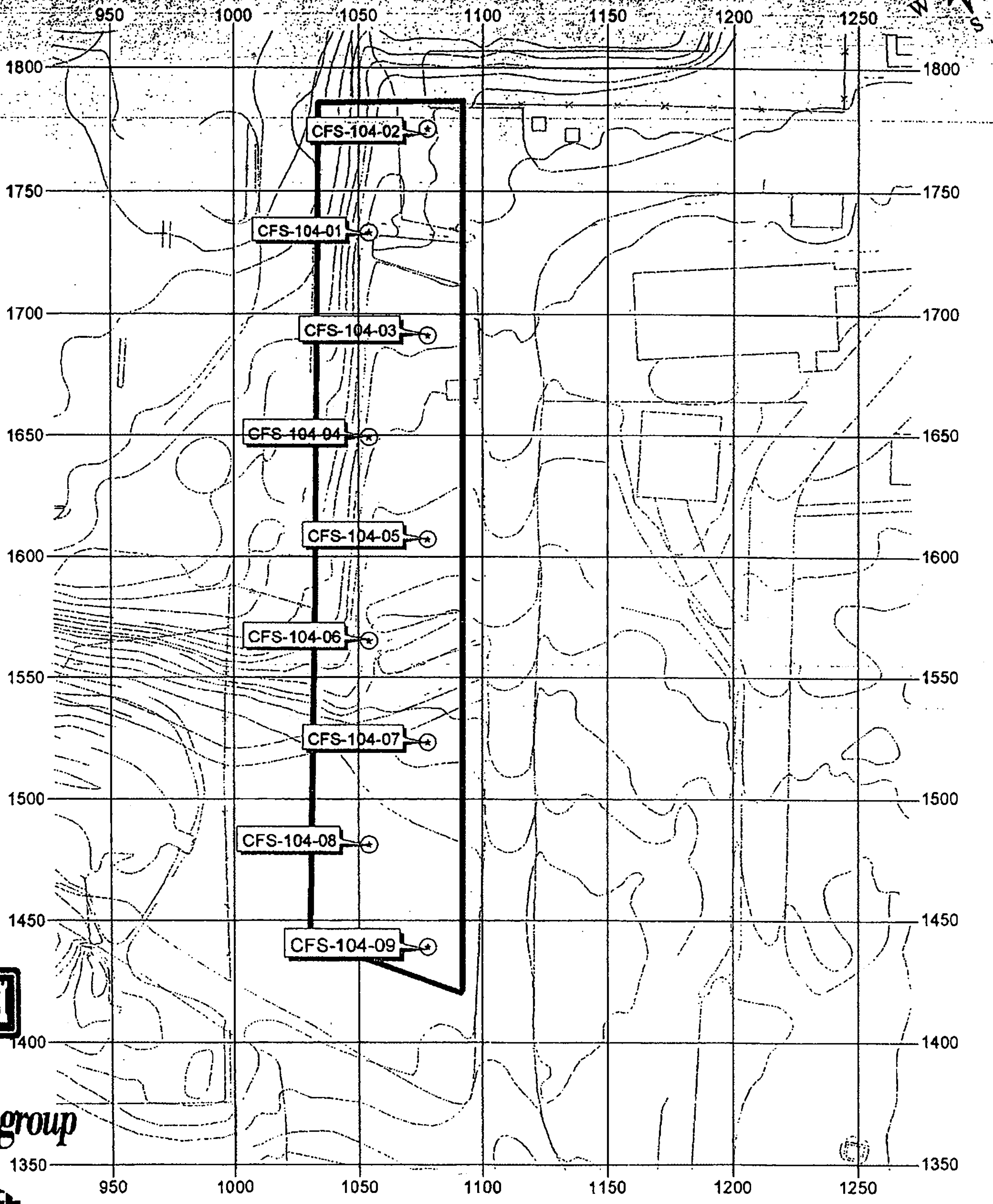
Colonie FUSRAP Site



the group

FSS103
Sample Locations

Colonie FUSRAP Site

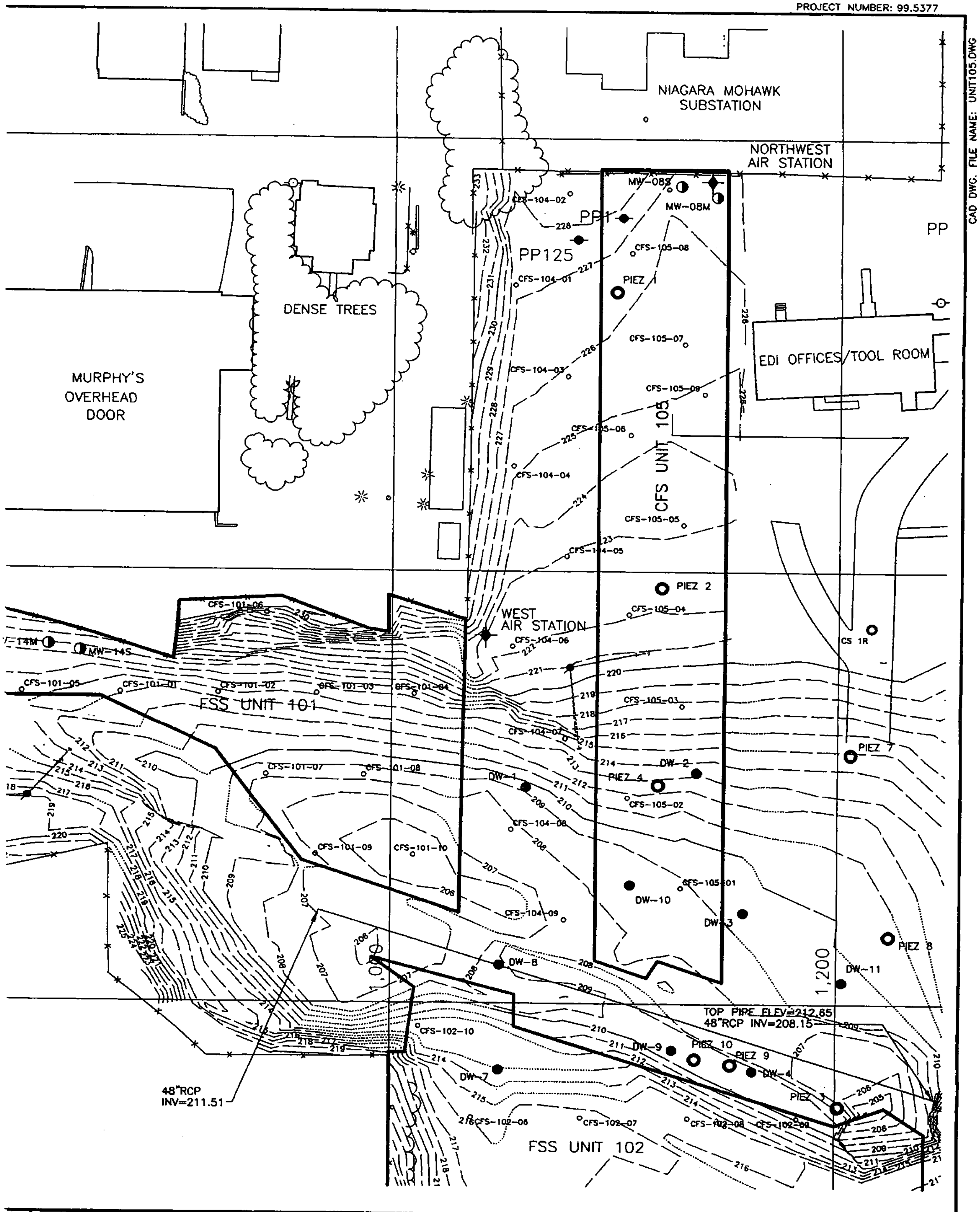


the group

FSS104 Sample Locations

139GS02028

PROJECT NUMBER: 99.5377



ECK	APPR.	UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW. © 2002 C.T. MALE ASSOCIATES P.C.
		APPROVED:
		DRAFTED : GLB
		CHECKED :
		PROJ. NO : 99.5377
		SCALE : 1" = 40'
		DATE : SEPT. 19, 2002

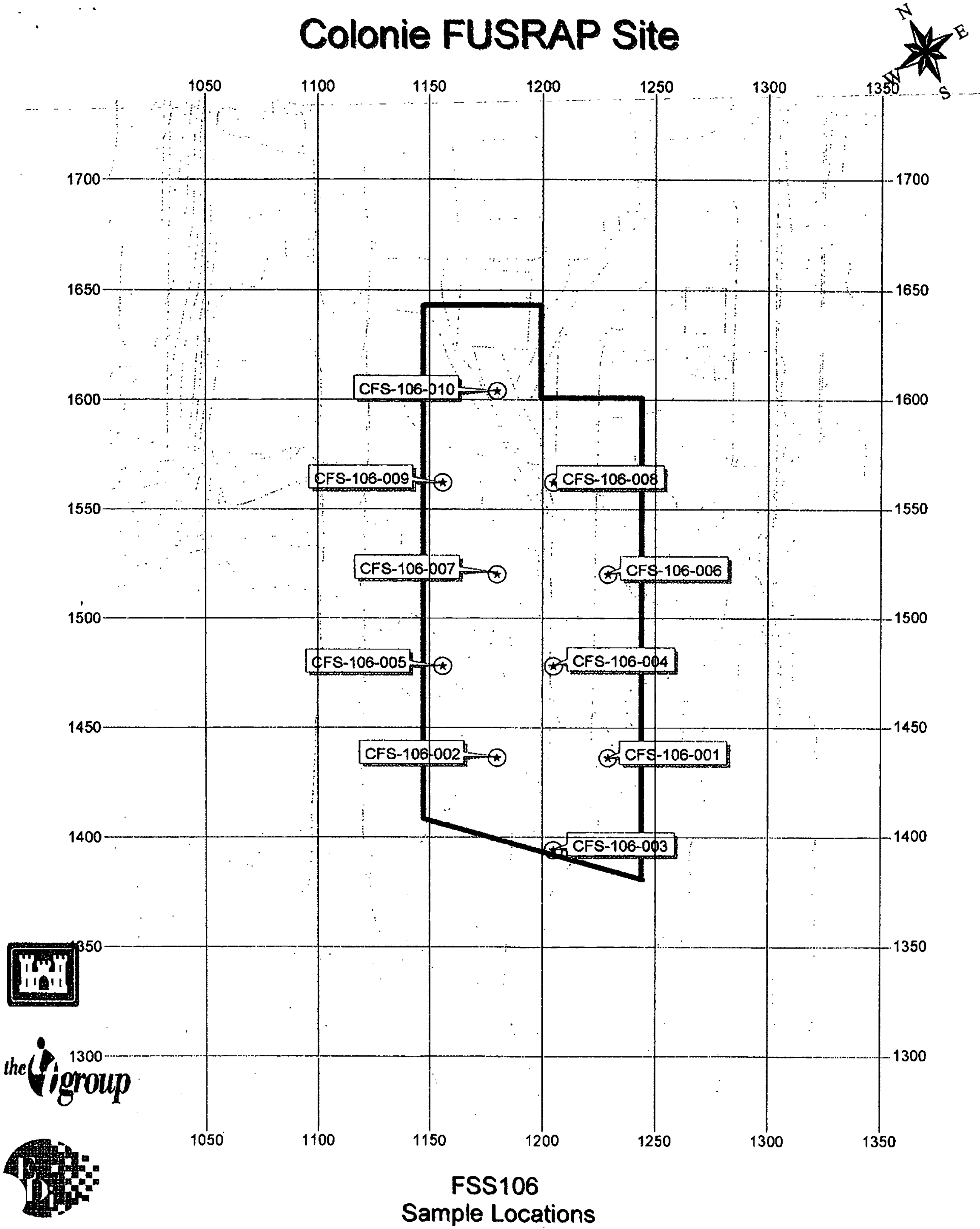
TOPOGRAPHIC SURVEY
CFS UNIT 105
1130 CENTRAL AVENUE

TOWN OF COLONIE — ALBANY COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE, P.O. BOX 727, LATHAM, NY 12110
518.786.7400 • FAX 518.786.7299
ARCHITECTURE & BUILDING SYSTEMS ENGINEERING • CIVIL ENGINEERING
ENVIRONMENTAL SERVICES • SURVEY & LAND INFORMATION SERVICES

SHEET 2 OF 2
DWG. NO: 02-559

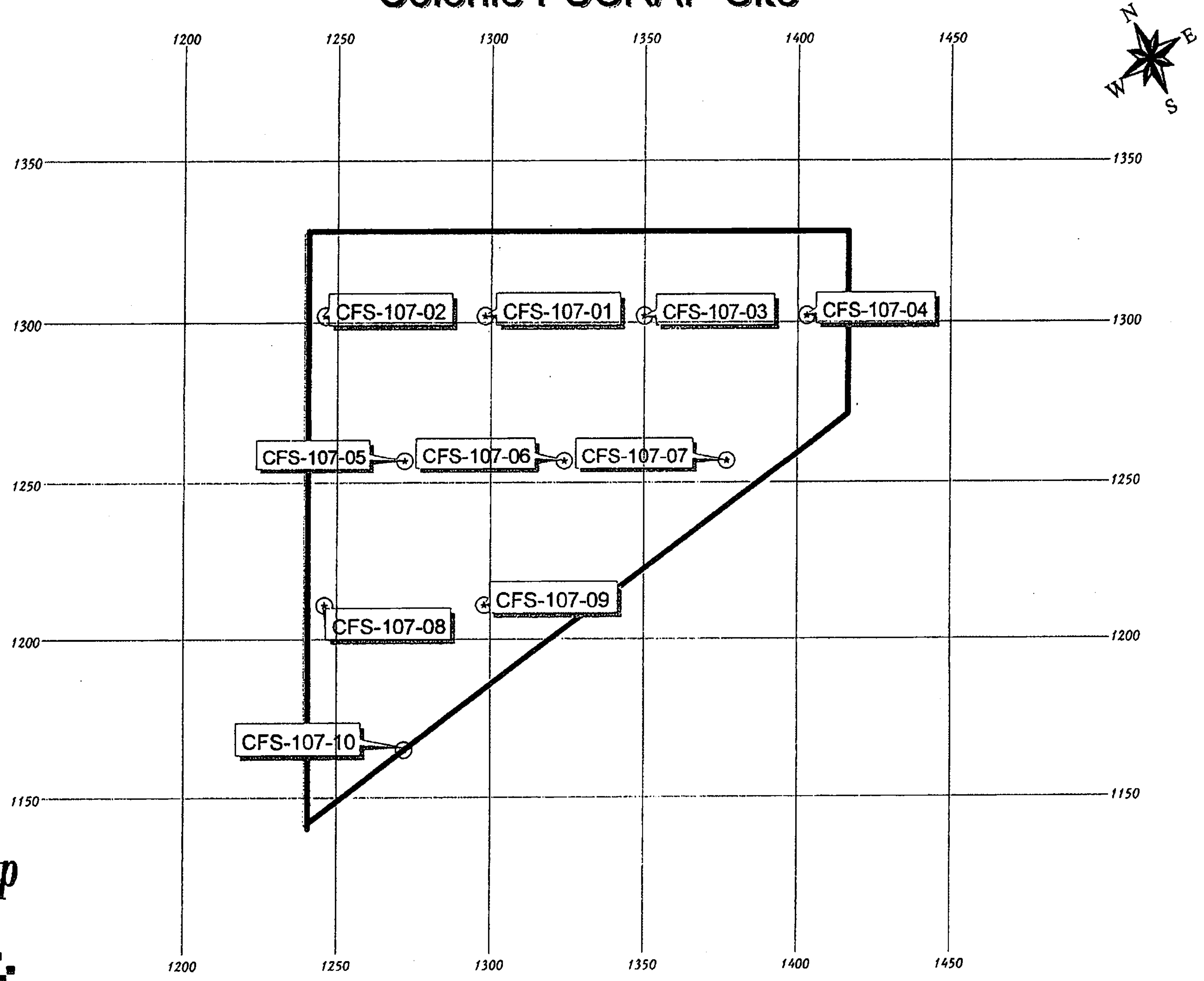
Colonie FUSRAP Site



FSS106
Sample Locations

139GS02030 Samp. Loc.

Colonie FUSRAP Site

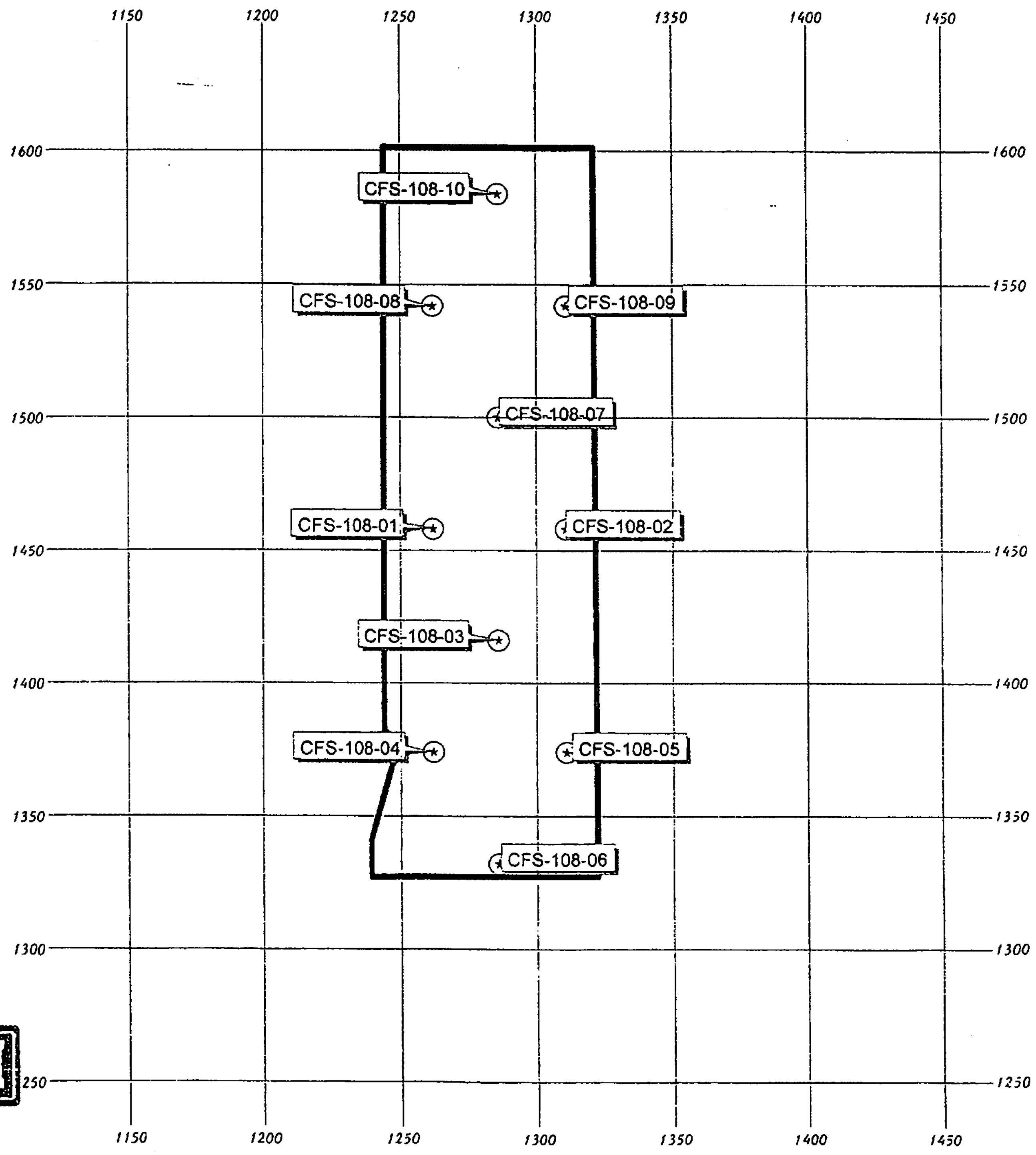


FSS107

Sample Lo--tions

139GS ,0

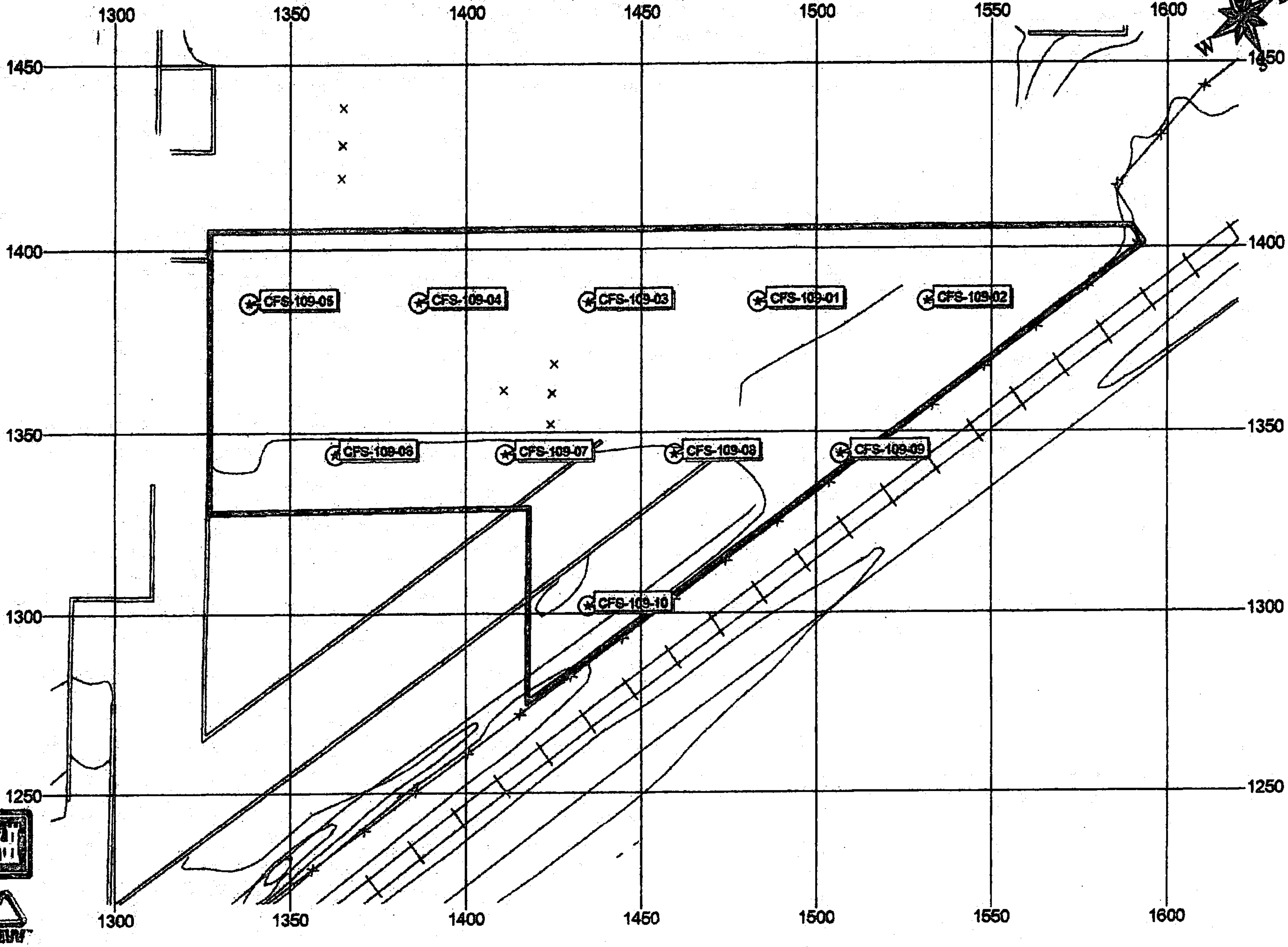
Colonie FUSRAP Site



FSS 108
Sample Locations

139GS02133samplocs

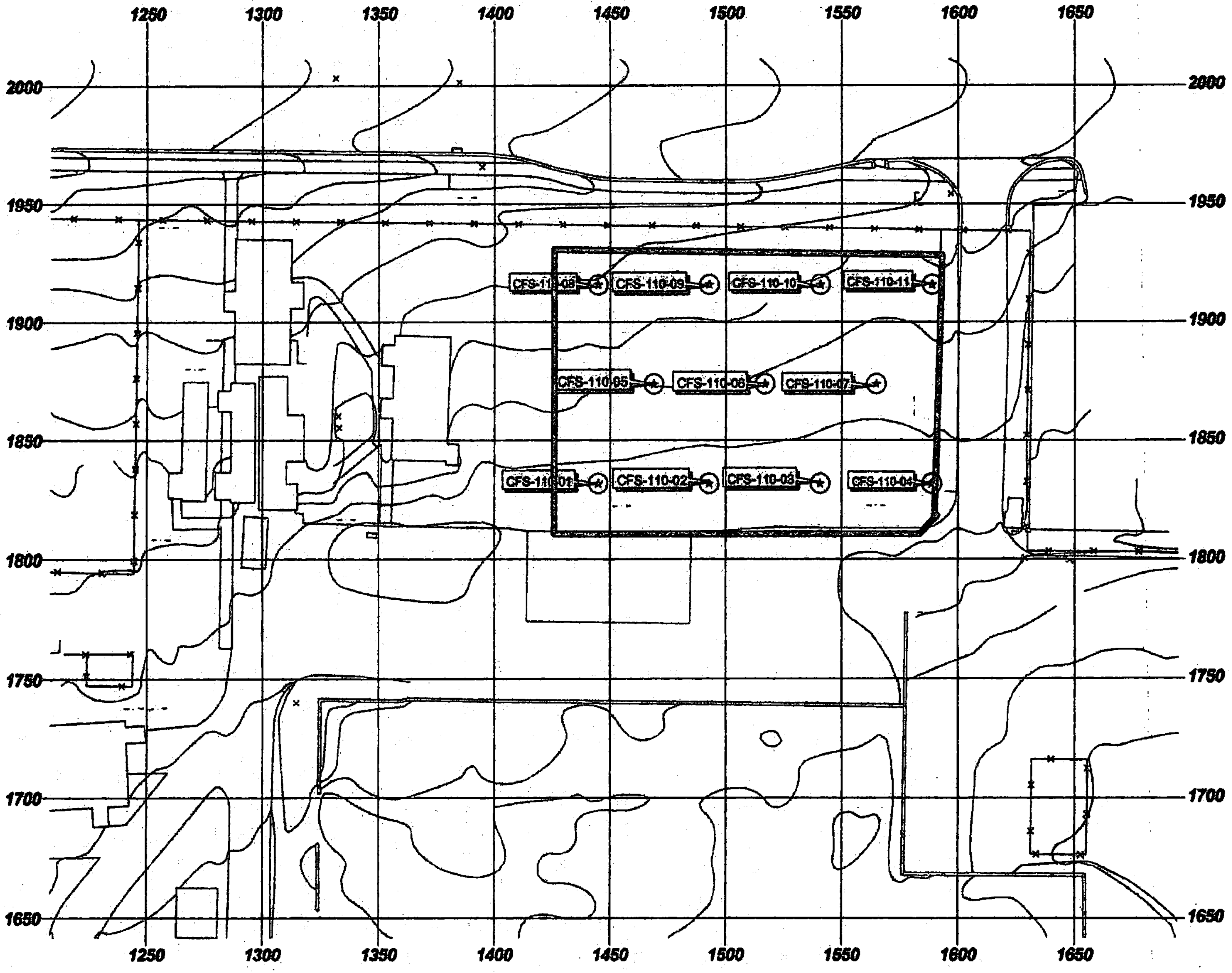
Colonie FUSRAP Site



Shaw

FSS109 SAMPLE LOCATIONS

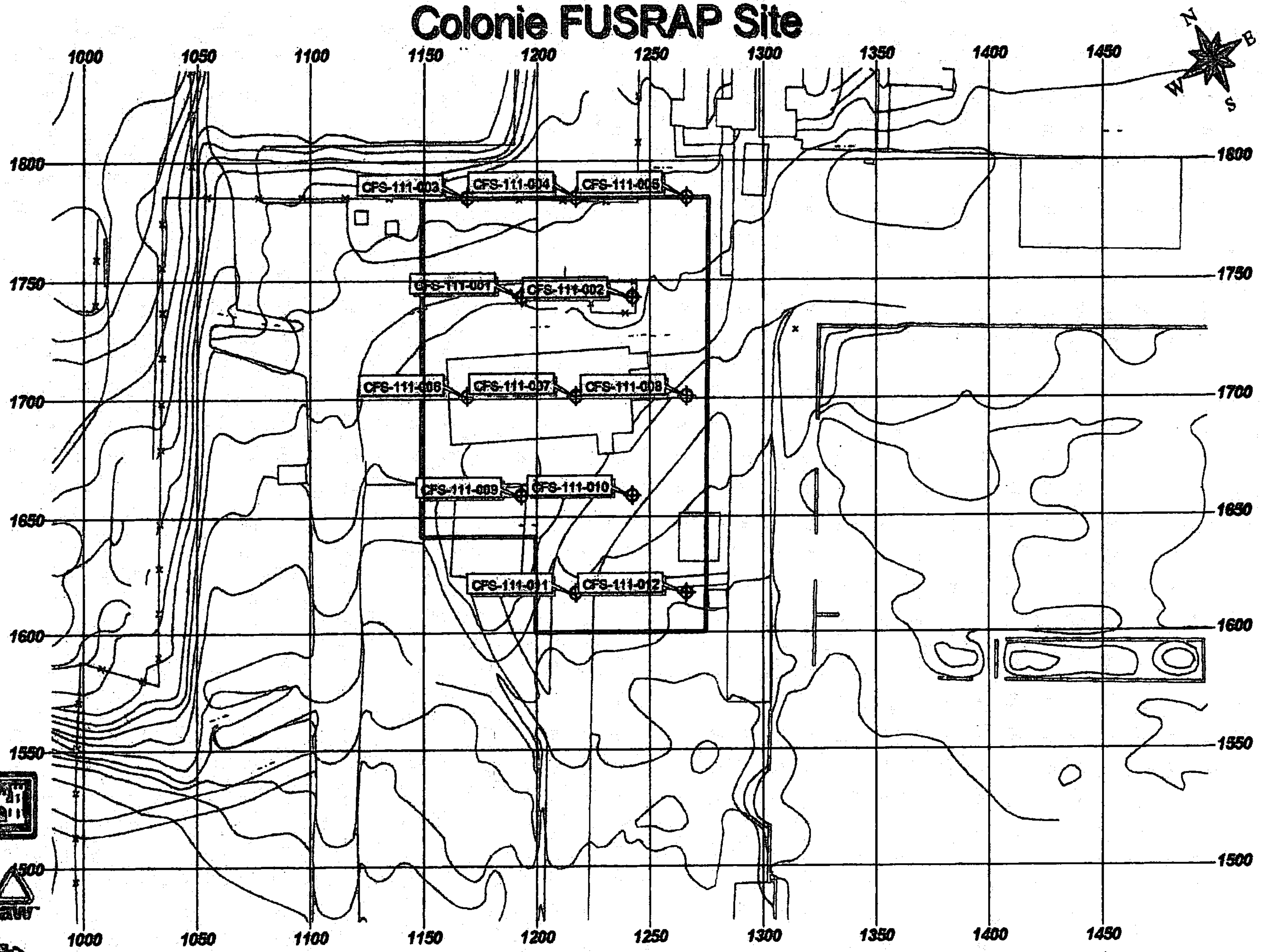
Colonie FUSRAP Site



Shaw

FSS110 Sample Locations

Colonie FUSRAP Site

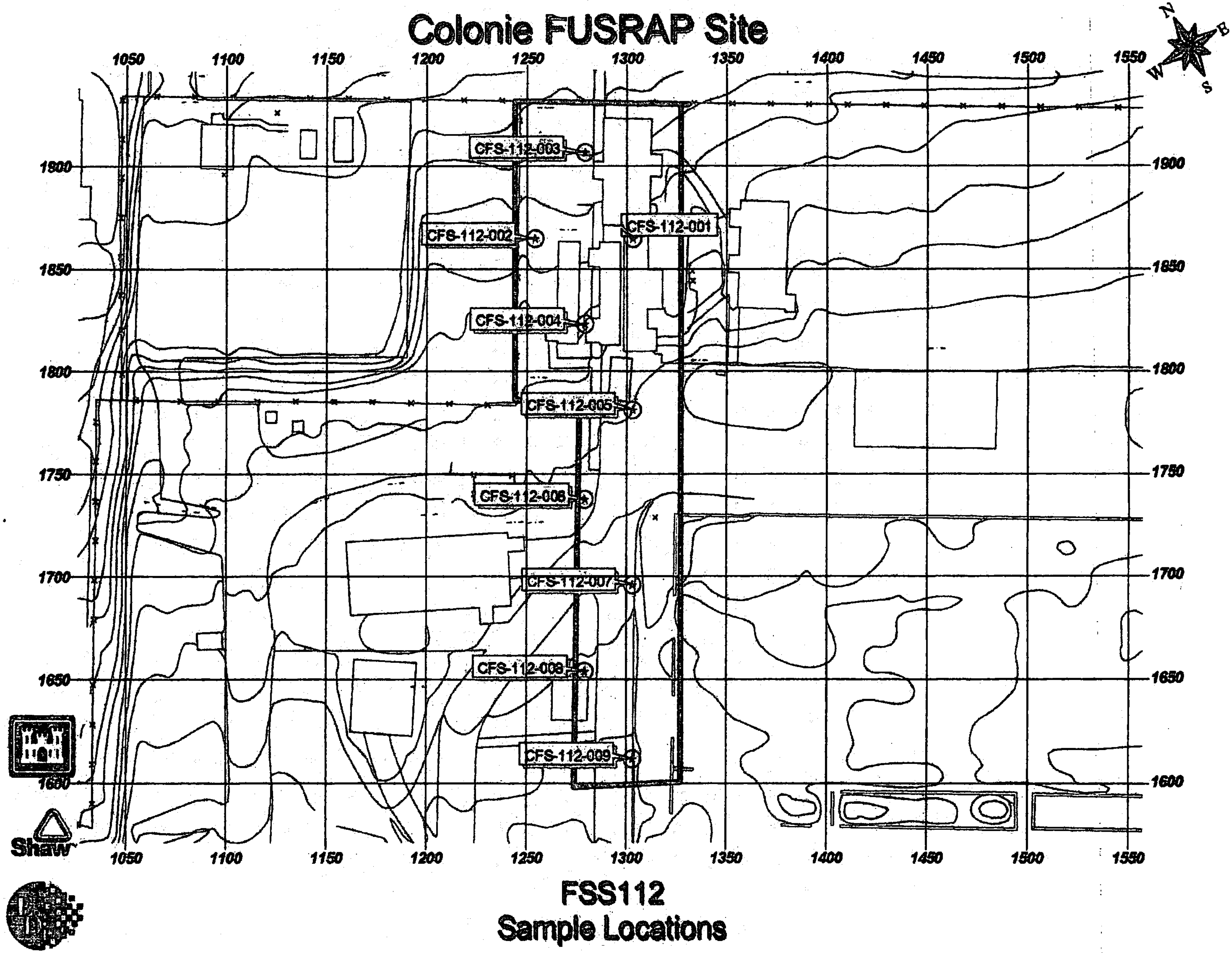


Shaw

FSS111
Sample Locations

fss111/samplocs.apr

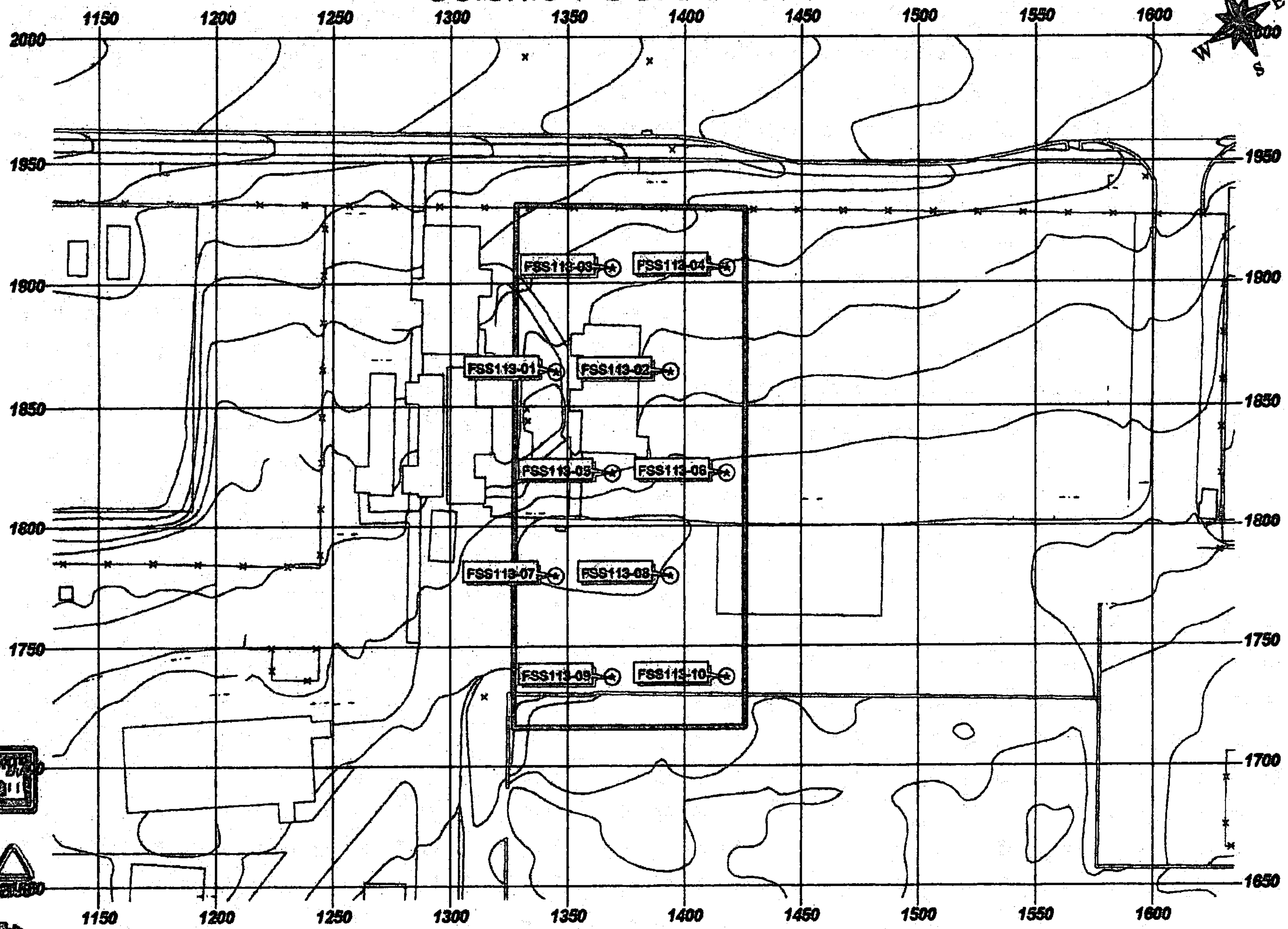
Colonie FUSRAP Site



FSS112
Sample Locations

FSS112/samplocs/apr

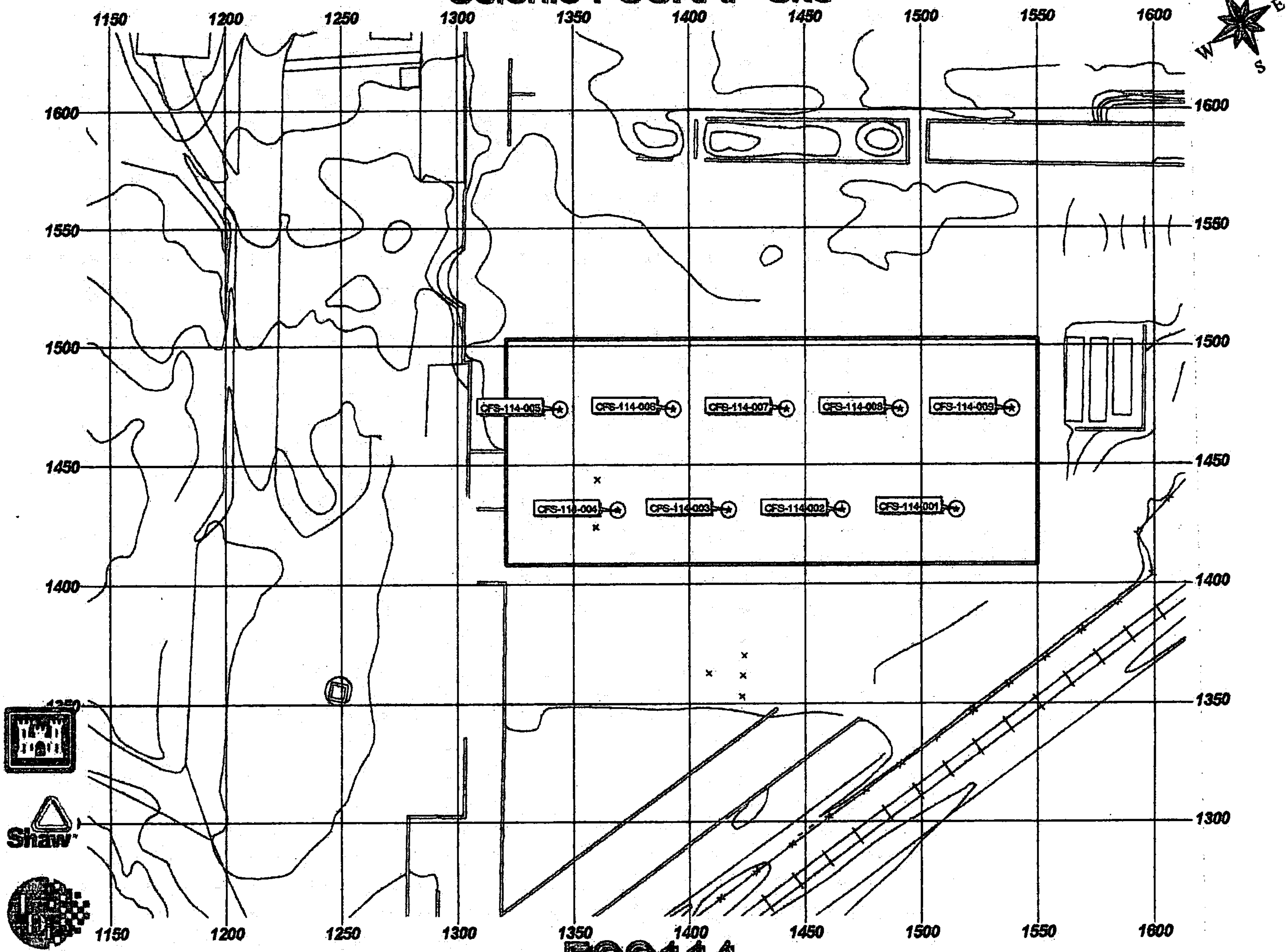
Colonie FUSRAP Site



FSS113

Sample Locations

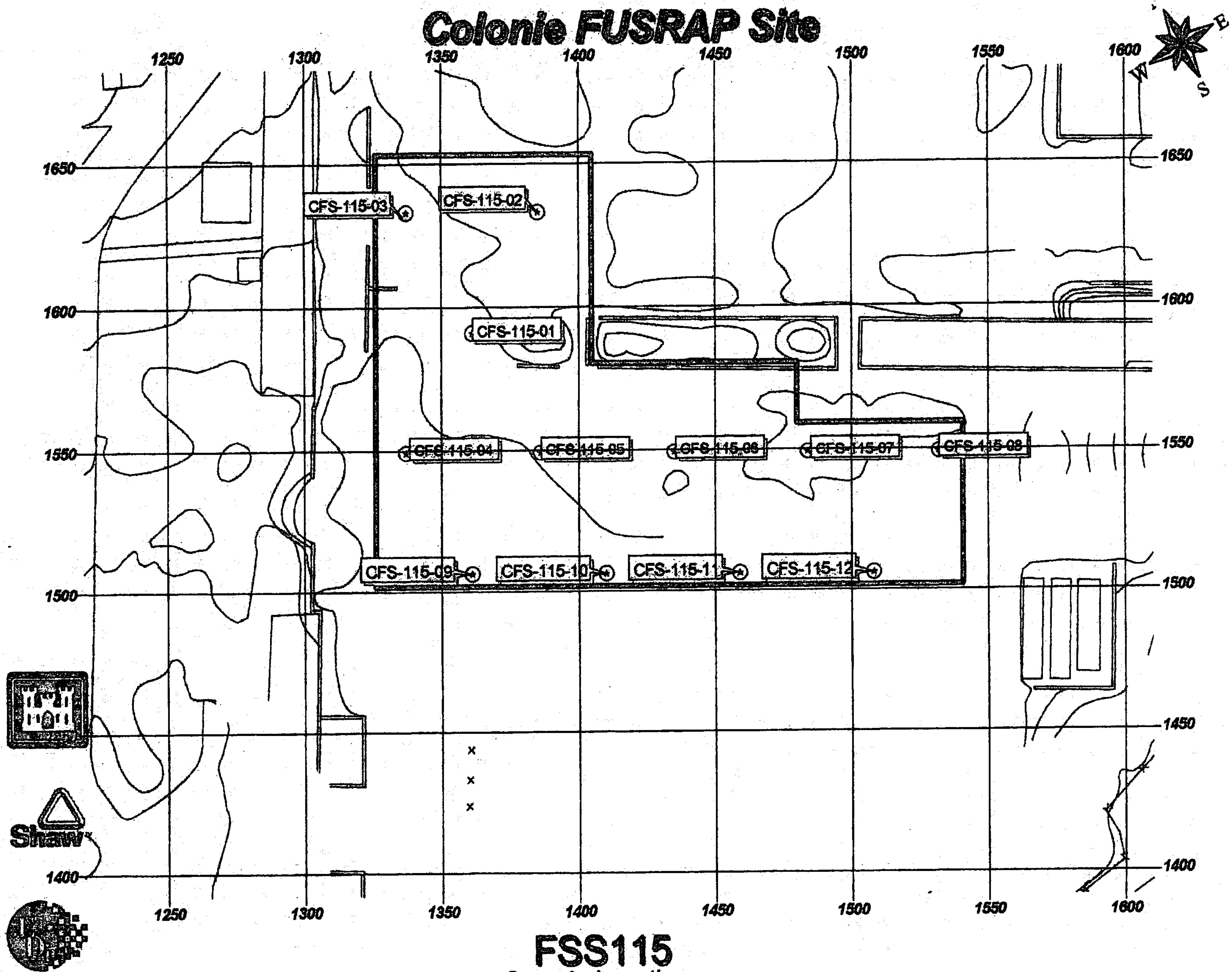
Colonie FUSRAP Site



FSS114

Sample Locations

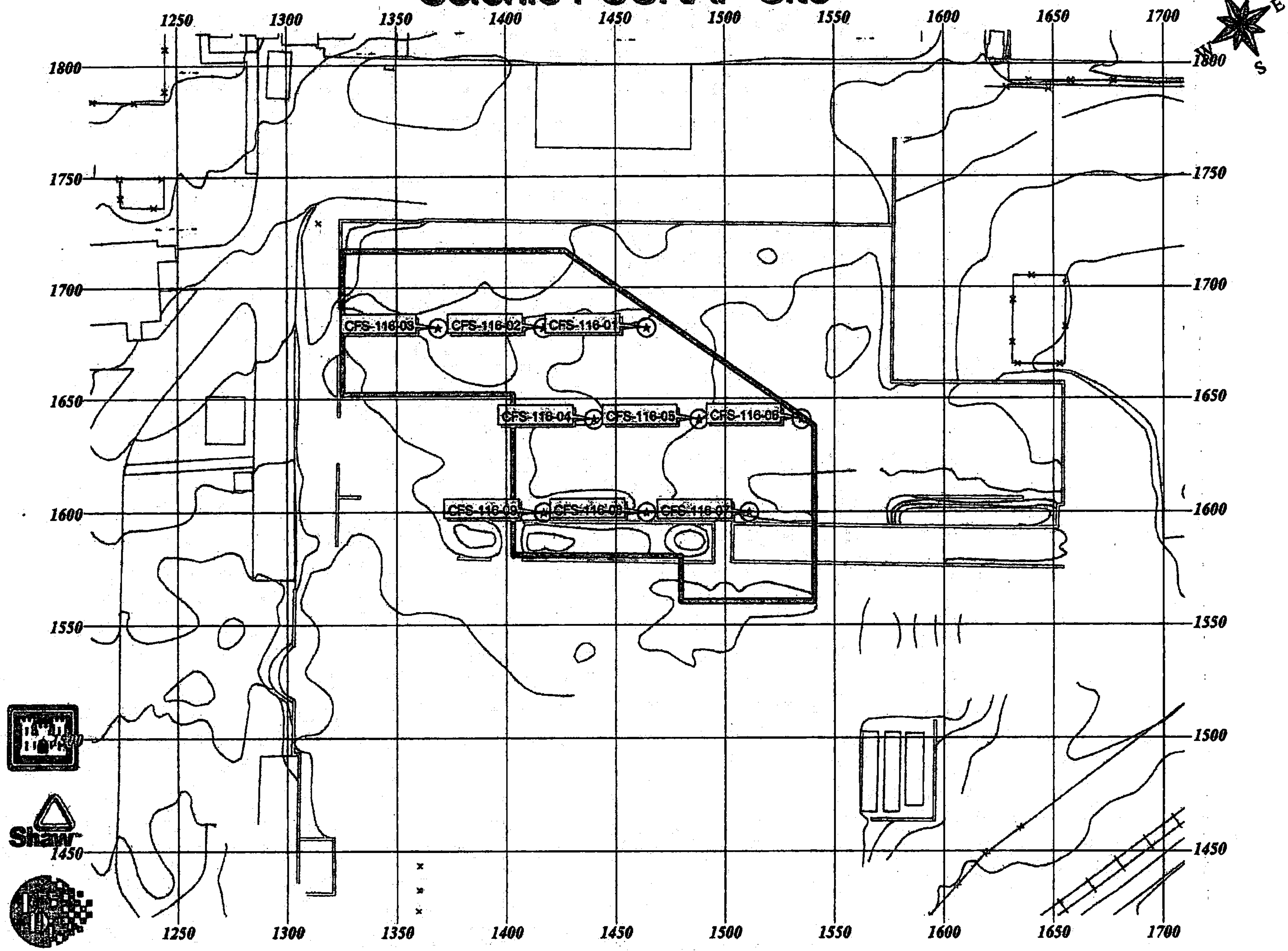
Colonie FUSRAP Site



FSS115

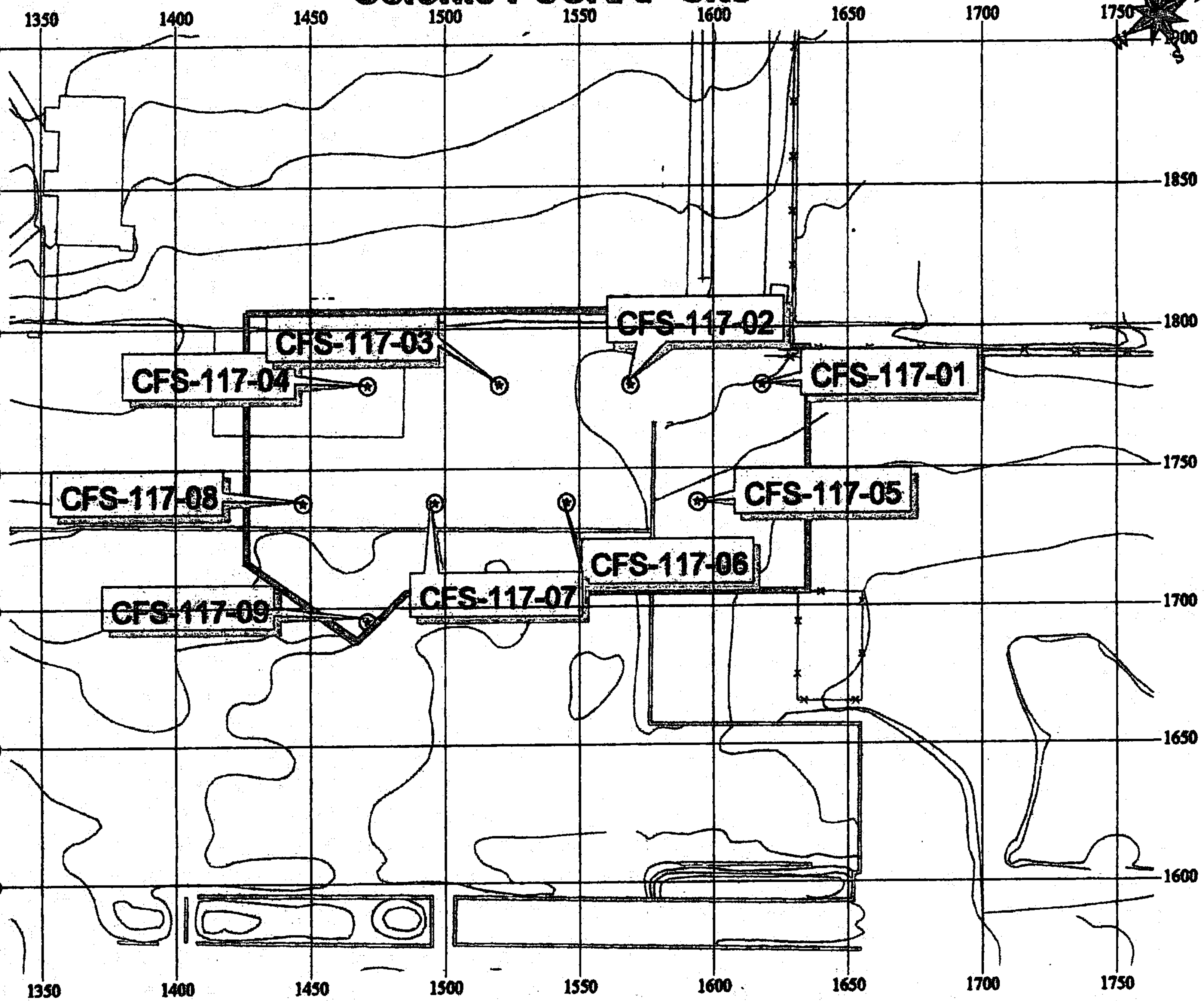
Sample Locations

Colonie FUSRAP Site



FSS116
Sample Locations

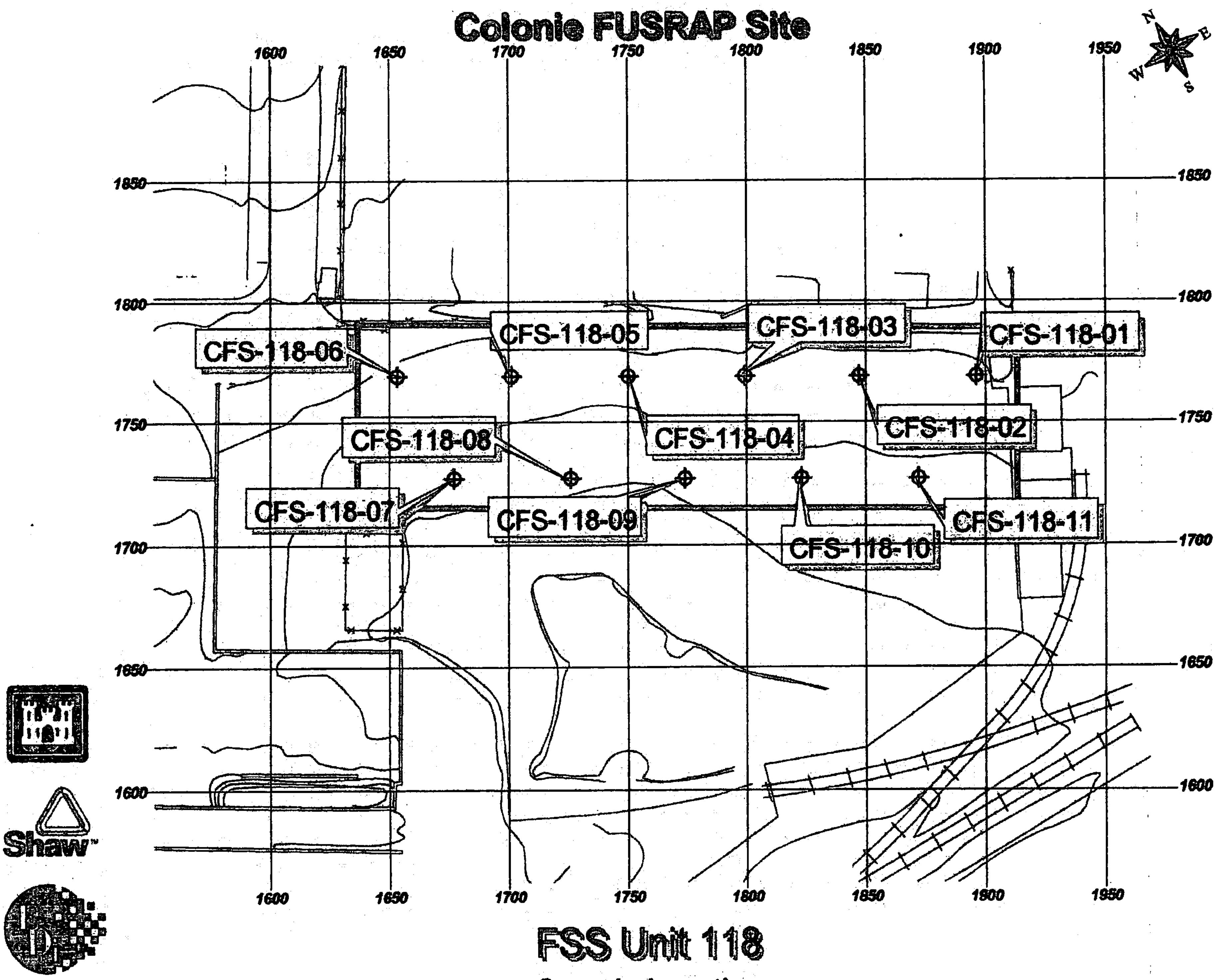
Colonie FUSRAP Site



FSS Unit 117

Sample Locations

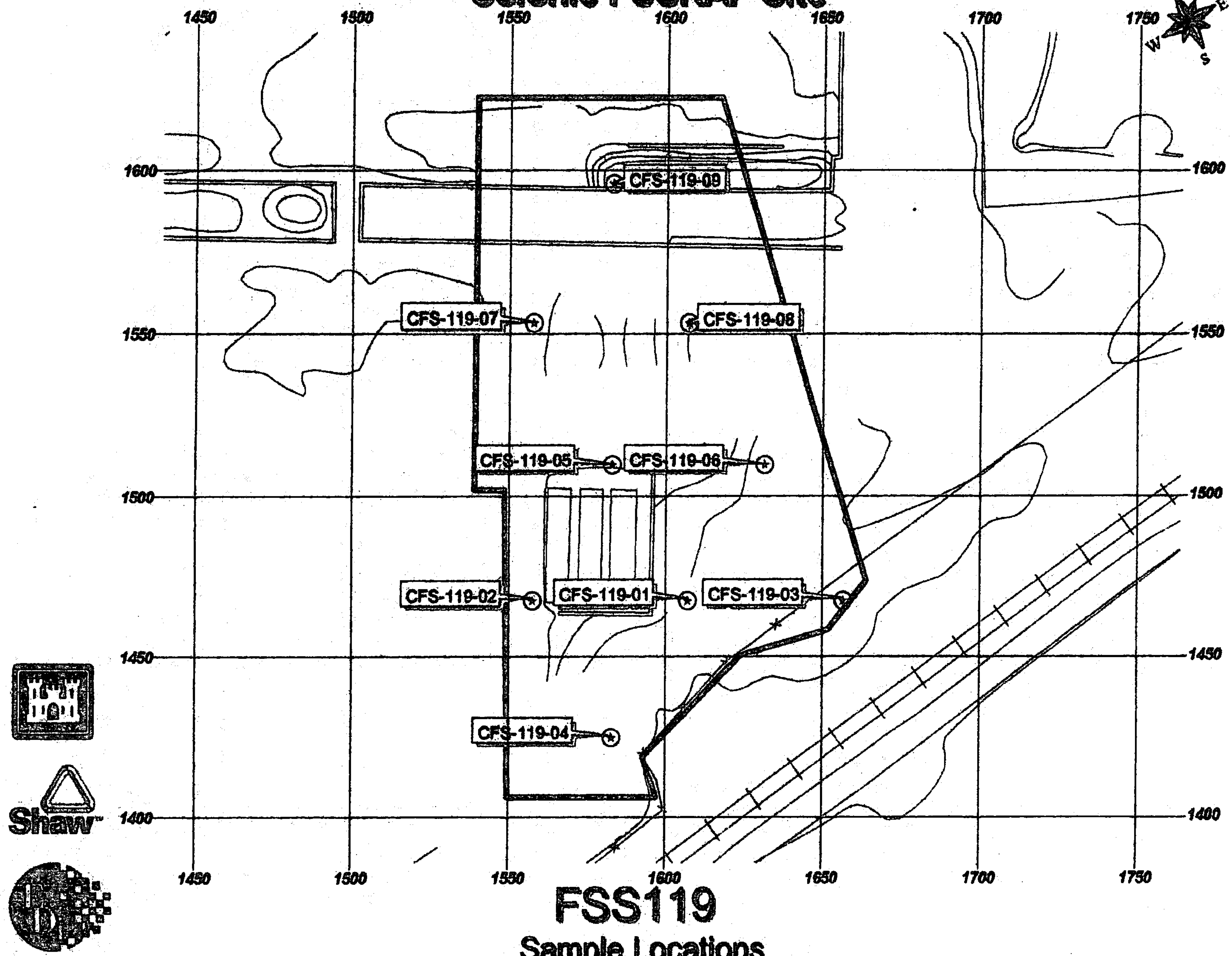
Colonie FUSRAP Site



FSS Unit 118

Sample Locations

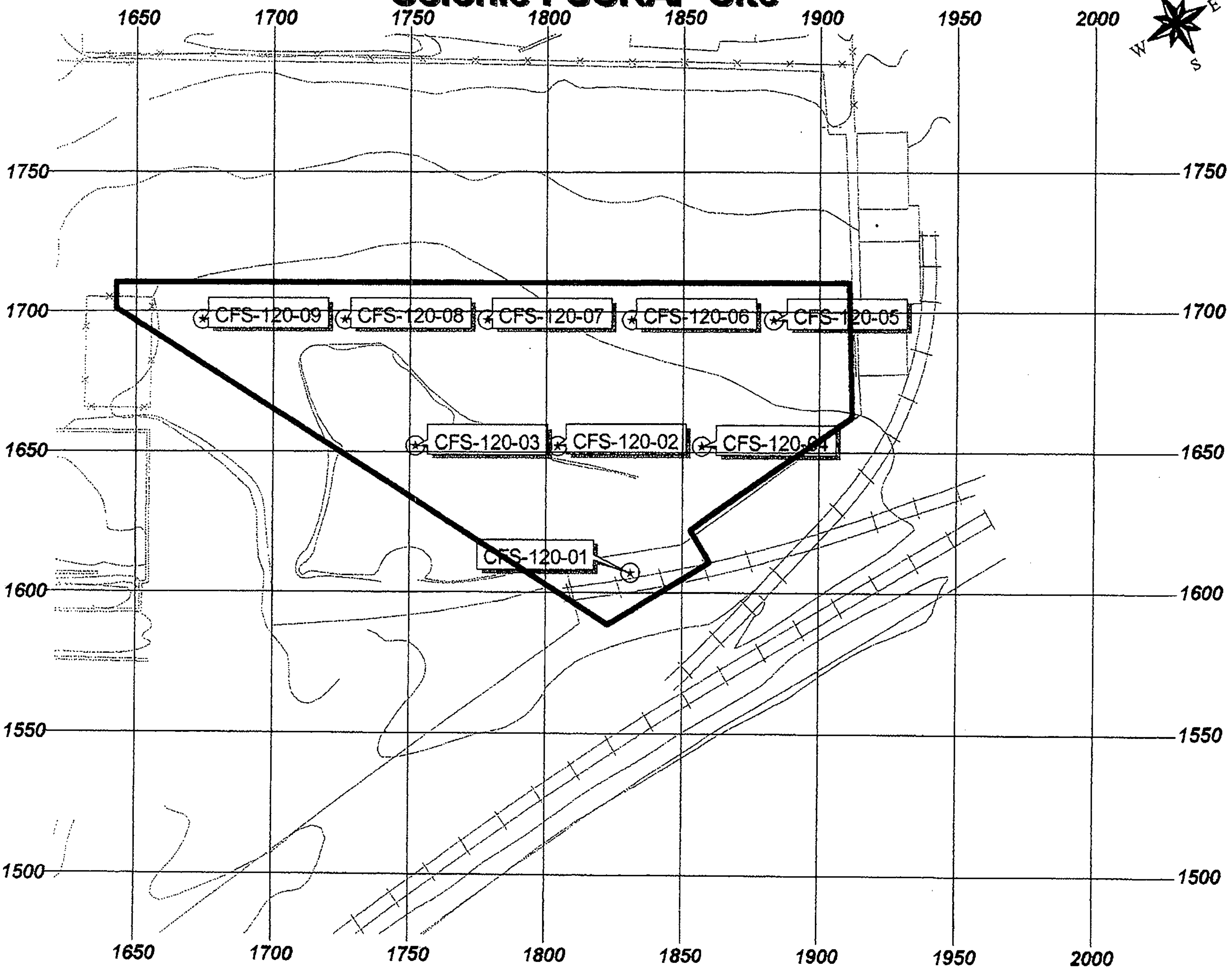
Colonie FUSRAP Site



FSS119

Sample Locations

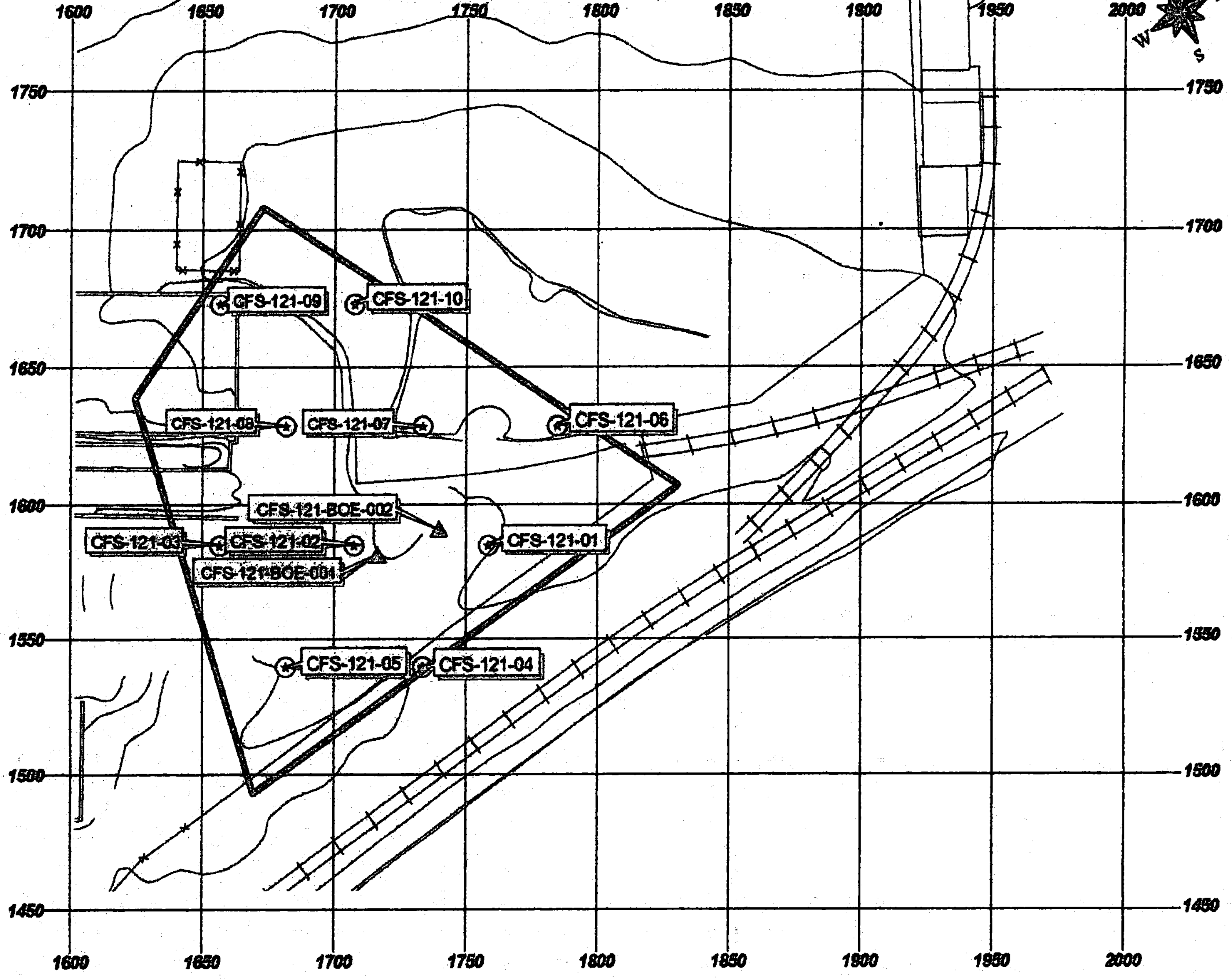
Colonie FUSRAP Site



Shaw

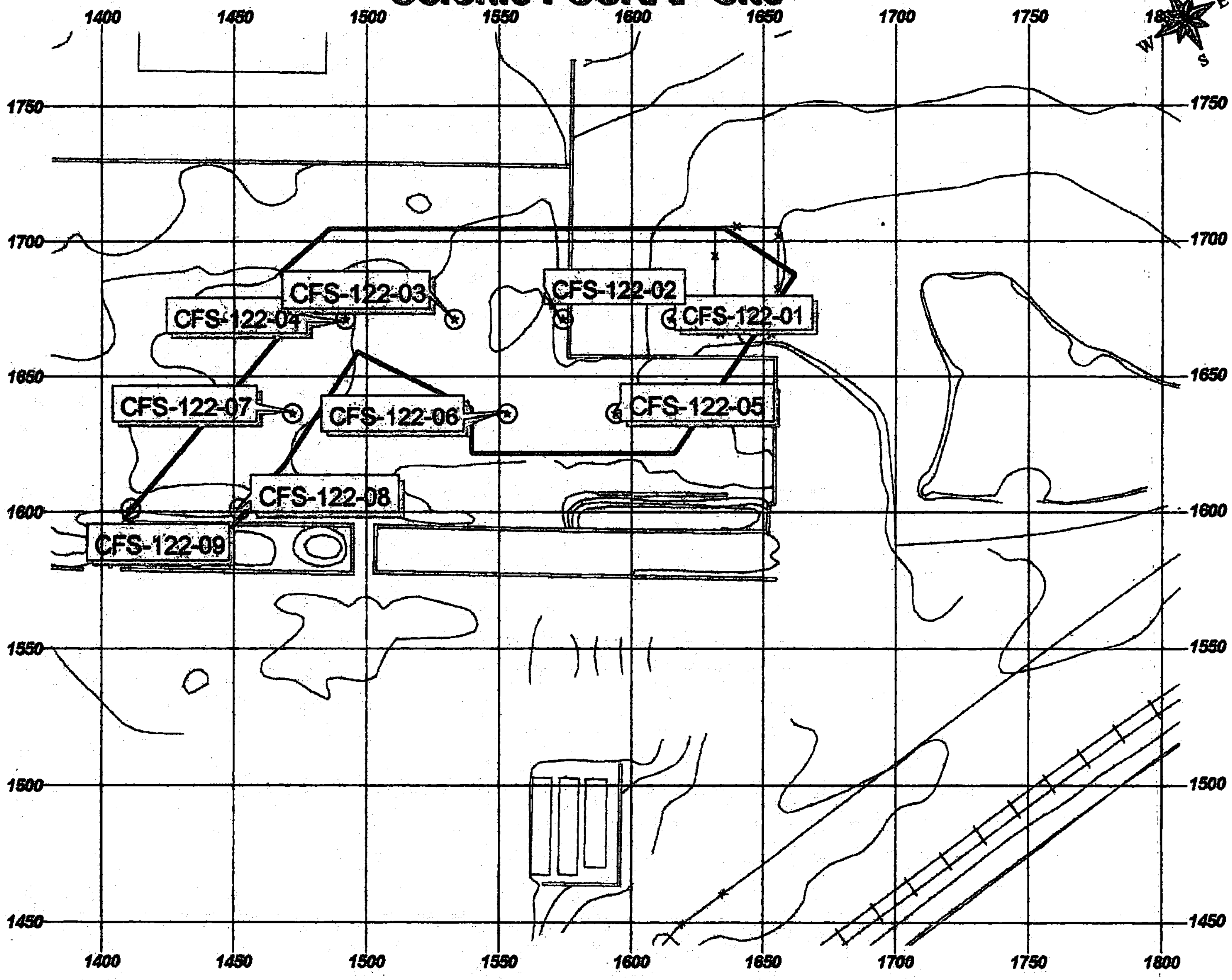
FSS120
Sample Locations

Colonie FUSRAP Site



FSS121
Sample Locations

Colonie FUSRAP Site

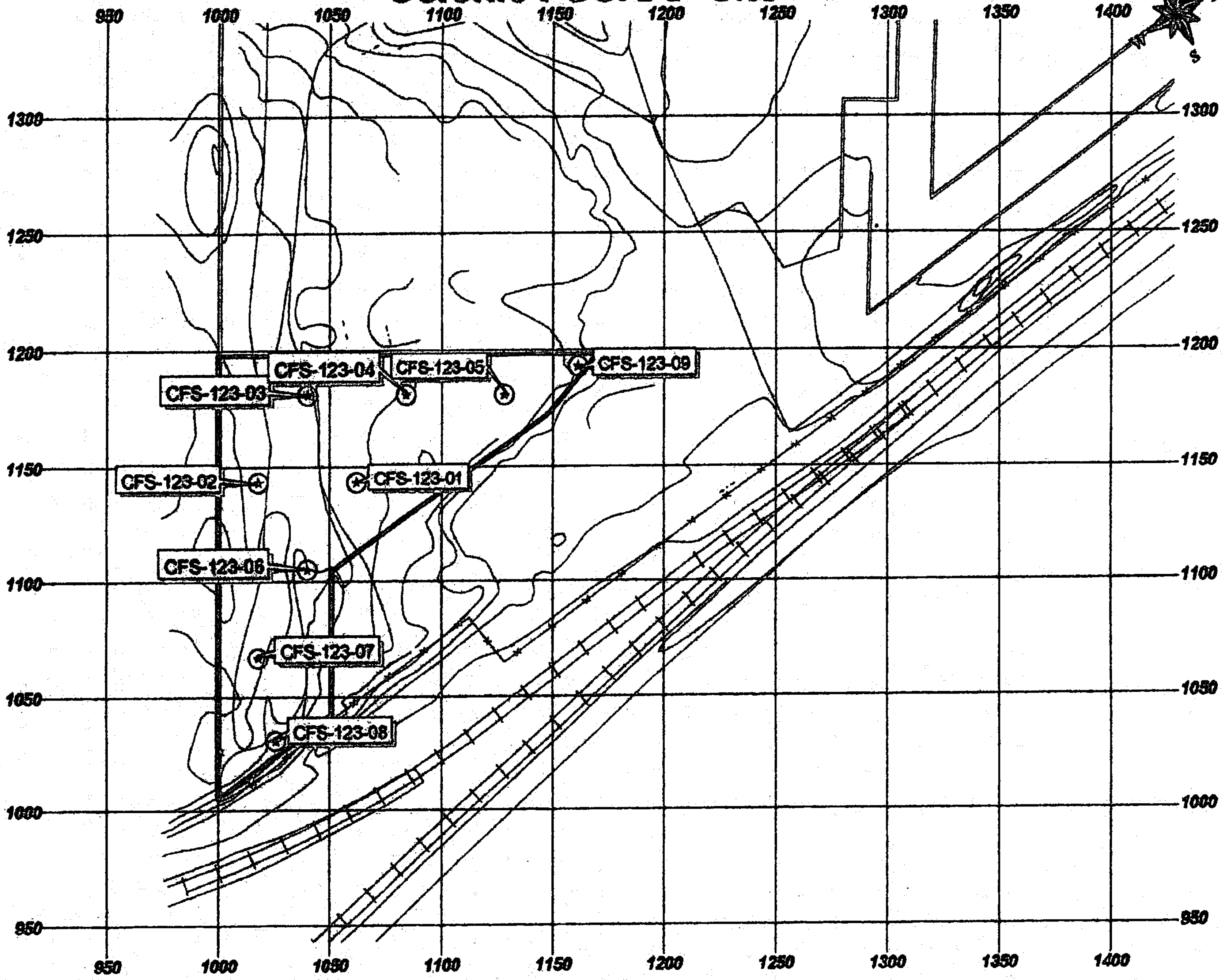


Shaw

FSS122

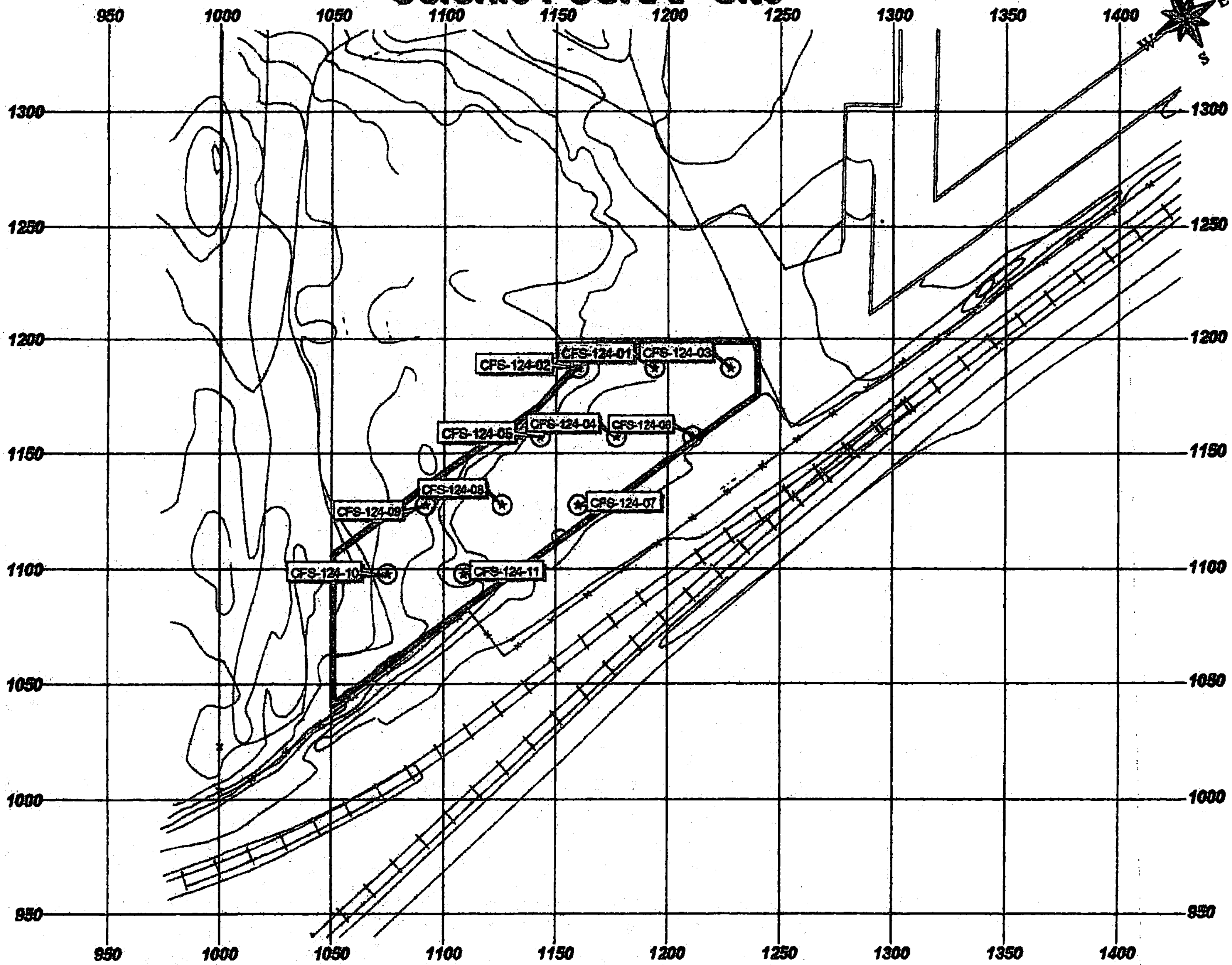
Sample Locations

Colonie FUSRAP Site



FSS123
Sample Locations

Colonie FUSRAP Site

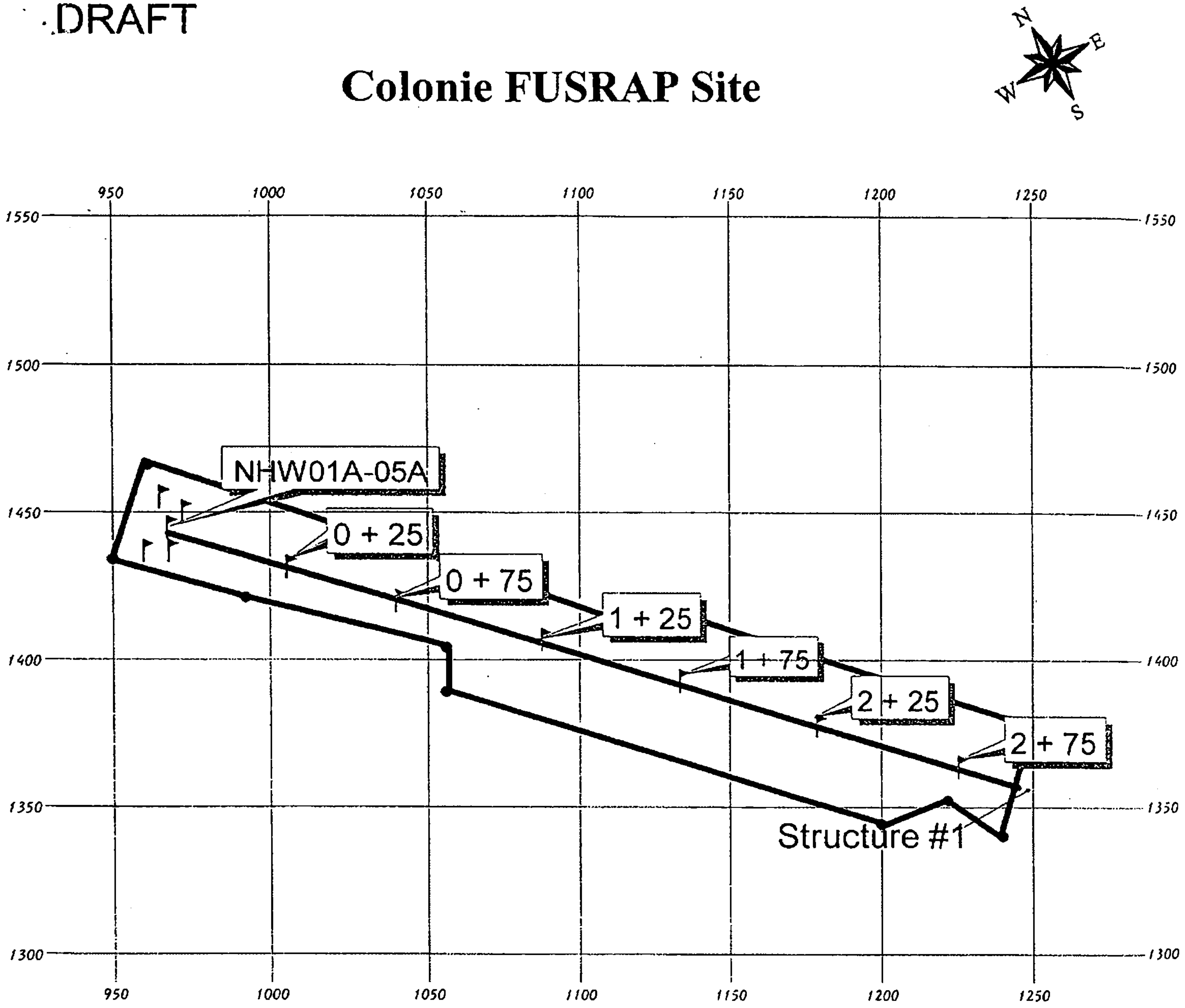


Shaw

FSS124
Sample Locations

DRAFT

Colonie FUSRAP Site

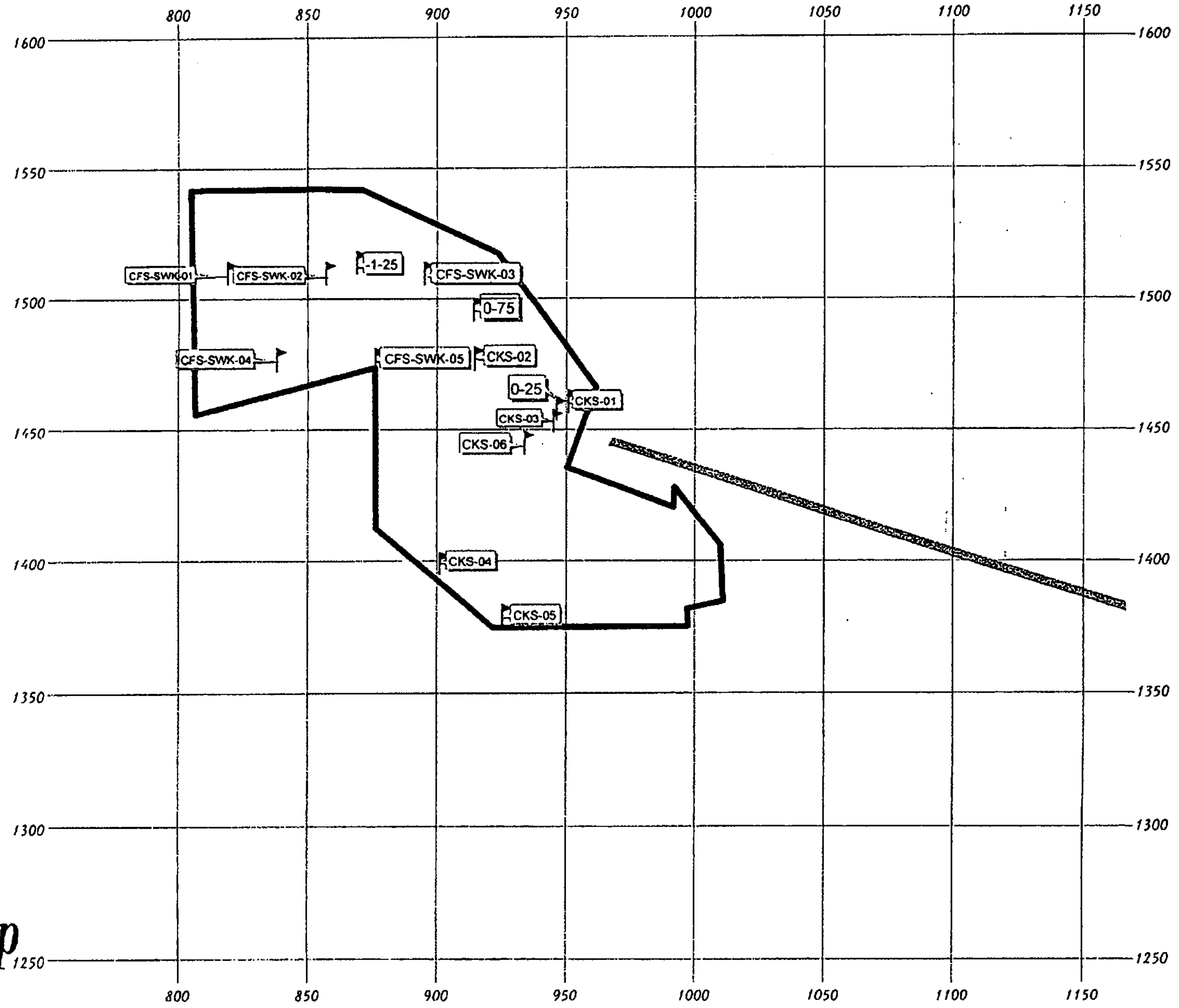


East Culvert Sample Locations

= Sample Locations

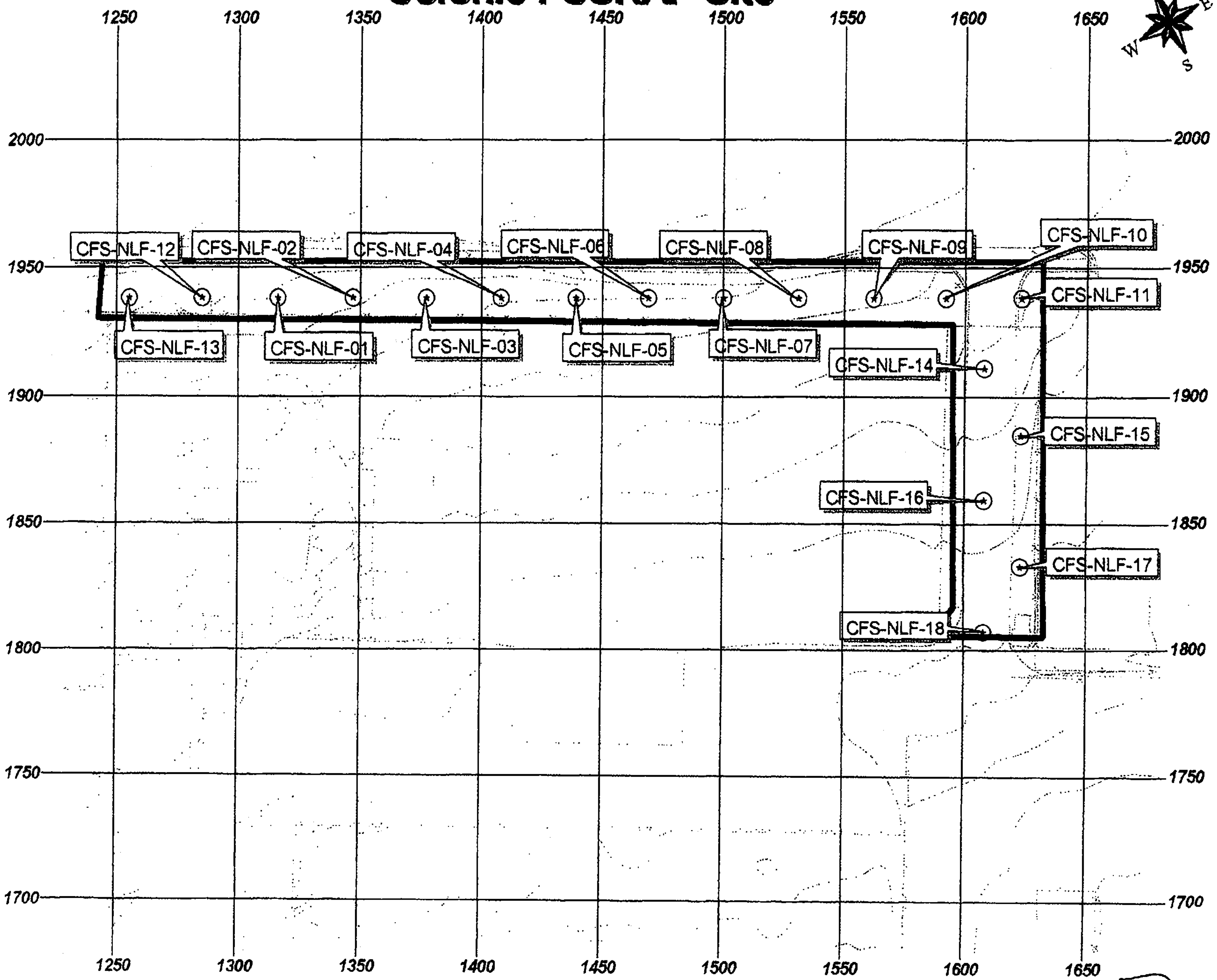
139GS0129

Colonie FUSRAP Site



West Culvert Sample Locations

Colonie FUSRAP Site



Shaw

North Lawn
Sample Locations

APPENDIX B – HHRA TABLES

Table 1

SELECTION OF EXPOSURE PATHWAYS
Colonie FUSRAP Site
All exposure Units

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Soil	Soil	Subsurface Soil	Hypothetical Resident	Adult	Dermal	Quant	Future residents may come into contact with soils that have been brought to the surface.
						Ingestion	Quant	Future residents may ingest soil that has been brought to the surface.
						Inhalation	Quant	Future residents may inhale soil dust that has been brought to the surface.
					Child	Dermal	Quant	Future residents may come into contact with soils that have been brought to the surface.
						Ingestion	Quant	Future residents may ingest soil that has been brought to the surface.
						Inhalation	Quant	Future residents may inhale soil dust that has been brought to the surface.
				Adult Worker	Adult	Dermal	Quant	Future workers may come into contact with soils that have been brought to the surface. Example: Installation of footings.
						Ingestion	Quant	Future workers may incidentally ingest subsurface soils that has been brought to the surface.
						Inhalation	Quant	Future workers may inhale soil dust from subsurface soils that have been brought to the surface.

TABLE 2

RAGS Part D TABLE 3.3

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Current/Future
Medium: Soil - Exposure Unit 104
Exposure Medium: Subsurface Soils

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Subsurface Soils	Arsenic	mg/kg	1.84E+01	–	8.54E+01	8.54E+01	mg/kg	Maximum	(1)
Survey Unit 104	Copper	mg/kg	5.51E+01	–	2.34E+02	2.34E+02	mg/kg	Maximum	(1)
	Lead	mg/kg	5.00E+01	–	2.32E+02	5.00E+01	mg/kg	Mean	(2)

The EPC is based on the lower of the UCL and the maximum detected concentration (Lead models use the mean concentration).

(1) There are too few data points to calculate a 95%UCL, therefore, the maximum value is used

(2) Lead models assume a mean input.

TABLE 3

RAGS Part D TABLE 3.8

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Current/Future
Medium: Soil - Exposure Unit 109
Exposure Medium: Subsurface Soils

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Subsurface Soils Survey Unit 109	Arsenic	mg/kg	6.80E+00	–	1.05E+01	1.05E+01	mg/kg	Maximum	(1)
	Copper	mg/kg	3.14E+02	–	8.95E+02	8.95E+02	mg/kg	Maximum	(1)
	Lead	mg/kg	2.15E+02	–	6.30E+02	2.15E+02	mg/kg	Mean	(2)

The EPC is based on the lower of the UCL and the maximum detected concentration (Lead models use the mean concentration).

(1) There are too few data points to calculate a 95%UCL, therefore, the maximum value is used

(2) Lead models assume a mean input.

TABLE 4

RAGS Part D TABLE 3.10

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Current/Future
Medium: Soil - Exposure Unit 124
Exposure Medium: Subsurface Soils

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Subsurface Soils	Arsenic	mg/kg	2.60E+00	--	3.10E+00	3.10E+00	mg/kg	Maximum	(1)
Survey Unit 124	Copper	mg/kg	1.23E+03	--	2.45E+03	2.45E+03	mg/kg	Maximum	(1)
	Lead	mg/kg	3.71E+02	--	7.34E+02	3.71E+02	mg/kg	Mean	(2)

The EPC is based on the lower of the UCL and the maximum detected concentration (Lead models use the mean concentration).

(1) There are too few data points to calculate a 95%UCL, therefore, the maximum value is used

(2) Lead models assume a mean input.

TABLE 5

RAGS Part D TABLE 3.11

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe:	Current/Future
Medium:	Soil - Exposure Unit North Lawn
Exposure Medium:	Subsurface Soils

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL	Maximum Concentration	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Subsurface Soils Survey Unit North Lawn	Arsenic	mg/kg	3.10E+00	--	8.00E+00	8.00E+00	mg/kg	Maximum	(1)
	Copper	mg/kg	2.62E+02	--	4.34E+03	4.34E+03	mg/kg	Maximum	(1)
	Lead	mg/kg	1.23E+03	--	3.37E+03	1.23E+03	mg/kg	Mean	(2)

The EPC is based on the lower of the UCL and the maximum detected concentration (Lead models use the mean concentration).

(1) There are too few data points to calculate a 95%UCL, therefore, the maximum value is used

(2) Lead models assume a mean input.

TABLE 6
RAGS Part D Table 4.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
Colonie FUSRAP Site

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soils

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residents	Child/Adult (Cancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Chronic daily intake (CDI)(mg/kg-day) =
				IFS_{adj}	Age-adjusted soil ingestion factor	146	mg-year/kg-day	Calculated	EPC x IFS_{adj} x CF x FI x EF x 1/AT
				FI	Fraction Ingested	1	unitless	EPA, 1989	Where
				EF	Exposure Frequency	155	days/year	NYSDEC, 2006	IFS_{adj} = (IR_c x ED_c x 1/BW_c) + (IR_a x ED_a x 1/BW_a)
				ED_c	Exposure Duration - child	6	years	EPA, 2002a	
				ED_a	Exposure Duration - adult	64	years	NYSDEC, 2006; 70 yr total minus 6 child	
				IR_c	Ingestion Rate of Soil - child	120	mg/day	NYSDEC, 2006	
				IR_a	Ingestion Rate of Soil - adult	100	mg/day	NYSDEC, 2006	
				BW_c	Body Weight - child	13.3	kg	NYSDEC, 2006	
				BW_a	Body Weight - adult	70	kg	EPA, 1991a	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989 (70 years x 365 days/year)	
		Child (Noncancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Chronic daily intake (CDI)(mg/kg-day) =
				IR	Ingestion Rate of Soil	120	mg/day	NYSDEC, 2006	EPC x IR x CF x FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	EPA, 1989	
				EF	Exposure Frequency	155	days/year	NYSDEC, 2006	
				ED	Exposure Duration	6	years	EPA, 2002a	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				BW	Body Weight	13.3	kg	NYSDEC, 2006	
				AT-NC	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989 (ED x 365 days/year)	
		Adult (Noncancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Chronic daily intake (CDI)(mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	NYSDEC, 2006	EPC x IR x CF x FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	EPA, 1989	
				EF	Exposure Frequency	62	days/year	NYSDEC, 2006	
				ED	Exposure Duration	24	years		
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-NC	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989 (ED x 365 days/year)	
	Adult Worker	Adult	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	µg/L	Survey Unit Specific	Chronic daily intake (CDI)(mg/kg-day) =
				IR	Ingestion Rate of Soil	50	mg/day	NYSDEC, 2006	EPC x IR x CF x FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	EPA, 1989	
				EF	Exposure Frequency	124	days/year	NYSDEC, 2006	
				ED	Exposure Duration	25	years	NYSDEC, 2006; carc. or noncarc.	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-NC	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989 (ED x 365 days/year)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989 (70 years x 365 days/year)	

TABLE 6

RAGS Part D Table 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

Colonie FUSRAP Site

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soils

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Residents	Child/Adult (Cancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Dermally Absorbed Dose (DAD)(mg/kg-day) =
				SFS_{adj}	Age-adjusted soil contact factor	617	mg -year/kg-day	Calculated	EPC x CF x SFS_{adj} x ABS x EF x 1/AT
				ABS	Dermal Absorption Factor	COPC-specific	unitless	EPA, 2004a	Where
				EF	Exposure Frequency	155	days/year	NYSDEC, 2006	SFS_{adj} = (SA_c x AF_c x ED_c x 1/BW_c) + (SA_a x AF_a x ED_a x 1/BW_a)
				SA_c	Exposed Skin Surface Area - child	2,800	cm^2/day	EPA, 2004a, 2003a	
				SA_a	Exposed Skin Surface Area - adult	5,700	cm^2/day	EPA, 2004a, 2003a	617.4315789
				AF_c	Soil to Skin Adherence Factor - child	0.2	mg/cm^2	EPA, 2004a, 2003a	
				AF_a	Soil to Skin Adherence Factor - adult	0.07	mg/cm^2	EPA, 2004a, 2003a	
				ED_c	Exposure Duration - child	6	years	NYSDEC, 2006	
				ED_a	Exposure Duration - adult	64	years	NYSDEC, 2006; 70 yr total minus 6 child	
				BW_c	Body Weight - child	13.3	kg	NYSDEC, 2006	
				BW_a	Body Weight - adult	70	kg	EPA, 1991a	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
		Child (Noncancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Dermally Absorbed Dose (DAD)(mg/kg-day) =
				SA	Exposed Skin Surface Area	2,800	cm^2/day	EPA, 2004a, 2003a	EPC x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004a, 2003a	
				ABS	Dermal Absorption Factor	COPC-specific	unitless	EPA, 2004a	
				EF	Exposure Frequency	155	days/year	NYSDEC, 2006	
				ED	Exposure Duration	6	years	EPA, 2002a	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				BW	Body Weight	13.3	kg	NYSDEC, 2006	
				AT-NC	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989 (ED x 365 days/year)	
		Adult (Noncancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Dermally Absorbed Dose (DAD)(mg/kg-day) =
				SA	Exposed Skin Surface Area	5,700	cm^2/day	EPA, 2004a, 2003a	EPC x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.07	mg/cm^2	EPA, 2004a, 2003a	
				ABS	Dermal Absorption Factor	COPC-specific	unitless	EPA, 2004a	
				EF	Exposure Frequency	62	days/year	NYSDEC, 2006	
				ED	Exposure Duration	24	years	EPA, 2002a	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-NC	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989 (ED x 365 days/year)	
	Adult Worker	Adult	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Dermally Absorbed Dose (DAD)(mg/kg-day) =
				SA	Exposed Skin Surface Area	5,700	cm^2/day	EPA, 2004a, 2003a	EPC x CF x SA x AF x ABS x EF x ED x 1/BW x 1/AT
				AF	Soil to Skin Adherence Factor	0.01	mg/cm^2	EPA, 2004a	
				ABS	Dermal Absorption Factor	COPC-specific	unitless	EPA, 2004a	
				EF	Exposure Frequency	124	days/year	NYSDEC, 2006	
				ED	Exposure Duration	25	years	NYSDEC, 2006; carc. or noncarc.	
				CF	Conversion Factor	1.00E-06	kg/mg	----	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-NC	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989 (ED x 365 days/year)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

TABLE 6

RAGS Part D Table 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

Colonie FUSRAP Site

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soils

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation of Particulates	Residents	Child/Adult (Cancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Exposure Concentration (EC)($\mu g/m^3$) =
				ET	Exposure Time	24	hours/day	Professional Judgment	(C_a x CF x ET x EF x ED)/AT
				EF	Exposure Frequency	155	days/year	NYSDEC, 2006	
				ED_c	Exposure Duration - child	6	years	EPA, 2002a	C_a= EPC/PEF
				ED_a	Exposure Duration - adult	64	years	NYSDEC, 2006; 70 yr total minus 6 child	ED=EDa+EDc
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	C_a= Contaminant concentration in air
				CF	Conversion Factor	1.00E-03	mg/µg	----	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989 (70 years x 365 days/year)	
		Child (Noncancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Exposure Concentration (EC)($\mu g/m^3$) =
				ET	Exposure Time	24	hours/day	Professional Judgment	(C_a x CF x ET x EF x ED)/AT
				EF	Exposure Frequency	155	days/year	NYSDEC, 2006	
				ED	Exposure Duration	6	years	EPA, 2002a	C_a= EPC/PEF
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				VF	Volatilization Factor	COPC-specific	m^3/kg	COPC-specific, EPA, 2002a	
				CF	Conversion Factor	1.00E-03	mg/µg	----	
				AT-NC	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989 (ED x 365 days/year)	
		Adult (Noncancer)	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Exposure Concentration (EC)($\mu g/m^3$) =
				ET	Exposure Time	24	hours/day	Professional Judgment	(C_a x CF x ET x EF x ED)/AT
				EF	Exposure Frequency	62	days/year	NYSDEC, 2006	
				ED	Exposure Duration	24	years	EPA, 2002a	C_a= EPC/PEF
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				CF	Conversion Factor	1.00E-03	mg/µg	----	
				AT-NC	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989 (ED x 365 days/year)	
	Adult Worker	Adult	Subsurface Soils	EPC	Exposure Point Concentration	COPC-specific	mg/kg	Survey Unit Specific	Exposure Concentration (EC)($\mu g/m^3$) =
				EF	Exposure Frequency	124	days/year	NYSDEC, 2006	(C_a x CF x ET x EF x ED)/AT
				ET	Exposure Time	8	hours/day	Professional Judgment	
				ED	Exposure Duration	25	years	NYSDEC, 2006; carc. or noncarc.	C_a= EPC/PEF
				PEF	Particulate Emissions Factor	1.36E+09	m^3/kg	EPA, 2002	
				CF	Conversion Factor	1.00E-03	mg/µg	----	
				AT-NC	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989 (ED x 365 days/year)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Table 7

Dermal Absorption Factors
Colonie FUSRAP Site

COPC	Dermal Absorption Factor (unitless)	
Arsenic	0.03	a
Copper	--	a
Lead	--	a

Note:
[a] Table 5.2.2.3-2, *New York State Brownfield Cleanup Program, Development of Soil Cleanup Objectives, Technical Support Document* (NYSDEC, 2006) p. 139

TABLE 8

RAGS Part D TABLE 5.1

NON-CANCER TOXICITY DATA – ORAL/DERMAL

Colonie FUSRAP Site

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal (1)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (2) (MM/DD/YYYY)
Arsenic	Chronic	3.00E-04	mg/kg/day	1.0	3.00E-04	mg/kg/day	Skin	3	IRIS	1/9/2013
Copper	Chronic	4.00E-02	mg/kg/day	1.0	4.00E-02	mg/kg/day	Gastrointestinal System	NA	HEAST	1/9/2013
Lead	NA	NA	NA	---	NA	NA	NA	NA	NA	NA

(1) Source: EPA, 2004.

(2) Date of source or date when source was searched.

Definitions:

HEAST=Health Effects Assessment Summary Tables, July 1997.

IRIS=Integrated Risk Information System

NA=Not available

TABLE 9

RAGS Part D TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

Colonie FUSRAP Site

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units			Source(s)	Date(s) (2) (MM/DD/YYYY)
Arsenic	Chronic	1.50E-05	mg/m3	Cardiovascular System	30	Cal EPA	1/9/2013
Copper	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA

(2) Date of source or date when source was searched.

(3) 2,4-Dinitrotoluene value used.

Definitions:
CNS=Central nervous system
IRIS=Integrated Risk Information System
NA=Not available
PPRTV=Provisional Peer-Reviewed Toxicity Value.

TABLE 10

RAGS Part D TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Colonie FUSRAP Site

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (1)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (2) (MM/DD/YYYY)
Arsenic	1.5E+00	1/mg/kg/day	1.0	1.5E+00	1/mg/kg/day	A	IRIS	1/9/2013
Copper	NA	NA	--	NA	NA	D	NA	NA
Lead	NA	NA	--	NA	NA	B2	NA	NA

(1) Source: EPA, 2004.

(2) Date of source or date when source was searched.

Definitions: IRIS = Integrated Risk Information System

NA = Not available

NCEA=National Center for Environmental Assessment

A - Human carcinogen.

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans.

C - Possible human carcinogen.

D - Not classifiable as a human carcinogen.

TABLE 11

RAGS Part D TABLE 6.2

CANCER TOXICITY DATA – INHALATION

Colonie FUSRAP Site

Chemical of Potential Concern	Unit Risk		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation	
	Value	Units		Source(s)	Date(s) (1) (MM/DD/YYYY)
Arsenic	4.3E-03	$1/\mu g/m^3$	A	IRIS	1/10/2013
Copper	NA	NA	D	NA	NA
Lead	NA	NA	B2	NA	NA

(1) Date of source or date when source was searched.

Definitions: IRIS = Integrated Risk Information System.

NA = Not available.

A - Human carcinogen.

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans.

D - Not classifiable as a human carcinogen.

Table 12

RAGS Part D TABLE 7.9

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 104)
Receptor Age: Age-Adjusted (Child/Adult)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.54E+01	mg/kg	7.56E-05	mg/kg/day	1.5E+00	1/mg/kg/day	1.13E-04	—	—	—	—	—
				Copper	2.34E+02	mg/kg	2.07E-04	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.13E-04					—
			Dermal	Arsenic	8.54E+01	mg/kg	9.60E-06	mg/kg/day	1.5E+00	1/mg/kg/day	1.44E-05	—	—	—	—	—
				Copper	2.34E+02	mg/kg	NA	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.44E-05					—
			Inhalation of VOCs/Particulates	Arsenic	8.54E+01	mg/kg	2.67E-11	µg/m³	4.3E-03	1/µg/m³	1.15E-13	—	—	—	—	—
				Copper	2.34E+02	mg/kg	5.86E-10	µg/m³	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.15E-13					—
	Aggregate Soils Total										1.28E-04					—

Table 13

RAGS Part D TABLE 7.10

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 104)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.54E+01	mg/kg	—	—	—	—	—	3.35E-04	mg/kg/day	3.0E-04	mg/kg/day	1.12E+00
				Copper	2.34E+02	mg/kg	—	—	—	—	—	9.17E-04	mg/kg/day	4.0E-02	mg/kg/day	2.29E-02
			Exp. Route Total								—					1.14E+00
			Dermal	Arsenic	8.54E+01	mg/kg	—	—	—	—	—	4.69E-05	mg/kg/day	3.0E-04	mg/kg/day	1.56E-01
				Copper	2.34E+02	mg/kg	—	—	—	—	—	1.28E-04	mg/kg/day	4.0E-02	mg/kg/day	3.21E-03
			Exp. Route Total								—					1.59E-01
			Inhalation of VOCs/Particulates	Arsenic	8.54E+01	mg/kg	—	—	—	—	—	2.67E-11	mg/m3	1.5E-05	mg/m3	1.78E-06
				Copper	2.34E+02	mg/kg	—	—	—	—	—	NA	mg/m3	NA	mg/m3	NA
			Exp. Route Total								—					1.78E-06
	Aggregate Soils Total										—					1.30E+00

Table 14

RAGS Part D TABLE 7.11

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 104)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.54E+01	mg/kg	—	—	—	—	—	2.07E-05	mg/kg/day	3.0E-04	mg/kg/day	6.91E-02
				Copper	2.34E+02	mg/kg	—	—	—	—	—	5.68E-05	mg/kg/day	4.0E-02	mg/kg/day	1.42E-03
			Exp. Route Total								—					7.05E-02
			Dermal	Arsenic	8.54E+01	mg/kg	—	—	—	—	—	2.48E-06	mg/kg/day	3.0E-04	mg/kg/day	8.27E-03
				Copper	2.34E+02	mg/kg	—	—	—	—	—	0.00E+00	mg/kg/day	4.0E-02	mg/kg/day	0.00E+00
			Exp. Route Total								—					8.27E-03
			Inhalation of VOCs/Particulates	Arsenic	8.54E+01	mg/kg	—	—	—	—	—	1.07E-11	mg/m^3	3.0E-04	mg/m^3	3.56E-08
				Copper	2.34E+02	mg/kg	—	—	—	—	—	2.92E-11	mg/m^3	4.0E-02	mg/m^3	7.31E-10
			Exp. Route Total								—					3.63E-08
	Aggregate Soils Total										—					7.88E-02

Table 15-

RAGS Part D TABLE 7.12

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker (Exposure Unit 104)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.54E+01	mg/kg	7.40E-06	mg/kg/day	1.5E+00	1/mg/kg/day	1.11E-05	2.07E-05	mg/kg/day	3.0E-04	mg/kg/day	6.91E-02
				Copper	2.34E+02	mg/kg	2.03E-05	mg/kg/day	NA	NA	NA	5.68E-05	mg/kg/day	4.0E-02	mg/kg/day	1.42E-03
			Exp. Route Total								1.11E-05					7.05E-02
			Dermal	Arsenic	8.54E+01	mg/kg	2.53E-07	mg/kg/day	1.5E+00	1/mg/kg/day	3.80E-07	7.09E-07	mg/kg/day	3.0E-04	mg/kg/day	2.36E-03
				Copper	2.34E+02	mg/kg	2.31E-07	mg/kg/day	NA	NA	NA	6.47E-07	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								3.80E-07					2.36E-03
			Inhalation of VOCs/Particulates	Arsenic	8.54E+01	mg/kg	2.51E-12	µg/m3	4.3E-03	1/µg/m3	1.08E-14	7.04E-12	mg/m3	3.0E-04	mg/m3	2.35E-08
				Copper	2.34E+02	mg/kg	6.89E-12	µg/m3	NA	NA	NA	1.93E-11	mg/m3	4.0E-02	mg/m3	4.82E-10
			Exp. Route Total								1.08E-14					2.39E-08
	Aggregate Soils Total										1.15E-05					7.29E-02

Table 16

RAGS Part D TABLE 7.29

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 109)
Receptor Age: Age-Adjusted (Child/Adult)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	1.05E+01	mg/kg	9.30E-06	mg/kg/day	1.5E+00	1/mg/kg/day	1.40E-05	—	—	—	—	—
				Copper	8.95E+02	mg/kg	7.93E-04	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.40E-05					—
			Dermal	Arsenic	1.05E+01	mg/kg	1.18E-06	mg/kg/day	1.5E+00	1/mg/kg/day	1.77E-06	—	—	—	—	—
				Copper	8.95E+02	mg/kg	NA	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.77E-06					—
			Inhalation of VOCs/Particulates	Arsenic	1.05E+01	mg/kg	3.28E-12	µg/m^3	4.3E-03	1/µg/m^3	1.41E-14	—	—	—	—	—
				Copper	8.95E+02	mg/kg	2.24E-09	µg/m^3	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.41E-14					—
	Aggregate Soils Total										1.57E-05					—

Table 17

RAGS Part D TABLE 7.30

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 109)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	1.05E+01	mg/kg	—	—	—	—	—	4.12E-05	mg/kg/day	3.0E-04	mg/kg/day	1.37E-01
				Copper	8.95E+02	mg/kg	—	—	—	—	—	3.51E-03	mg/kg/day	4.0E-02	mg/kg/day	8.77E-02
			Exp. Route Total								—					2.25E-01
			Dermal	Arsenic	1.05E+01	mg/kg	—	—	—	—	—	5.76E-06	mg/kg/day	3.0E-04	mg/kg/day	1.92E-02
				Copper	8.95E+02	mg/kg	—	—	—	—	—	4.91E-04	mg/kg/day	4.0E-02	mg/kg/day	1.23E-02
			Exp. Route Total								—					3.15E-02
			Inhalation of VOCs/Particulates	Arsenic	1.05E+01	mg/kg	—	—	—	—	—	3.28E-12	mg/m3	1.5E-05	mg/m3	2.19E-07
				Copper	8.95E+02	mg/kg	—	—	—	—	—	NA	mg/m3	NA	mg/m3	NA
			Exp. Route Total								—					2.19E-07
	Aggregate Soils Total										—					2.56E-01

Table 18

RAGS Part D TABLE 7.31

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 109)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	1.05E+01	mg/kg	—	—	—	—	—	2.55E-06	mg/kg/day	3.0E-04	mg/kg/day	8.49E-03
				Copper	8.95E+02	mg/kg	—	—	—	—	—	2.17E-04	mg/kg/day	4.0E-02	mg/kg/day	5.43E-03
			Exp. Route Total								—					1.39E-02
			Dermal	Arsenic	1.05E+01	mg/kg	—	—	—	—	—	3.05E-07	mg/kg/day	3.0E-04	mg/kg/day	1.02E-03
				Copper	8.95E+02	mg/kg	—	—	—	—	—	0.00E+00	mg/kg/day	4.0E-02	mg/kg/day	0.00E+00
			Exp. Route Total								—					1.02E-03
			Inhalation of VOCs/Particulates	Arsenic	1.05E+01	mg/kg	—	—	—	—	—	1.31E-12	mg/m^3	3.0E-04	mg/m^3	4.37E-09
				Copper	8.95E+02	mg/kg	—	—	—	—	—	1.12E-10	mg/m^3	4.0E-02	mg/m^3	2.79E-09
			Exp. Route Total								—					7.17E-09
	Aggregate Soils Total										—					1.49E-02

Table 19

RAGS Part D TABLE 7.32

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker (Exposure Unit 109)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	1.05E+01	mg/kg	9.10E-07	mg/kg/day	1.5E+00	1/mg/kg/day	1.36E-06	2.55E-06	mg/kg/day	3.0E-04	mg/kg/day	8.49E-03
				Copper	8.95E+02	mg/kg	7.76E-05	mg/kg/day	NA	NA	NA	2.17E-04	mg/kg/day	4.0E-02	mg/kg/day	5.43E-03
			Exp. Route Total								1.36E-06					1.39E-02
			Dermal	Arsenic	1.05E+01	mg/kg	3.11E-08	mg/kg/day	1.5E+00	1/mg/kg/day	4.67E-08	8.71E-08	mg/kg/day	3.0E-04	mg/kg/day	2.90E-04
				Copper	8.95E+02	mg/kg	8.84E-07	mg/kg/day	NA	NA	NA	2.48E-06	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								4.67E-08					2.90E-04
			Inhalation of VOCs/Particulates	Arsenic	1.05E+01	mg/kg	3.09E-13	µg/m3	4.3E-03	1/µg/m3	1.33E-15	8.66E-13	mg/m3	3.0E-04	mg/m3	2.89E-09
				Copper	8.95E+02	mg/kg	2.63E-11	µg/m3	NA	NA	NA	7.38E-11	mg/m3	4.0E-02	mg/m3	1.84E-09
			Exp. Route Total								1.33E-15					4.73E-09
	Aggregate Soils Total										1.41E-06					1.42E-02

Table 20

RAGS Part D TABLE 7.37

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 124)
Receptor Age: Age-Adjusted (Child/Adult)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	3.10E+00	mg/kg	2.75E-06	mg/kg/day	1.5E+00	1/mg/kg/day	4.12E-06	—	—	—	—	—
				Copper	2.45E+03	mg/kg	2.17E-03	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								4.12E-06					—
			Dermal	Arsenic	3.10E+00	mg/kg	3.48E-07	mg/kg/day	1.5E+00	1/mg/kg/day	5.22E-07	—	—	—	—	—
				Copper	2.45E+03	mg/kg	NA	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								5.22E-07					—
			Inhalation of VOCs/Particulates	Arsenic	3.10E+00	mg/kg	9.68E-13	μg/m^3	4.3E-03	1/μg/m^3	4.16E-15	—	—	—	—	—
				Copper	2.45E+03	mg/kg	6.14E-09	μg/m^3	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								4.16E-15					—
	Aggregate Soils Total										4.64E-06					—

Table 21

RAGS Part D TABLE 7.38

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 124)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Non-Cancer Hazard Calculations: Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	3.10E+00	mg/kg	—	—	—	—	—	1.22E-05	mg/kg/day	3.0E-04	mg/kg/day	4.05E-02
				Copper	2.45E+03	mg/kg	—	—	—	—	—	9.60E-03	mg/kg/day	4.0E-02	mg/kg/day	2.40E-01
			Exp. Route Total								—					2.81E-01
			Dermal	Arsenic	3.10E+00	mg/kg	—	—	—	—	—	1.70E-06	mg/kg/day	3.0E-04	mg/kg/day	5.67E-03
				Copper	2.45E+03	mg/kg	—	—	—	—	—	1.34E-03	mg/kg/day	4.0E-02	mg/kg/day	3.36E-02
			Exp. Route Total								—					3.93E-02
			Inhalation of VOCs/Particulates	Arsenic	3.10E+00	mg/kg	—	—	—	—	—	9.68E-13	mg/m3	1.5E-05	mg/m3	6.45E-08
				Copper	2.45E+03	mg/kg	—	—	—	—	—	NA	mg/m3	NA	mg/m3	NA
			Exp. Route Total								—					6.45E-08
	Aggregate Soils Total										—					3.20E-01

Table 22

RAGS Part D TABLE 7.39

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit 124)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	3.10E+00	mg/kg	—	—	—	—	—	7.52E-07	mg/kg/day	3.0E-04	mg/kg/day	2.51E-03
				Copper	2.45E+03	mg/kg	—	—	—	—	—	5.95E-04	mg/kg/day	4.0E-02	mg/kg/day	1.49E-02
			Exp. Route Total								—					1.74E-02
			Dermal	Arsenic	3.10E+00	mg/kg	—	—	—	—	—	9.00E-08	mg/kg/day	3.0E-04	mg/kg/day	3.00E-04
				Copper	2.45E+03	mg/kg	—	—	—	—	—	0.00E+00	mg/kg/day	4.0E-02	mg/kg/day	0.00E+00
			Exp. Route Total								—					3.00E-04
			Inhalation of VOCs/Particulates	Arsenic	3.10E+00	mg/kg	—	—	—	—	—	3.87E-13	mg/m^3	3.0E-04	mg/m^3	1.29E-09
				Copper	2.45E+03	mg/kg	—	—	—	—	—	3.06E-10	mg/m^3	4.0E-02	mg/m^3	7.65E-09
			Exp. Route Total								—					8.94E-09
	Aggregate Soils Total										—					1.77E-02

Table 23

RAGS Part D TABLE 7.40

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker (Exposure Unit 124)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	3.10E+00	mg/kg	2.69E-07	mg/kg/day	1.5E+00	1/mg/kg/day	4.03E-07	7.52E-07	mg/kg/day	3.0E-04	mg/kg/day	2.51E-03
				Copper	2.45E+03	mg/kg	2.12E-04	mg/kg/day	NA	NA	NA	5.95E-04	mg/kg/day	4.0E-02	mg/kg/day	1.49E-02
			Exp. Route Total								4.03E-07					1.74E-02
			Dermal	Arsenic	3.10E+00	mg/kg	9.19E-09	mg/kg/day	1.5E+00	1/mg/kg/day	1.38E-08	2.57E-08	mg/kg/day	3.0E-04	mg/kg/day	8.58E-05
				Copper	2.45E+03	mg/kg	2.42E-08	mg/kg/day	NA	NA	NA	6.78E-06	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								1.38E-08					8.58E-05
			Inhalation of VOCs/Particulates	Arsenic	3.10E+00	mg/kg	9.13E-14	µg/m3	4.3E-03	1/µg/m3	3.92E-16	2.56E-13	mg/m3	3.0E-04	mg/m3	8.52E-10
				Copper	2.45E+03	mg/kg	7.21E-11	µg/m3	NA	NA	NA	2.02E-10	mg/m3	4.0E-02	mg/m3	5.05E-09
			Exp. Route Total								3.92E-16					5.90E-09
	Aggregate Soils Total										4.17E-07					1.75E-02

Table 24

RAGS Part D TABLE 7.41

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit North Lawn)
Receptor Age: Age-Adjusted (Child/Adult)

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.00E+00	mg/kg	7.09E-06	mg/kg/day	1.5E+00	1/mg/kg/day	1.06E-05	—	—	—	—	—
				Copper	4.34E+03	mg/kg	3.84E-03	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.06E-05					—
			Dermal	Arsenic	8.00E+00	mg/kg	8.99E-07	mg/kg/day	1.5E+00	1/mg/kg/day	1.35E-06	—	—	—	—	—
				Copper	4.34E+03	mg/kg	NA	mg/kg/day	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.35E-06					—
			Inhalation of VOCs/Particulates	Arsenic	8.00E+00	mg/kg	2.50E-12	µg/m^3	4.3E-03	1/µg/m^3	1.07E-14	—	—	—	—	—
				Copper	4.34E+03	mg/kg	1.09E-08	µg/m^3	NA	NA	NA	—	—	—	—	—
			Exp. Route Total								1.07E-14					—
	Aggregate Soils Total										1.20E-05					—

Table 25

RAGS Part D TABLE 7.42

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit North Lawn)
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.00E+00	mg/kg	—	—	—	—	—	3.14E-05	mg/kg/day	3.0E-04	mg/kg/day	1.05E-01
				Copper	4.34E+03	mg/kg	—	—	—	—	—	1.70E-02	mg/kg/day	4.0E-02	mg/kg/day	4.25E-01
			Exp. Route Total								—					5.30E-01
			Dermal	Arsenic	8.00E+00	mg/kg	—	—	—	—	—	4.39E-06	mg/kg/day	3.0E-04	mg/kg/day	1.46E-02
				Copper	4.34E+03	mg/kg	—	—	—	—	—	2.38E-03	mg/kg/day	4.0E-02	mg/kg/day	5.95E-02
			Exp. Route Total								—					7.42E-02
			Inhalation of VOCs/Particulates	Arsenic	8.00E+00	mg/kg	—	—	—	—	—	2.50E-12	mg/m3	1.5E-05	mg/m3	1.67E-07
				Copper	4.34E+03	mg/kg	—	—	—	—	—	NA	mg/m3	NA	mg/m3	NA
			Exp. Route Total								—					1.67E-07
	Aggregate Soils Total										—					6.04E-01

Table 26

RAGS Part D TABLE 7.43

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident (Exposure Unit North Lawn)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.00E+00	mg/kg	—	—	—	—	—	1.94E-06	mg/kg/day	3.0E-04	mg/kg/day	6.47E-03
				Copper	4.34E+03	mg/kg	—	—	—	—	—	1.05E-03	mg/kg/day	4.0E-02	mg/kg/day	2.63E-02
			Exp. Route Total								—					3.28E-02
			Dermal	Arsenic	8.00E+00	mg/kg	—	—	—	—	—	2.32E-07	mg/kg/day	3.0E-04	mg/kg/day	7.75E-04
				Copper	4.34E+03	mg/kg	—	—	—	—	—	0.00E+00	mg/kg/day	4.0E-02	mg/kg/day	0.00E+00
			Exp. Route Total								—					7.75E-04
			Inhalation of VOCs/Particulates	Arsenic	8.00E+00	mg/kg	—	—	—	—	—	9.99E-13	mg/m^3	3.0E-04	mg/m^3	3.33E-09
				Copper	4.34E+03	mg/kg	—	—	—	—	—	5.42E-10	mg/m^3	4.0E-02	mg/m^3	1.36E-08
			Exp. Route Total								—					1.69E-08
	Aggregate Soils Total										—					3.36E-02

Table 27
RAGS Part D TABLE 7.44
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker (Exposure Unit North Lawn)
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soils	Subsurface Soils	Subsurface Soils	Ingestion	Arsenic	8.00E+00	mg/kg	6.93E-07	mg/kg/day	1.5E+00	1/mg/kg/day	1.04E-06	1.94E-06	mg/kg/day	3.0E-04	mg/kg/day	6.47E-03
				Copper	4.34E+03	mg/kg	3.76E-04	mg/kg/day	NA	NA	NA	1.05E-03	mg/kg/day	4.0E-02	mg/kg/day	2.63E-02
			Exp. Route Total								1.04E-06					3.28E-02
			Dermal	Arsenic	8.00E+00	mg/kg	2.37E-08	mg/kg/day	1.5E+00	1/mg/kg/day	3.56E-08	6.64E-08	mg/kg/day	3.0E-04	mg/kg/day	2.21E-04
				Copper	4.34E+03	mg/kg	4.29E-06	mg/kg/day	NA	NA	NA	1.20E-05	mg/kg/day	NA	mg/kg/day	NA
			Exp. Route Total								3.56E-08					2.21E-04
			Inhalation of VOCs/Particulates	Arsenic	8.00E+00	mg/kg	2.36E-13	μg/m3	4.3E-03	1/μg/m3	1.01E-15	6.59E-13	mg/m3	3.0E-04	mg/m3	2.20E-09
				Copper	4.34E+03	mg/kg	1.28E-10	μg/m3	NA	NA	NA	3.58E-10	mg/m3	4.0E-02	mg/m3	8.94E-09
			Exp. Route Total								1.01E-15					1.11E-08
	Aggregate Soils Total										1.08E-06					3.30E-02

Table 28

RAGS Part D TABLE 9.5

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit 104

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child; Adult; Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils Adult/Child	Arsenic	1.1E-04	1.4E-05	1.1E-13	—	1.3E-04	Skin	—	—	—	—
			Copper	—	—	—	—	—	Gastrointestinal System	—	—	—	—
			Chemical Total	1.1E-04	1.4E-05	1.1E-13	—	1.3E-04		0.0E+00	0.0E+00	0.0E+00	0.0E+00
		Child	Arsenic	—	—	—	—	—	Skin	1.1E+00	1.6E-01	1.8E-06	1.3E+00
			Copper	—	—	—	—	—	Gastrointestinal System	2.3E-02	3.2E-03	—	2.6E-02
			Chemical Total	—	—	—	—	0.0E+00		1.1E+00	1.6E-01	1.8E-06	1.3E+00
				0.0E+00	0.0E+00	0.0E+00							
		Adult	Arsenic	—	—	—	—	—	Skin	6.9E-02	8.3E-03	3.6E-08	7.7E-02
			Copper	—	—	—	—	—	Gastrointestinal System	1.4E-03	0.0E+00	7.3E-10	1.4E-03
			Chemical Total	0.0E+00	0.0E+00	0.0E+00	—	0.0E+00		7.0E-02	8.3E-03	3.6E-08	7.9E-02
								1.3E-04					1.4E+00
		Exposure Point Total						1.3E-04					1.4E+00
	Aggregate Soils Total							1.3E-04					1.4E+00

Total Risk Across All Media	1.3E-04
Total Hazard Across All Media	1.4E+00
Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	—
Total Skin HI Across All Media	—
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 29

RAGS Part D TABLE 9.6

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit 104

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils	Arsenic	1.1E-05	3.8E-07	1.1E-14	—	1.1E-05	Skin	6.9E-02	2.4E-03	2.3E-08	7.1E-02
			Copper	—	—	—	—	—	Gastrointestinal System	1.4E-03	—	4.8E-10	1.4E-03
			Chemical Total	1.1E-05	3.8E-07	1.1E-14	—	1.1E-05		7.0E-02	2.4E-03	2.4E-08	7.3E-02
								1.1E-05					7.3E-02
		Exposure Point Total						1.1E-05					7.3E-02
	Subsurface Soils Total							1.1E-05					7.3E-02

Total Risk Across All Media: 1.1E-05

Total Hazard Across All Media: 7.3E-02

Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	—
Total Skin HI Across All Media	—
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 30

RAGS Part D TABLE 9.15

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit 109

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child; Adult; Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils Adult/Child	Arsenic	1.4E-05	1.8E-06	1.4E-14	—	1.6E-05	Skin	—	—	—	—
			Copper	—	—	—	—	—	Gastrointestinal System	—	—	—	—
			Chemical Total	1.4E-05	1.8E-06	1.4E-14	—	1.6E-05		0.0E+00	0.0E+00	0.0E+00	0.0E+00
		Child	Arsenic	—	—	—	—	—	Skin	1.4E-01	1.9E-02	2.2E-07	1.6E-01
			Copper	—	—	—	—	—	Gastrointestinal System	8.8E-02	1.2E-02	—	1.0E-01
			Chemical Total	—	—	—	—	0.0E+00		2.2E-01	3.1E-02	2.2E-07	2.6E-01
				0.0E+00	0.0E+00	0.0E+00							
		Adult	Arsenic	—	—	—	—	—	Skin	8.5E-03	1.0E-03	4.4E-09	9.5E-03
			Copper	—	—	—	—	—	Gastrointestinal System	5.4E-03	0.0E+00	2.8E-09	5.4E-03
			Chemical Total	0.0E+00	0.0E+00	0.0E+00	—	0.0E+00		1.4E-02	1.0E-03	7.2E-09	1.5E-02
								1.6E-05					2.7E-01
		Exposure Point Total						1.6E-05					2.7E-01
	Aggregate Soils Total							1.6E-05					2.7E-01

Total Risk Across All Media: 1.6E-05

Total Hazard Across All Media: 2.7E-01

Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	1.1E-01
Total Skin HI Across All Media	1.7E-01
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 31

RAGS Part D TABLE 9.16

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit 109

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils	Arsenic	1.4E-06	4.7E-08	1.3E-15	—	1.4E-06	Skin	8.5E-03	2.9E-04	2.9E-09	8.8E-03
			Copper	—	—	—	—	—	Gastrointestinal System	5.4E-03	—	1.8E-09	5.4E-03
			Chemical Total	1.4E-06	4.7E-08	1.3E-15	—	1.4E-06		1.4E-02	2.9E-04	4.7E-09	1.4E-02
								1.4E-06					1.4E-02
		Exposure Point Total						1.4E-06					1.4E-02
	Subsurface Soils Total							1.4E-06					1.4E-02

Total Risk Across All Media	1.4E-06
Total Hazard Across All Media	1.4E-02
Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	—
Total Skin HI Across All Media	—
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 32

RAGS Part D TABLE 9.19

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit 124

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child; Adult; Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils Adult/Child	Arsenic	4.1E-06	5.2E-07	4.2E-15	—	4.6E-06	Skin	—	—	—	—
			Copper	—	—	—	—	—	Gastrointestinal System	—	—	—	—
			Chemical Total	4.1E-06	5.2E-07	4.2E-15	—	4.6E-06		0.0E+00	0.0E+00	0.0E+00	0.0E+00
		Child	Arsenic	—	—	—	—	—	Skin	4.1E-02	5.7E-03	6.5E-08	4.6E-02
			Copper	—	—	—	—	—	Gastrointestinal System	2.4E-01	3.4E-02	—	2.7E-01
			Chemical Total	—	—	—	—	0.0E+00		2.8E-01	3.9E-02	6.5E-08	3.2E-01
				0.0E+00	0.0E+00	0.0E+00							
		Adult	Arsenic	—	—	—	—	—	Skin	2.5E-03	3.0E-04	1.3E-09	2.8E-03
			Copper	—	—	—	—	—	Gastrointestinal System	1.5E-02	0.0E+00	7.7E-09	1.5E-02
			Chemical Total	0.0E+00	0.0E+00	0.0E+00	—	0.0E+00		1.7E-02	3.0E-04	8.9E-09	1.8E-02
								4.6E-06					3.4E-01
		Exposure Point Total						4.6E-06					3.4E-01
	Aggregate Soils Total							4.6E-06.					3.4E-01

Total Risk Across All Media	4.6E-06
Total Hazard Across All Media	3.4E-01
Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	—
Total Skin HI Across All Media	—
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 33

RAGS Part D TABLE 9.20

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit 124

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils	Arsenic	4.0E-07	1.4E-08	3.9E-16	---	4.2E-07	Skin	2.5E-03	8.6E-05	8.5E-10	2.6E-03
			Copper	---	---	---	---	---	Gastrointestinal System	1.5E-02	---	5.0E-09	1.5E-02
			Chemical Total	4.0E-07	1.4E-08	3.9E-16	---	4.2E-07		1.7E-02	8.6E-05	5.9E-09	1.7E-02
								4.2E-07					1.7E-02
		Exposure Point Total						4.2E-07					1.7E-02
	Subsurface Soils Total							4.2E-07					1.7E-02

Total Risk Across All Media 4.2E-07

Total Hazard Across All Media 1.7E-02

Total Liver HI Across All Media	---
Total Blood HI Across All Media	---
Total Kidney HI Across All Media	---
Total Gastrointestinal System HI Across All Media	---
Total Skin HI Across All Media	---
Total Adrenal HI Across All Media	---
Total Spleen HI Across All Media	---
Total CNS HI Across All Media	---

Table 34

RAGS Part D TABLE 9.21

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit North Lawn

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child; Adult; Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils Adult/Child	Arsenic	1.1E-05	1.3E-06	1.1E-14	—	1.2E-05	Skin	—	—	—	—
			Copper	—	—	—	—	—	Gastrointestinal System	—	—	—	—
			Chemical Total	1.1E-05	1.3E-06	1.1E-14	—	1.2E-05		0.0E+00	0.0E+00	0.0E+00	0.0E+00
		Child	Arsenic	—	—	—	—	—	Skin	1.0E-01	1.5E-02	1.7E-07	1.2E-01
			Copper	—	—	—	—	—	Gastrointestinal System	4.3E-01	6.0E-02	—	4.8E-01
			Chemical Total	—	—	—	—	0.0E+00		5.3E-01	7.4E-02	1.7E-07	6.0E-01
				0.0E+00	0.0E+00	0.0E+00							
		Adult	Arsenic	—	—	—	—	—	Skin	6.5E-03	7.7E-04	3.3E-09	7.2E-03
			Copper	—	—	—	—	—	Gastrointestinal System	2.6E-02	0.0E+00	1.4E-08	2.6E-02
			Chemical Total	0.0E+00	0.0E+00	0.0E+00	—	0.0E+00		3.3E-02	7.7E-04	1.7E-08	3.4E-02
								1.2E-05					6.4E-01
		Exposure Point Total						1.2E-05					6.4E-01
	Aggregate Soils Total							1.2E-05					6.4E-01

Total Risk Across All Media: 1.2E-05

Total Hazard Across All Media: 6.4E-01

Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	—
Total Skin HI Across All Media	—
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 35

RAGS Part D TABLE 9.22

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs for Exposure Unit North Lawn

REASONABLE MAXIMUM EXPOSURE

Colonie FUSRAP Site

Scenario Timeframe: Future
Receptor Population: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	External (Radiation)	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soils	Subsurface Soils	Subsurface Soils	Arsenic	1.0E-06	3.6E-08	1.0E-15	—	1.1E-06	Skin	6.5E-03	2.2E-04	2.2E-09	6.7E-03
			Copper	—	—	—	—	—	Gastrointestinal System	2.6E-02	—	8.9E-09	2.6E-02
			Chemical Total	1.0E-06	3.6E-08	1.0E-15	—	1.1E-06		3.3E-02	2.2E-04	1.1E-08	3.3E-02
								1.1E-06					3.3E-02
		Exposure Point Total						1.1E-06					3.3E-02
	Subsurface Soils Total							1.1E-06					3.3E-02

Total Risk Across All Media: 1.1E-06

Total Hazard Across All Media: 3.3E-02

Total Liver HI Across All Media	—
Total Blood HI Across All Media	—
Total Kidney HI Across All Media	—
Total Gastrointestinal System HI Across All Media	—
Total Skin HI Across All Media	—
Total Adrenal HI Across All Media	—
Total Spleen HI Across All Media	—
Total CNS HI Across All Media	—

Table 36
Summary of: Cancer Risks, Hazard Indices and Lead Risk by Exposure Unit
Colonie FUSRAP Site

Survey Unit Exposure		Site Health Effects		
		Cancer Risk	Hazard Index	Lead Model Risk
EXPOSURE UNIT 104				
Future Resident (Tables 31-33)	Subsurface Soils	1.E-04	1.4	No
Future Worker (Table 34)		1.E-05	0.1	No
EXPOSURE UNIT 109				
Future Resident (Tables 51-53)	Subsurface Soils	2.E-05	0.3	No
Future Worker (Table 54)		1.E-06	0.0	No
EXPOSURE UNIT 124				
Future Resident (Tables 59-61)	Subsurface Soils	1.E-05	0.3	Yes
Future Worker (Table 62)		4.E-07	0.02	No
EXPOSURE UNIT North Lawn				
Future Resident (Tables 63-65)	Subsurface Soils	1.E-05	0.6	Yes
Future Worker (Table 66)		1.E-06	0.03	No

LEAD MODEL FOR WINDOWS Version 1.1

==

Model Version: 1.1 Build11
User Name: USACE
Date: 06/11/2013
Site Name: Colonie FUSRAP
Operable Unit: 104
Run Mode: Site Risk Assessment

Soil/Dust Data
Average subsurface soil near data point 104

==

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (μg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(μg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 μg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 45.000 μg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	50.000	45.000
1-2	50.000	45.000
2-3	50.000	45.000
3-4	50.000	45.000
4-5	50.000	45.000
5-6	50.000	45.000
6-7	50.000	45.000

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

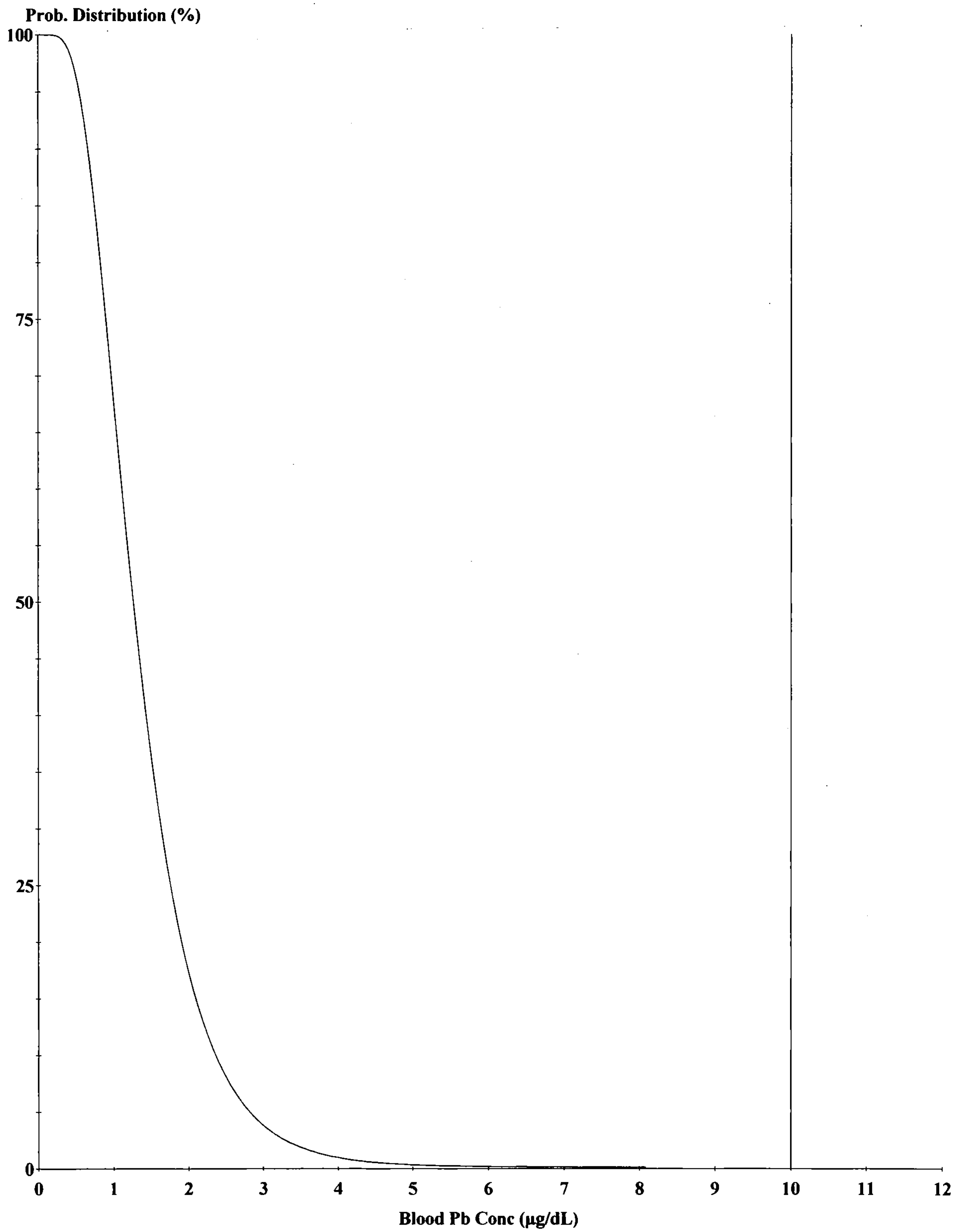
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.097	0.000	0.388
1-2	0.034	0.948	0.000	0.968
2-3	0.062	1.035	0.000	1.010
3-4	0.067	0.995	0.000	1.034
4-5	0.067	0.957	0.000	1.080
5-6	0.093	1.008	0.000	1.141
6-7	0.093	1.093	0.000	1.162

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	1.169	2.675	1.5
1-2	1.852	3.802	1.6
2-3	1.859	3.966	1.5
3-4	1.867	3.963	1.4
4-5	1.391	3.495	1.2
5-6	1.255	3.498	1.1
6-7	1.187	3.535	1.0



Cutoff = 10.000 µg/dl
Geo Mean = 1.322
GSD = 1.600
% Above = 0.001

Age Range = 0 to 84 months

Run Mode = Site Risk Assessment
Comment = Soil near 104

LEAD MODEL FOR WINDOWS Version 1.1

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Model Version: 1.1 Build11
User Name: USACE
Date: 06/11/2013
Site Name: Colonie FUSRAP
Operable Unit: 109
Run Mode: Site Risk Assessment

Soil/Dust Data
Average subsurface soil value near data point 109

==

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 160.500 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	215.000	160.500
1-2	215.000	160.500
2-3	215.000	160.500
3-4	215.000	160.500
4-5	215.000	160.500
5-6	215.000	160.500
6-7	215.000	160.500

******** Alternate Intake ********

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

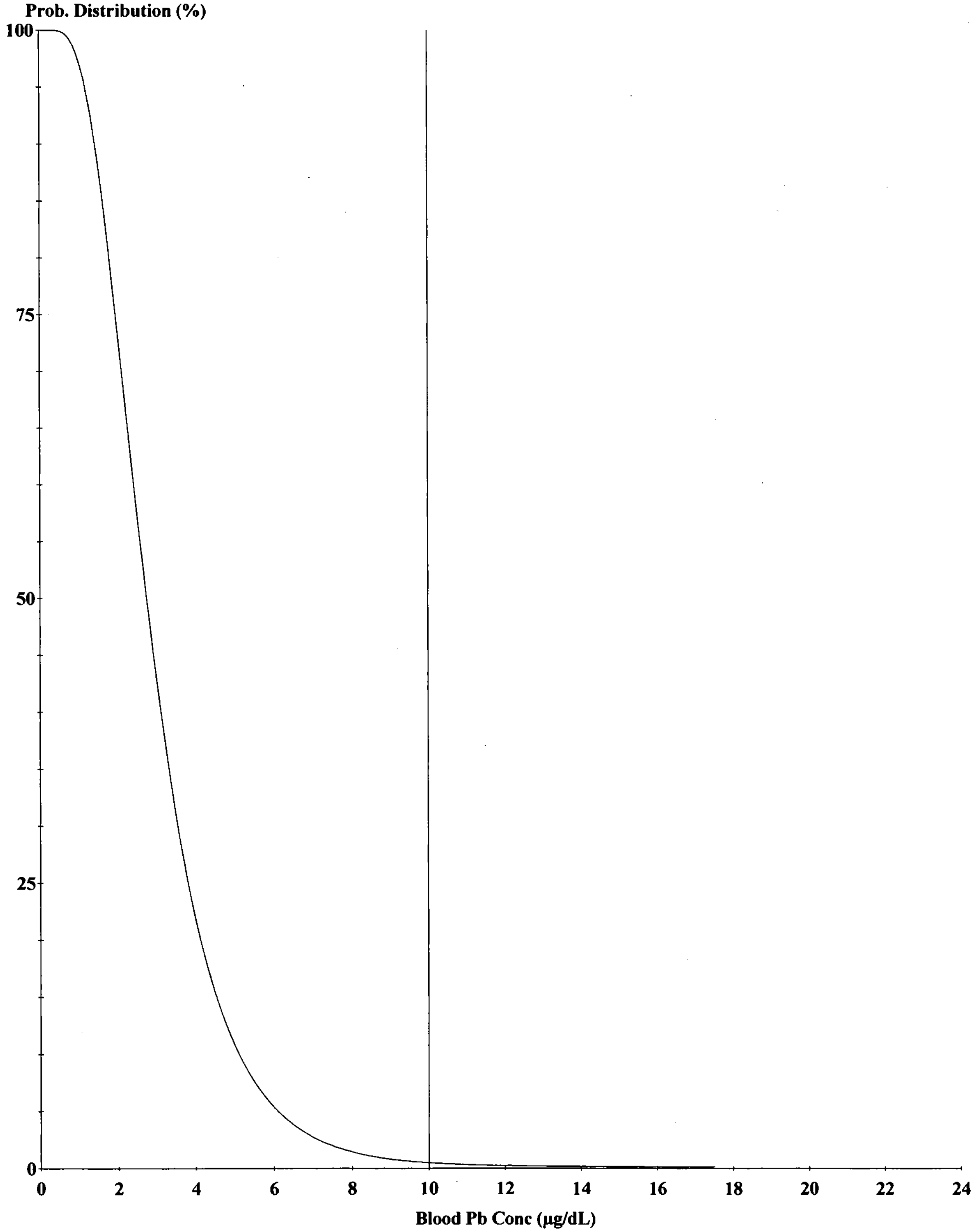
******** Maternal Contribution: Infant Model ********

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.057	0.000	0.374
1-2	0.034	0.907	0.000	0.926
2-3	0.062	0.996	0.000	0.973
3-4	0.067	0.963	0.000	1.001
4-5	0.067	0.937	0.000	1.057
5-6	0.093	0.991	0.000	1.122
6-7	0.093	1.077	0.000	1.145

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	4.414	5.866	3.2
1-2	6.937	8.805	3.6
2-3	7.008	9.039	3.4
3-4	7.075	9.105	3.2
4-5	5.333	7.393	2.6
5-6	4.830	7.036	2.2
6-7	4.578	6.893	2.0



Cutoff = 10.000 µg/dl
Geo Mean = 2.865
GSD = 1.600
% Above = 0.391

Age Range = 0 to 84 months

Run Mode = Site Risk Assessment
Comment = Soil near 109

LEAD MODEL FOR WINDOWS Version 1.1

==

Model Version: 1.1 Build11
User Name: USACE
Date: 06/11/2013
Site Name: Colonie FUSRAP
Operable Unit: 124
Run Mode: Site Risk Assessment

Soil/Dust Data
Average soil value around data point 124
GSD, Cutoff and Age Type
Colonie FUSRAP 109
Soil/Dust Data
Average subsurface soil value near data point 124

==

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (μg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(μg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 μg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 523.800 μg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (μg Pb/g)	House Dust (μg Pb/g)
.5-1	734.000	523.800
1-2	734.000	523.800
2-3	734.000	523.800
3-4	734.000	523.800
4-5	734.000	523.800
5-6	734.000	523.800
6-7	734.000	523.800

******** Alternate Intake ********

Age	Alternate (μg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

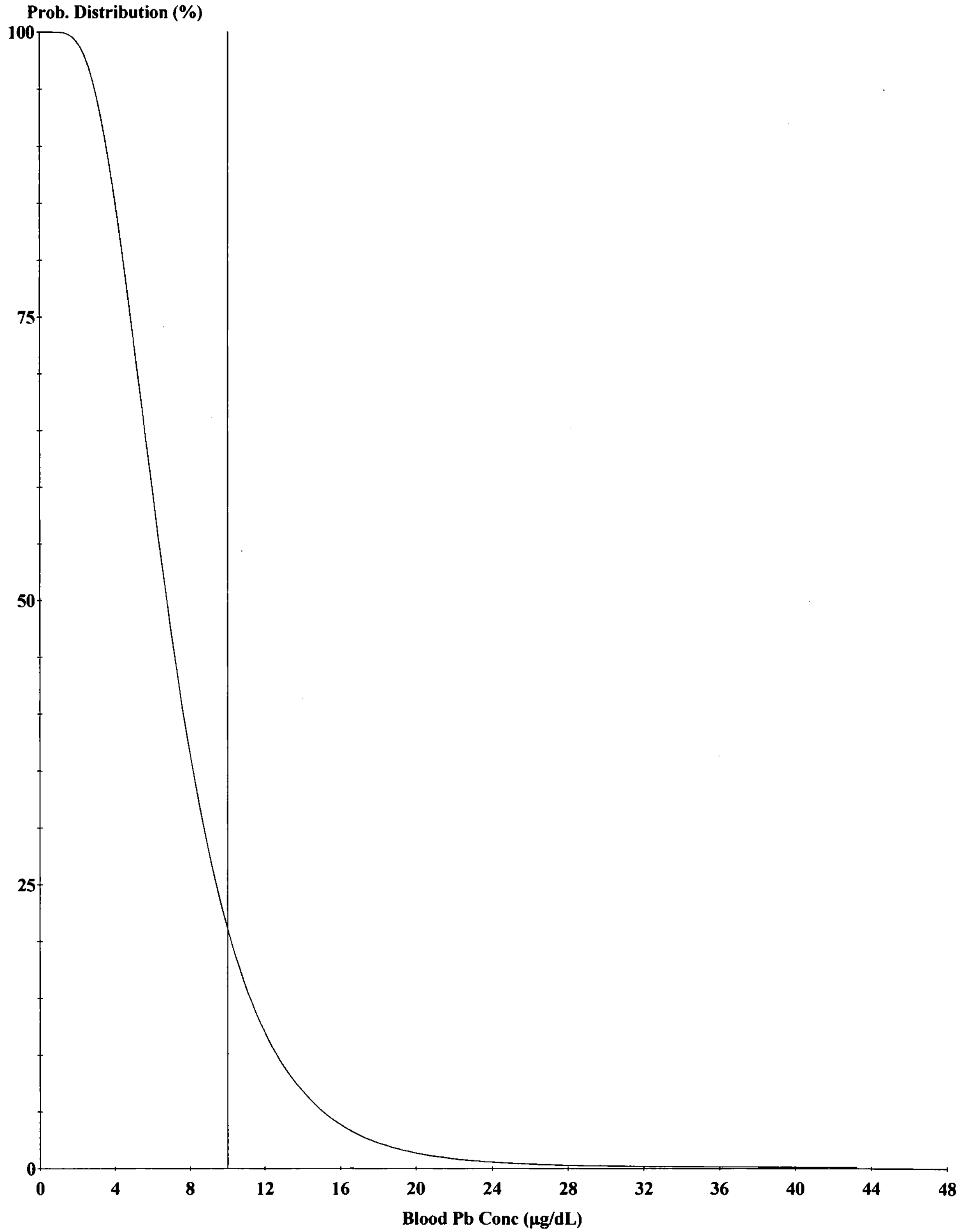
******** Maternal Contribution: Infant Model ********

Maternal Blood Concentration: 1.000 μg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (μg/day)	Diet (μg/day)	Alternate (μg/day)	Water (μg/day)
.5-1	0.021	0.954	0.000	0.338
1-2	0.034	0.803	0.000	0.819
2-3	0.062	0.895	0.000	0.874
3-4	0.067	0.877	0.000	0.911
4-5	0.067	0.879	0.000	0.992
5-6	0.093	0.941	0.000	1.065
6-7	0.093	1.030	0.000	1.094

Year	Soil+Dust (μg/day)	Total (μg/day)	Blood (μg/dL)
.5-1	13.308	14.620	7.8
1-2	20.522	22.179	9.0
2-3	21.050	22.881	8.4
3-4	21.531	23.386	8.1
4-5	16.733	18.671	6.7
5-6	15.335	17.436	5.6
6-7	14.626	16.844	4.9



Cutoff = 10.000 µg/dl
Geo Mean = 7.072
GSD = 1.600
% Above = 23.051

Age Range = 0 to 84 months

Run Mode = Site Risk Assessment
Comment = Soil near 124

LEAD MODEL FOR WINDOWS Version 1.1

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Model Version: 1.1 Build11
User Name: USACE
Date: 06/11/2013
Site Name: Colonie FUSRAP
Operable Unit: North Lawn
Run Mode: Site Risk Assessment

Soil/Dust Data
Average soil value around data point 124
GSD, Cutoff and Age Type
Colonie FUSRAP 109
Soil/Dust Data
Average subsurface soil value near data point 124
Soil/Dust Data
Soil near North Lawn

==

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 873.800 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	1234.000	873.800
1-2	1234.000	873.800
2-3	1234.000	873.800
3-4	1234.000	873.800
4-5	1234.000	873.800
5-6	1234.000	873.800
6-7	1234.000	873.800

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

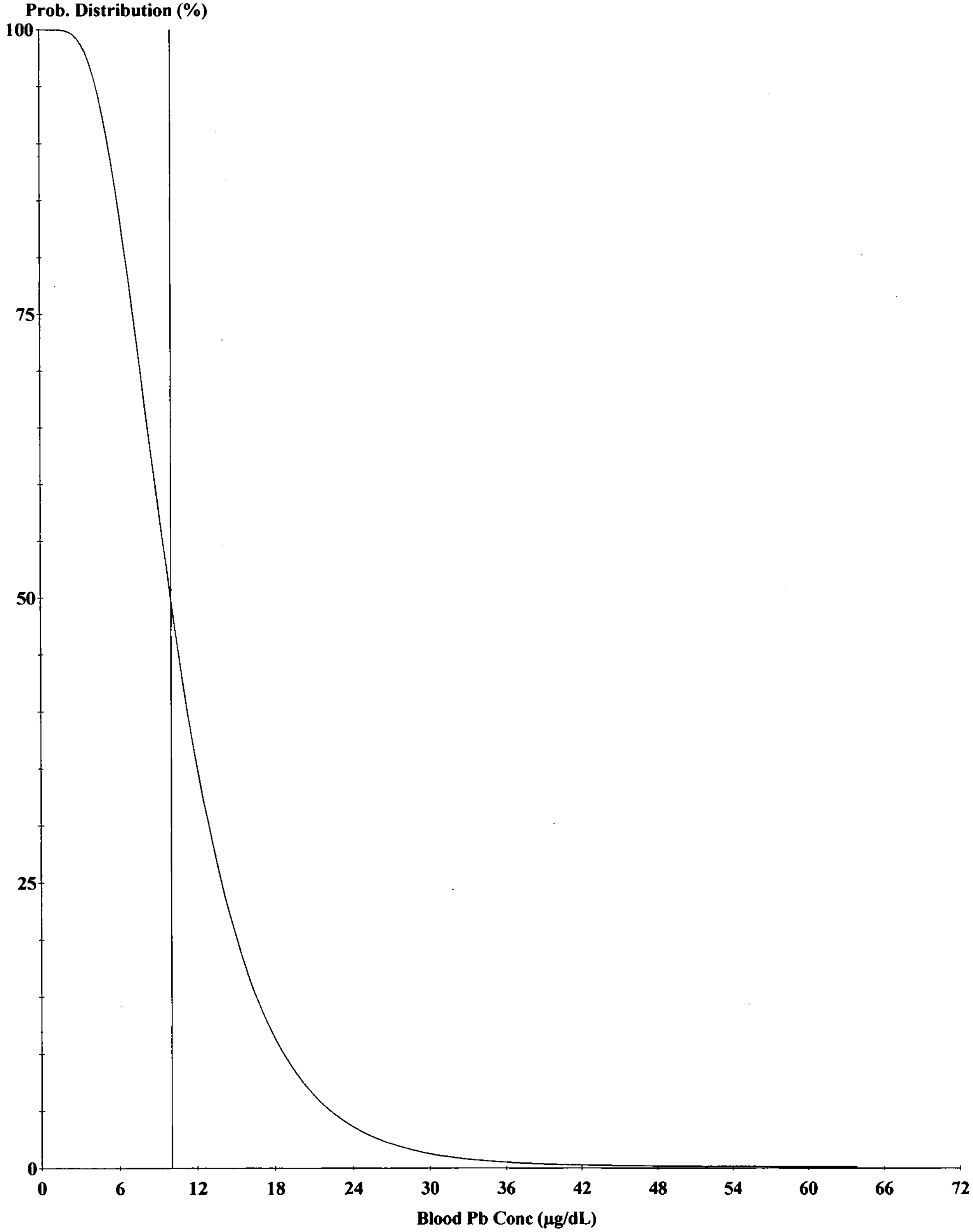
****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	0.876	0.000	0.310
1-2	0.034	0.728	0.000	0.743
2-3	0.062	0.820	0.000	0.801
3-4	0.067	0.811	0.000	0.842
4-5	0.067	0.832	0.000	0.939
5-6	0.093	0.899	0.000	1.018
6-7	0.093	0.989	0.000	1.051

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	20.474	21.681	11.3
1-2	31.163	32.669	13.2
2-3	32.294	33.977	12.4
3-4	33.341	35.061	12.0
4-5	26.520	28.357	10.0
5-6	24.536	26.547	8.4
6-7	23.527	25.660	7.4



Cutoff = 10.000 µg/dl
Geo Mean = 10.448
GSD = 1.600
% Above = 53.711

Age Range = 0 to 84 months

Run Mode = Site Risk Assessment
Comment = Soil near North Lawn

APPENDIX D – ADULT LEAD MODEL

Calculations of LEAD Preliminary Remediation Goals (PRGs) for the Colonie FUSRAP Site

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004
$PbB_{fetal, 0.95}$	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	1.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$ [1]	Exposure frequency (same for soil and dust)	days/yr	124
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PRG		**ppm**	**3,955**

[1] EF for Adult Worker from Table 13, App. A