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BUREAU OF EASTERN REMEDIAL ACTION
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REVISED
REMEDIAL INVESTIGATION
WORK PLAN FOR THE
MALTA ROCKET FUEL AREA SITE
TOWNS OF MALTA AND STILLWATER
SARATOGA COUNTY, NEW YORK

VOLUME I

December 1990

Prepared by

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Environmental Services
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15 (12-75)

New York State Department of Environmental Conservation

MEMORANDUM

TO: Daniel Steenberge, Reg. Hazardous Waste Remediation Engineer, Region 5

FROM: Marsden Chen, Bureau of Eastern Remedial Action, DHWR   Marsden Chen/ KG.

SUBJECT: Malta Rocket Test Site Id. No. 546022 - Final Remedial Investigation Work Plan

DATE:

DEC 12 1990

Attached is a copy of the above referenced document for the Malta Rocket Test Site for your records.

Please review to be sure that your comments have been addressed.

If you have any questions, please contact Mr. Jonathan Greco, of my staff, at (518) 457-3976.

Attachment

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1.0 INTRODUCTION

The Malta Rocket Fuel Area (MRFA) Site Remedial Investigation (RI) work plan has been prepared in response to a United States Environmental Protection Agency (USEPA) Administrative Order (AO) Index No. II CERCLA-90219 issued to Advanced Nuclear Fuels, Inc., Curtiss-Wright Corporation, General Electric Company (GE), Mechanical Technology, Inc., New York State Energy Research and Development Authority (NYSERDA), Olin Corporation, Power Technologies, Inc. and Wright Malta Corporation as potentially responsible parties (PRPs) on September 28, 1989.

The MRFA RI work plan has been developed in accordance with the National Contingency Plan (NCP), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA 1988b). References to CERCLA throughout this document should be interpreted as meaning "CERCLA as amended by SARA."

The purpose of the RI is to identify sources of contamination, to define the nature and extent of contamination at the site, to assess the potential risk to human health and the environment, and to initiate the development and evaluation of potential remedial alternatives. Initially, the tasks described in Section 4, Work Plan tasks for the Remedial Investigation, are designed to address all known and potential source areas. Data will be collected to characterize the quality of all media at the specific areas of concern. If contamination is identified, focused data collection activities will be developed to fulfill the purpose of the RI and to meet data quality objectives.

2.0 SUMMARY OF EXISTING INFORMATION

2.1 Site Location and History

The MRFA site, also known as the Saratoga Research and Development Center, is located in the Towns of Malta and Stillwater, Saratoga County, New York (Figure 1). Between 1945 and 1964, a portion of the site was known as the Malta Test Station and was operated for various agencies of the United States Government for a wide range of rocket and weapon testing programs and space research activities. Between 1945 and 1955, a square 165-acre parcel of the site was leased to the United States Army by the Luther family. In 1955, the United States Government acquired this parcel and a perpetual easement, over a circular area containing approximately 1800 acres, within a one mile radius of the parcel.

In 1955, the United States Army permitted the United States Air Force (USAF) to use the Malta Test Station. The permit was terminated in 1960 when the site was committed to the National Aeronautics and Space Administration (NASA).

In 1964, the 165-acre Malta Test Station and the United States Government's interest in the easement area were purchased by the New York State Atomic and Space Development Authority (NYSASDA), predecessor of the New York State Energy Research and Development Authority (NYSERDA) in the name of the State of New York. In 1968, an additional 280 acres adjacent to the test station, 273 of which were taken from the northwestern portion of the easement area, was acquired by NYSASDA. Since that time, portions of the property were leased to GE, Wright-Malta Corporation, and Exxon Nuclear Company, Inc. among others. Two parcels originally leased by Wright-Malta were subsequently leased by Power Technology, Inc. in 1972 and by Mechanical Technology, Inc. in 1976. In 1984, NYSERDA sold an 81-acre portion of the site, including most of the original test station facilities, to Wright-Malta. GE and other companies were subcontractors from time to time to agencies of the U.S. Government at the site. Most of the 165-acre parcel on which the majority of testing has occurred is fenced and inaccessible to the general public.

Figure 1 shows the site property boundary and the one-mile easement area. Adjacent property boundaries and property owners will be identified during the RI based on currently available information.

2.2 Site Description

2.2.1 Environmental Setting and Land Use

The MRFA site includes approximately 445 acres in southeastern Saratoga County. The Test Station consists of 165 acres containing 25 structures which were erected during the course of research activities. In addition, a number of concrete block structures, cooling ponds, leaching fields, dry wells, storage areas and disposal areas are also present. A 1952 General Electric map was used to illustrate Test Station structures, as well as underground tanks and septic systems as they existed in 1952 (Figure 2). The remaining 280 acres of the site are primarily undeveloped forest. In addition, an easement area and additional acreage acquired by NYSASDA surrounding the Test Station consists of approximately 1800 acres representing the circular area within a one mile radius of the Test Station. The easement area is owned by the Luther Forest Corporation.

The one-mile easement was established to prohibit human habitation and hunting. Consequently, the nearest residences are situated greater than one mile from the center of the test station. However, the nearest residence to the site boundary is 1,200 feet west of the site. This residence is not shown on Figure 1 because it was constructed after the latest revision of the topographic map. However, the residence is shown on Figure 5, west of the GE-Exxon Nuclear Building. Within the easement, the land is primarily wooded. Several roads have been cut to facilitate logging by the Luther Forest Corporation which retains logging rights within the easement. Streams which originate near the MRFA site flow through ravines on the easement area toward Lake Saratoga, Round Lake and Little Round Lake (Figure 1).

Residential communities developed by the Luther Forest Corporation are present outside the perimeter of the one-mile easement. Residences in the Towns of Malta and Stillwater and the hamlet of Maltaville are located approximately 1.75, 2.5, and 1.5 miles, respectively, from the MRFA site (Figure 1). The public water supplies for these communities are obtained from ground water production wells located southwest of the site as shown on Figure 1.

Information regarding other public water supply wells between 1 and 3 miles from the site and all private water supplies within a three-mile radius of the site will be obtained during the literature search as described in Section 4.2. This task will include determining the number and location of wells.

2.2.2 Topography and Surface Drainage

Topography controls surface runoff and influences the water-table configuration. Lowland areas with surface-water bodies are the receptors of both runoff and ground-water drainage. The topographical setting of the MRFA Test Station and surrounding area is a gently undulating upland ranging from 300 to 350 ft in elevation with occasional rises and extensive ravines. The low hills tend to be elongated in a northeast-southwest direction, and alternate with broad, relatively flat-bottomed valleys (Heath et al. 1963).

There are no streams on the MRFA site itself; however, there are deep ravines with flowing streams on the easement property to the north-northeast, and west-southwest of the test station. The ravines closest to the test station are in the southwest corner. These ravines intersect the ground-water flow system which feed small streams in the area.

Saratoga Lake to the north, and Little Round Lake and Round Lake to the south, are the major discharge areas.

There is only one surface-water feature on the site, a small pond near the center of the test station. The pond may have been used to collect discharge water from test facilities 3 and 4, and possibly from other nearby test areas (Geraghty & Miller 1988). Storm drainage in the undeveloped portion of the site infiltrates the sandy soils, resulting in little, if any, runoff. To date, the only minor flooding observed has occurred at the GE-Exxon Nuclear loading dock located on the west side of the building (Figure 5) during heavy rains (C.T. Male, 1979). Other specific areas of minor flooding will be identified during field reconnaissance as part of the RI. A map of the site showing these surface features will be provided in the RI report.

2.2.3 Climate

The published records of the National Oceanic and Atmospheric Administration's National Weather Service were used to obtain the mean monthly temperature and precipitation data. The temperature and precipitation data were recorded during the period 1931 through 1960 at the National Climatic Data Center in Albany, New York, approximately 20 miles south of the test station.

Table 1 gives the long-term monthly mean temperatures for Albany and surrounding areas. The climate is typical of that which prevails in the northeastern United States, with winter temperatures averaging just below freezing and midsummer temperatures averaging in the lower 70s. The warmest month is July, and the coolest month is January. Midsummer high temperatures sometimes reach the 90s and above, accompanied by high humidity.

The long-term monthly mean precipitations for Albany, New York are also given in Table 1. The average monthly precipitation is 3.16 inches. The period from May through

September is wetter than average and the period from October through April is drier (Officials of the National Oceanic and Atmospheric Administration 1974).

2.2.4 Soil Characteristics

According to the USDA Soil Conservation Service, soil in the area is a Colonie Silty Sand which is typically deep and moderately to very well drained. Soil at the MRFA site has been observed to be a homogeneous, well sorted, fine to medium-grained, dark brown sand, with small roots throughout (Geraghty & Miller 1986b). The vegetation (predominantly white pine) indicates a well drained soil structure (C.T. Male 1979).

2.2.5 Regional Geology

Three principal varieties of unconsolidated surficial deposits are characteristically found in Saratoga County: (1) glacial till, a nonstratified mixture consisting of sediments ranging from boulder to clay-sized; (2) coarse grained stratified deposits (sand and gravel); and (3) fine grained stratified lacustrine silts and clays (Heath et al. 1963).

Bedrock varies throughout Saratoga County. Crystalline rocks, sandstones, carbonate rocks and shales are present, to some extent, in the area. Bedrock crops out in parts of stream valleys and on some uplands. The crystalline rocks are Precambrian in age and consist of various igneous and metamorphic rocks. These rocks underlie the unconsolidated deposits in most of the northwestern part of the county. The shale, Ordovician in age (the youngest of the consolidated rocks), underlies most of the remaining areas of the county (Heath et al. 1963). The carbonate series (where present) overlies the sandstone (where present), which overlies the crystalline rock. Dolomite is the dominant rock in the carbonate series, although some sections of the series are composed of limestone.

Stratigraphy varies throughout Saratoga County. The specific stratigraphy underlying the MRFA site, located in the southeastern portion of the county, is discussed in the Site Geology section below. Geologic logs are provided in Appendix A (Site Specific).

2.2.6 Site Geology

Based on literature (Heath et al. 1963) and prior investigations, the MRFA site is underlain by approximately 200 ft of unconsolidated deposits. The surficial deposits are glacial in origin and consist predominantly of brown, fine to medium sand and silt. The glacial deposits are approximately 80 ft thick. Fine grained, stratified, lake-bottom sediments, consisting chiefly of gray silts and clays, underlie the surficial deposits to an approximate depth of 140 ft below land surface. Lacustrine blue clay extends from 140 ft to about 200 ft below land surface. A gravelly layer has been identified in some borings at 60 to 80 ft below land surface (C.T. Male 1979). Geologic logs from prior investigations are included in Appendix A.

Below the unconsolidated sediments lies a Canajoharie Shale bedrock valley. The surface of the shale is irregular and consists of blue-black to gray shale containing thin layers of sandstone. The shale layers generally range in thickness from a few inches to several feet and the sandstone layers are rarely more than 2 to 3 inches in thickness (Heath et al. 1963).

A buried channel (the Colonie Channel), which cuts through the Canajoharie Shale, may extend as deep as 280 ft below grade. This channel is reported to cross in the north-south direction near the northwest corner of the MRFA site (Dineen and Hanson 1983).

2.2.7 Regional Hydrology

Ground water is used extensively in Saratoga County to fulfill domestic and farming needs. Small industries and commercial establishments also require ground water which is obtained from wells and, in some instances, natural springs. The wells vary in depth and tap both bedrock and unconsolidated aquifers (Heath et al. 1963).

The source of all ground and surface water in the study area is atmospheric precipitation. Ground-water recharge occurs in upland areas; the most important recharge areas are those where the most permeable sediments and/or the greatest concentration of bedrock fractures occur near land surface. Lowland surface water bodies are the receptors of both surface water and ground water.

The most productive sources of ground water in the County are unconsolidated deposits of sand and gravel found in much of eastern Saratoga County and sporadically in the west. Heath et al. (1963) state that valley deposits of sand and gravel in some areas yield more than 750 gallons per minute (gpm) to screened wells. Sand and gravel in areas other than valleys are capable of yielding 50 gpm.

The average yield of bedrock wells in Saratoga County ranges from about 6 gpm in crystalline rock to 31 gpm in carbonate rock. The glacial till blanketing much of the county is not an adequate water-bearing unit.

The nearest wells to the MRFA site are located approximately 1-mile southwest of the Test Station. The well field consists of three supply wells which provide water to a residential community situated just west of the 1-mile site easement boundary (Geraghty & Miller 1985). The three wells are between 28.5 and 33 ft deep and tap into the Knapp Road aquifer. The aquifer consists of a clean, fine to coarse grained sand that is approximately 30 ft thick. Recharge to this well field is primarily from the north as infiltrated precipitation moves downgradient to the flatter topography that is drained by surface streams (Dunn Geoscience 1977).

As part of the RI, information will be obtained concerning wells within a 3-mile radius of the site. Specifically, all available information with respect to well location, depth, construction, and water quality of water supplies within a 3-mile radius of the site will be obtained as part of the literature search described in Section 4.2.

2.2.8 Site Hydrology

Water-level data collected by Geraghty & Miller (1985 and 1986a) and Blasland & Bouck (1986) indicate that the depth to ground water at the site is between 25 to 40 ft below land surface within the unconfined sand and gravel aquifer. Water-level data from both shallow water table and deeper wells (60 to 80 ft below land surface) within the unconfined sand and gravel aquifer indicate that ground-water flow beneath the site is generally from southeast to northwest. Blasland & Bouck indicated that the flow directions correlate with local topography and that a southeast- to northwest-trending topographical high crosses the site. Ground-water flow in the northern portion of the site is to the north-northwest, and flow in the southern portion of the site is in a westerly direction (Blasland & Bouck 1986). The shallow ground-water contour map developed by Blasland & Bouck is reproduced herein as Figure 3a. The potentiometric water levels in deep wells indicate that the directions of deep ground-water flow are similar to those of shallow ground-water flow, however, a downward vertical gradient is present (Figure 3b). Additional water-level data will be collected during the RI. Water levels will be measured at all wells sampled during the RI and updated ground-water contour maps will be produced.

Blasland & Bouck indicate that the on-site flow directions also appear to correlate with the regional topography. The site is located on a broad ridge top that extends from a high point to the southeast near Cold Springs Road (in excess of 370 ft above National Geodetic Vertical Datum [NGVD]) and slopes gently to the northwest towards Plains Road where the surface elevation is approximately 330 ft NGVD. The ravines to the north-northeast and west-southwest cut deeply into this ridge top and drain north to Saratoga Lake (203 ft NGVD) and south to Round Lake (155 ft NGVD). The deep ravines west-southwest of the test station appear to exert a strong influence on the flow direction and gradient in the southern part of the test station. It was noted that preliminary hydrogeologic information collected at the MRFA site indicated that a portion of the ground water underneath the site flows in a southwesterly direction from the site, while another portion of the ground water discharges as surface water, seeping into these ravines (Dunn Geoscience 1989). The north-northeasterly ravines, which are located farther away, appear to exert a lesser influence on flow direction in the northern part of the site. At present, no site-specific ground-water data are known to exist for the area occupied by the GE-Exxon Nuclear Building, the existence of such data will be investigated during the Literature Search. Ground-water flow direction in the area will be determined during the RI through the installation of monitoring wells.

Blasland & Bouck concluded that downward vertical gradients observed in many of the well clusters during their investigation indicate that the site is in a recharge area, with water moving to lower depths, probably toward the lower discharge points along the bottoms of the nearby ravines. They also indicate that downward vertical flow is restricted by the gradually increasing clay and silt content below 250 ft NGVD (approximately 80 ft below grade) and ultimately by the clay aquiclude estimated to be at 180 ft NGVD (approximately 140 to 150 ft below grade).

The water-supply system for the test station is comprised of two active production wells and one well, not currently in service, located on the Wright-Malta property. These wells, variously labeled as Wells 1, 2, and 3, or 1D, 2D, and 3D, respectively, will be referred to as Wells 1D, 2D, and 3D hereafter in this plan. A fourth production well (4D), located northwest of the facilities, was never in service (Figure 2). According to C.T. Male (1979), Wells 1D, 2D, and 3D are 82, 86.5, and 76.5 ft deep, respectively. Pumping tests have revealed that Wells 1D and 2D yield 30 gpm. Well 3D is only used as a backup well to Wells 1D and 2D; originally, this well was also rated at 30 gpm. According to C.T. Male (1979), any new series of wells at similar depths in this area would require a separation of at least 200 ft to reduce interference between wells. C.T. Male (1979) also point out that the aquifer yields deteriorate in a westerly direction on the site. Well 4D, drilled on the western perimeter of the test station, did not yield comparable volumes of water.

The existing wells provide the normal water supply for the site and also provided extra water for special tests or processes in the past (C.T. Male 1979). The average water usage was approximately 10,000 gallons per day (gpd) and during tests and other processes, usage may have reached 30,000 gpd prior to 1979 (C.T. Male 1979).

Well construction diagrams and water-level measurements obtained during the above investigations are provided in Appendix B and C, respectively.

2.3 Specific Areas of Concern

Known chemical storage and waste disposal areas are shown on Figures 2 and 5. The figures also provide the locations of aboveground and underground storage tanks. Storage areas S-1, S-2 and S-3 were used for aboveground storage of scrap metal and miscellaneous metal parts. Storage area S-4 was used for aboveground storage of chemical wastes. Disposal area D-1 was an open burning pit used to incinerate materials such as waste paper and cartons. Solid wastes were stored and disposed in area D-2. Disposal area D-3 was reportedly used by the New York State Department of Transportation for disposal of earthen and construction waste. Disposal Areas D-4 and D-5 are believed to contain 5- and 50-gallon empty steel chemical drums buried approximately 10 ft deep. Disposal area D-6 is suspected to contain industrial wastes although this belief is based only on the discovery of one drum.

The following is a list of specific areas of concern that were identified by the EPA to be addressed during the RI:

- Scrap Metal Storage Areas S-1, S-2, and S-3.
- Chemical Storage Area S-4.
- Former Burning Pit D-1.
- Solid Waste Disposal Area D-2.
- NYSDOT Disposal Area D-3.

- Drum Disposal Areas D-4, D-5, and D-6.
- Rocket Gantries.
- Fuel Mixing Area A.
- Septic Tanks and Leach Fields.
- Dry Wells.
- Filled-in Ponds.
- Existing Pond and Drainage Ditch.
- Lagoon at MTI.
- Clearing in the Woods (Ice Pond).
- GE/Exxon Nuclear Building.
- PTI Area.
- Aboveground Storage Tanks.
- Underground Storage Tanks.
- Magazine Area.
- Triangular Parcel, southern corner of the Test Station.

Further investigation into historical operations and chemical or waste handling procedures will be carried out during the literature search phase of the RI (Section 4.2). Many of the areas listed above were described by C.T. Male in their site assessment performed in 1979. As part of an engineering planning study, C.T. Male observed existing landfills, metal reclamation operations, and chemical waste storage and disposal areas. These observations are included in Appendix D.

If additional areas of concern are identified during the RI, a plan of investigation for each area will be proposed for EPA approval.

3.0 INITIAL EVALUATION

3.1 Review of Existing Data

3.1.1 Summary of Existing Reports and Data

1) **New York State Atomic and Space Development Authority, 1965, "Malta Test Station."**

The New York State Atomic and Space DevelopmentAuthority (the predecessor of NYSERDA) published this reportafter acquiring the Malta Test Station in 1964. The purpose of the report was to inform the public that the test station is capable of serving the needs of federal defense, atomic and space agencies and their contractors. The report states that the testing station will be expanded to meet national defense requirements for the development and testing of equipment associated with military and aerospace programs. The report describes the Malta test station's resources and capabilities, the major complexes available for rocket engine and component testing and supporting services. These capabilities for aerospace testing included:

- complete propulsion systems in thrust sizes up to 250,000 lb;
- investigation of materials and shapes in rocket exhausts;
- investigation of exotic propellants to determine aspects of performance, compatibility, handling, and storage;
- cryogenic research under laboratory conditions;
- high speed burst tests in conjunction with materials research; and
- supporting functions such as a Central Data Acquisition Facility, Instrumentation Laboratory, Assembly Area, Shop and Manufacturing Facilities, plus equipment for environmental testing of aerospace components and systems.

The report also described the capabilities of each of the test complexes which are described below.

Test Complex 1 - This test complex was designed for research and development testing of rocket thrust chambers at thrust levels up to 5000 lb, and for investigation of materials and aerodynamic shapes which are submerged in the rocket engine exhaust. This latter technique was the only available method for simulating the combined high temperatures and high shear forces encountered by space vehicles upon re-entry into the atmosphere.

Test Complex 4 - This was a versatile, fully instrumented multiposition test complex capable of vertical or horizontal firing of rocket thrust chambers or complete rocket engines at thrust levels up to 250,000 lb. Designed primarily for pressurized operation of thrust chambers, its tank capacity was 300 cubic feet of liquid oxygen and 200 cubic feet of fuel with a maximum working pressure of 1500 psig.

Test Complex 6 - This was a turbomachinery test area and was designed to perform hazardous testing of pneumatic, hydraulic, and high-speed rotating equipment. In addition, this facility was well suited for flight configuration testing of ready propellant rocket systems up to 15,000 lb thrust.

Test Complex 15 - This was a component test area equipped for hydraulic and pneumatic testing of a variety of equipment and subsystems. Flow testing of components with water was available at flow rates ranging from a few pounds per second at several thousand pounds per square inch pressure up to 100 lb per second at 1000 psig and 400 lb per second at 250 psig. Nitrogen gas at 2200 psig was available throughout the complex for pneumatic testing.

Test Complex 21 - This was an environmental test and turbodrive test laboratory in which acceleration, vibration, temperature, and vacuum testing could have been performed.

Test Complex 24 - This complex was a thrust chamber research and development facility that was designed primarily for testing exotic types of propellants. Three firing locations, each connected to separate fuel and oxidizer supply rooms, permitted vertical or horizontal testing at thrust levels up to 15,000 lb. Propellants which were used included oxidizers, fuels, and monopropellants.

Test Complex 25 - This test complex was designed as a systems test area for testing complete missile systems. The area consisted of a test structure, a control and observation building, and an auxiliary shop building.

Supporting services included a central data acquisition facility (Building 14), shop facilities (machine, plumbing, welding, painting, electrical, and carpentry), and an instrumentation laboratory.

2) **Dunn Geoscience Corporation, 1977, "Hydrogeologic Investigation and Testing for the Exploration and Development of a Water Supply for Luther Forest, Malta, New York," January 5.**

Dunn Geoscience Corporation (DGC) conducted several hydrogeologic investigations for the Luther Forest Corporation during 1973-1977 which are summarized in this report. The objectives of these studies were to determine the feasibility and locations for the development of a water resource to supply the Luther Forest Planned District Development. Specifically, the project was directed towards the following five tasks:

- Evaluation of the geologic and hydrologic conditions on the site;
- Evaluation of water resources available;
- Determination of areas for exploration test drilling;

- Exploration drilling and aquifer testing; and
- Determination of maximum and long-term safe yields from individual wells to well fields.

Dunn Geoscience Corporation concluded that the Knapp Road aquifer consists of a clean sand ranging from fine to coarse-grained texture and averaging approximately 30 feet in thickness. At favorable well sites, the available drawdown ranges from 13 to 23 feet. Recharge to the well field is primarily from the north as infiltrated precipitation moves downgradient to the flatter topography that is drained by surface streams. Some local recharge will occur from the surface stream that flows adjacent to the southern-most well sites. This source of recharge will become more significant as the wells are placed in operations.

Dunn Geoscience Corporation stated that the fineness of the aquifer sand restricts the volume of water that will move through it at a given gradient. Test data from the two constant-rate aquifer tests suggests that some formational loss occurs adjacent to the well. The fine aquifer material and the apparent formation loss results in a specific capacity (yield in gpm/foot of drawdown) of approximately seven to nine gallons per minute per foot. Under these conditions, specific capacity is directly related to well design, increasing with better design. However, a point is quickly reached, at which specific capacity increases only slightly as the cost of well installation increases sharply.

Dunn Geoscience Corporation stated that a transmissivity (T) of approximately 40,000 gpd/ft represents the upper limit of the range of T for the aquifer. Additional drawdown data generated by future wells may decrease this value. The effective T around the wells may be as low as 10,000 gpd/ft due to possible formation losses.

Test data showed that a well spacing of approximately 300 feet was sufficient for minimum well interference and maximum well field yield. Based on the data from the two aquifer tests, the long-term safe capacity of Well No. 1 was 100 gpm. This value was based on 16 feet of available drawdown, the pump intake set at 25 feet below land surface (1.0 foot above the top of the screen), and a low drought-condition, static level of 9 feet below land surface. Well construction diagrams and geologic logs are provided in Appendix B and C, respectively.

3) **C.T. Male Associates, P.C., 1979, "Engineering Planning Study, Saratoga Research and Development Center, Malta, New York," July.**

C.T. Male Associates, P.C. prepared a site assessment of the Malta test station for NYSERDA in July 1979. This report describes the conditions of the natural site environment, existing buildings, roads, traffic patterns, utilities (water supply, fire protection, sanitary sewage disposal, storm water drainage, electrical, gas and telephone services), the existing landfill and incinerator sites, metal reclamation locations, and waste disposal areas. Pertinent sections of this assessment which describe the landfill operation, the metal reclamation, and chemical waste disposal areas are provided in their entirety in Appendix D.

C.T. Male provided a description of former disposal areas D-1 (incinerator), D-2 (waste dump), and D-3 (NYSDOT earth and tree dump), which are shown on Figures 2 and 5. The sizes of these areas and the materials that were reportedly disposed at these sites are described in Sections 4.13, 4.14, and 4.15, respectively.

C.T. Male also provided a description of the metal reclamation operation which has been identified as three separate sites (S-1, S-2, and S-3), as shown on Figure 2. The sizes of these areas and the materials that were reportedly stored at these sites are described in Section 4.11.

C.T. Male identified two areas where chemical wastes were believed to have been buried (D-4 and D-5), and a third site was discovered in 1985 (D-6). These sites are shown on Figure 2. The sizes of these sites and the materials that were reportedly disposed of at these sites are described in Sections 4.16 and 4.17.

4) **C.T. Male Associates, P.C., 1980, "Engineers Report, Rehabilitation of Existing Water Distribution System, Saratoga Research and Development Center, Town of Malta, Saratoga County, New York," December.**

This three-page letter report summarizes the rehabilitation of the water distribution system that was completed by a subcontractor to C.T. Male Associates, P.C. The work included the draining, cleaning and disinfecting of the concrete storage reservoir, the installation of a new chlorination system for supply Well Nos. 1 and 2, and the flushing of the existing water mains at the test station.

5) **Thomsen Associates, 1983, letter report to C.T. Male Associates, P.C. regarding ground-water movement.**

Thomsen Associates evaluated ground-water movement at the site based on C.T. Male reports, published information concerning regional ground-water flow and water-level elevations in four existing on-site wells. The report concludes that, although the direction of ground-water movement cannot be definitely determined based on data from four wells, flow in a southwestern direction is indicated. Complications may include the presense of ground-water divides and a cone of depression caused by pumping at Wells No. 1 and 2. This letter report is included with the selected C.T. Male Associates' observations in Appendix D.

6) **Geraghty & Miller, Inc., 1985, "Investigation of Ground-Water Conditions at the Wright-Malta Test Station, Malta, New York," June.**

Geraghty & Miller, Inc. conducted an investigation of air, ground water, and soil quality conditions at the Berth 24 test pad at the Wright-Malta test station on behalf of General Electric Company (Pittsfield) in 1985. The purpose of the investigation was to determine whether contaminants were present in the soil and/or ground water and to determine if the soil at the site was suitable for building a new test station. Water samples were also collected from existing potable supply wells No. 1 and 2. Supporting data, including air, ground water and soil quality data, are provided in Appendix E.

Water samples were collected from the only well that was installed (Well 9), as shown on Figure 2. Base-neutral extractable organics, acid extractable organics and pesticide/PCBs were not detected in the sample collected in February, 1985 from Well 9. Cyanide and phenols were below the detection limit and metal content was at acceptable levels. As this sample was not filtered prior to acidification and the results for arsenic, chromium, and lead were at the recommended drinking water standard, a second sample (filtered) was collected in March, 1985 to determine the dissolved trace-metal content. The results for the second sample showed that the dissolved trace metal contents were all below the drinking water limits.

The volatile organic compound (VOC) results indicated that low levels of carbon tetrachloride (12 ug/L), trace levels of trichloroethylene (TCE)(<10 ug/L), and methylene chloride (180 to 320 ug/L) were detected. The data for the VOC replicates collected in February, 1985 show that the precision of the laboratory was acceptable as the data for both samples generally agree. The data for the field and trip blanks show that the samples had been contaminated by several organic chemicals including methylene chloride. Therefore, the methylene chloride in the Well 9 sample for this date is attributed to external contamination and is not considered dissolved in the ground water. This conclusion was supported by the data from a second set of samples collected in March, 1985. The March results also indicated the presence of carbon tetrachloride and TCE at low levels (<10 ug/L). Methylene chloride was not detected in any of the samples and the field and trip blanks indicated that laboratory contamination had not occurred.

The ground water beneath Berth 24 is generally free of dissolved organic chemicals on the USEPA priority pollutant list, except for carbon tetrachloride and TCE, which were found at levels near the detection limit.

The chemical results for the water samples from the potable water supply wells show that high levels of TCE (240 ug/L) and carbon tetrachloride (1,100 ug/L) were found in Well 2 with less concentrations detected in Well 1. Chloroform was also found, but it may have been introduced during the chlorination process of the water supply.

The dissolved metal content of the sample from Well 1 does not contain any constituent in concentrations exceeding the USEPA potable water standards.

To characterize the quality of the shallow soil in the vicinity of the Berth 24 test site, soil samples were collected from the upper four feet at two locations. The samples at each location were composited and analyzed for USEPA priority pollutant compounds. The results of these analyses indicate that methylene chloride was the only organic compound found above detection limits (Boring 8 - 72 ug/kg and Well 9 - 140 ug/kg). It is likely that these results are due to laboratory contamination similar to the water samples that were collected during the same sampling round. The trace metal contents of the soil samples are within the ranges excepted for soil and do not indicate contamination from the testing at Berth 24.

Air in the Berth 24 Test Pad was sampled at the basement, main level, pipe bay, and outside cell (Bay 6). The samples were collected during a 3.5 to 4-hour period by pumping air through activated charcoal filters. Non-methane organic contaminants would become trapped on the activated charcoal. Contamination was not detected in either of the four sampling locations.

7) **Geraghty & Miller, Inc., January 20, 1986, letter report to General Electric Company (Pittsfield) regarding soil testing at Berth 24, Malta, New York.**

The purpose of this study was to determine the chemical quality of backfill material that was excavated from Disposal Area D-6 and placed near Berth 24 during recontouring activities. At the time of the excavation it was not known that this area had been used for disposal. At the request of GE, Geraghty & Miller, Inc. collected samples of fill material used for backfill during the construction of a new test facility. Sampling data are provided in Appendix E.

On October 31, 1985, ten soil borings were completed at the General Electric test site (Berth 24) in the Wright-Malta test facility, Malta, New York. The boring locations were selected using information supplied to Geraghty & Miller, Inc. by the General Electric site manager, and were arranged to provide data describing the area of concern.

The borings were installed with hand augers to depths of 7 to 10 feet and samples were composited over the entire depth of the boring. An organic vapor analyzer (OVA) was used in the field to determine if volatile organic compounds were present during sampling; however, none were detected. The soil in the area is a homogeneous, well-sorted, fine- to medium-grained, dark brown sand, with small roots throughout.

The samples were analyzed by Cambridge Analytical Associates in Boston, Massachusetts, for volatile organic compounds and acid/base/neutral extractable organic compounds. In addition, nitrosoamines were also analyzed for as they are degradation products of hydrazine. Benzene and toluene were found at the detection limit of 5 ug/kg at one location and bis(2-ethylhexyl) phthalate was detected in seven of the ten borings at concentrations that ranged from 250 to 2,700 ug/kg. Neither nitrosoamines nor any extractable organic compounds were found.

Bis(2-ethylhexyl) phthalate has a low solubility and it is readily adsorbed onto suspended particulates, therefore, it is unlikely that the levels detected in the soil will impact ground-water quality. The source of bis(2-ethylhexyl) phthalate is not known. However, it is commonly associated with paints, plasticizers, and the organic fluid in vacuum pumps. It may have been a laboratory artifact.

8) **O'Brien & Gere Engineers, Inc., 1986, "Preliminary Site Evaluation: Saratoga Research and Development Center and Wright-Malta Corporation, Malta, New York," January.**

O'Brien & Gere Engineers, Inc. conducted a site evaluation of the Malta test station for NYSERDA in 1986 to determine the source of volatile organic compounds (VOCs) in ground water at the site and to identify other areas that could have had a potential impact on the environment. The report reviewed previous studies, included a description of a site visit and subsequent field reconnaissance, summarized hydrogeological conditions, evaluated historical aerial photographs and provided conclusions.

The site visit was conducted on May 22, 1985 and included personnel from NYSERDA, O'Brien & Gere, NYSDOH, and NYSDEC. Disposal sites identified by C.T. Male in 1979 were visited. At NYSDOT disposal site D-3, O'Brien & Gere collected a sample of surface water and sediment. The surface water from the base of the site contained iron, manganese and lead at 148 mg/L, 27.8 mg/L, and 1.06 mg/L, respectively. The sediment sample contained iron, manganese, and lead at 28,000 mg/kg, 395 mg/kg, and 5.9 mg/kg, respectively. No other results were provided.

O'Brien & Gere's observations from the site visit are listed below.

- A machine shop is located on Wright-Malta property.

- Some drums containing liquid were found near Supply Well No. 2. Some empty drums were also found in the same area, and some of these were labeled "mineral spirits" (naphtha) and "freon."
- One of the gantry test areas stored containers of "GE Silicones".
- In the vicinity of disposal areas D-2, D-4, and D-5, there are several areas where vegetation characteristics change abruptly and/or the ground is unexpectedly even, according to O'Brien & Gere.
- General trash was observed in a pit used for disposal by Wright-Malta.
- A small mound was observed along the access road to PTI which may be natural or due to earth-moving activities.

O'Brien & Gere summarized the site hydrogeologic conditions which were previously described by C.T. Male (1979) and included Section 2.26 of this work plan. In addition, a brief description of the existing water-supply system and a summary of previous groundwater data from samples collected by NYSDOH and C.T. Male in 1985 was provided. These data indicate that carbon tetrachloride, trichloroethylene, chloroform and PCBs have been detected in the supply wells and distribution system at maximum concentrations of 840 ug/L, 230 ug/L, 58 ug/L, and 1.3 ug/L, respectively. Also, mercury (0.085 mg/L), chromium (0.018 mg/L), lead (0.025 mg/L), copper (0.09 mg/L), and boron (0.099 mg/L) also found in the supply wells and/or distribution system.

O'Brien & Gere also reviewed aerial photographs from 1952, 1961, 1968, 1978, and 1982 and estimated the approximate time during which disposal activities occurred at sites D-1 through D-5.

A field reconnaissance of the NYSERDA property was conducted on August 7 and 8, 1985 by O'Brien & Gere to identify any disturbed areas that may contain buried waste materials. Their observations are described below.

- Iron-stained water was discharging from the base of the NYSDOT disposal area D-3.
- Standing water was present in the PTI impoundment, and was partially covered with a liner.
- Trash was observed along a logging trail.
- Brush and cut logs were noted in several cleared areas south of the main access road.
- No other cleared areas potentially used for waste disposal were apparent from either the field reconnaissance or aerial-photograph analysis.

O'Brien & Gere concluded that the most likely sources of VOCs in ground water are the area northeast of Supply Well No. 2, where drums had been stored and/or disposal sites D-2, D-4, and D-5. Other potential sources may include disposal area D-3, the PTI impoundment, a small mound located adjacent to PTI, and disposal site D-6.

O'Brien & Gere recommended that a magnetometer survey be conducted at sites D-2 through D-6 and the small mound adjacent to PTI. In addition, six downgradient monitoring wells and one upgradient well were recommended for installation to determine ground-water quality and the direction of ground-water flow.

9) **Dunn Geoscience Corporation, 1986, "Hydrogeologic Investigation and Installation of Production Well 3, Luther Forest, Malta, New York," February.**

Dunn Geoscience Corporation conducted a hydrogeologic investigation for the Luther Forest Corporation to determine the safe yield of a third production well (PW-3) and the overall yield of the aquifer. Supporting data are provided in Appendices A and B.

The specific objectives of the hydrogeologic investigation included the following:

1. Analysis and description of geologic and hydrologic conditions of the site and underlying aquifer;

2. Determination of the long-term safe yield of the new production well;

3. Determination of the long-term safe yield of the aquifer.

One soil boring was drilled on the site. The samples collected from the soil boring were used for the final design of a 16 x 8-inch production well (PW-3) which was drilled at the same location (see Figure 2). PW-3 was constructed as a gravel packed well, 28.5-feet deep with 5 feet of stainless steel, 80-slot well screen. The production well was screened in a coarse sand.

A 24-hour pumping test was performed on PW-3. Drawdown and recovery data were collected from six observation wells, the Van Patten Well (VP-1) and pumping well PW-3. PW-3 was pumped at a rate of 70 gpm for the first 12 hours and 90 gpm for the second 12 hours. The purpose of the pumping test was to evaluate the aquifer characteristics surrounding PW-3, define the cone of depression, determine well loss, and determine the safe long-term yield of the well. The test was conducted using a submersible pump set at approximately 25 feet below top of casing.

The pumping test for PW-3 was conducted January 8 through January 10, 1986. Based on the time-drawdown plot of the data, the aquifer transmissivity is computed as 35,000 gallons per day per foot (gpd/ft). The aquifer storage coefficient was calculated as 0.003. As shown by the storage coefficient, the Knapp Road aquifer is a water-table aquifer. The pumping test was initially conducted at 70 gpm. Based on an exposed screen length of 5 feet, and well depth, there will be a maximum of 13.5 feet of available drawdown. Based on a pumping rate of 110 gpm, the computed theoretical drawdown would be 12 feet after 365 days of continuous pumping. The safe, long-term yield for well PW-3 is computed to be 110 gpm based on test results and available data.

The computed cone of depression around each well is approximately 0.5 foot of drawdown at 350 feet from the test well. The interference of all wells on each other is calculated to be approximately 0.5 foot per well using a 350-foot well spacing. The interference between wells is not expected to reduce individual well yields since additional available drawdown has been designed into the wells. An extended dry period with loss of recharge could result in some reduction in the total yield from the well field.

A total of seven 110 gpm wells can be installed in the well field. These seven wells will have a theoretical long-term yield of approximately 600 to 700 gpm. The total estimated yield of the Knapp Road aquifer is 600 to 700 gpm assuming that four additional production well sites prove to be productive as projected based on the exploration and testing work conducted to date.

The water-quality sample collected at the end of the pumping test indicated the presence of good quality ground water. The water-quality sample met all NYSDOH drinking-water standards.

10) **Geraghty & Miller, Inc., 1986, "Environmental Assessment for the Proposed General Electric Company Test station, Malta, New York," August.**

At the request of GE (Pittsfield), Geraghty & Miller, Inc. prepared a pre-construction environmental assessment for a parcel of property located adjacent to the Malta test station on Wright-Malta property. The objectives of the study were to determine site suitability for construction of a new test station; specifically, to make a preliminary determination of ground-water and soil quality, to identify any areas that may have been used for waste disposal, and to define the direction of ground-water flow. Data are provided in Appendices A, B, C, and E.

Four 2-inch diameter PVC monitoring wells (MW-1 through MW-4) were installed along the perimeter of the study area (Figure 2). The well depths ranged from 39.5 to 55 feet, and each well was installed to a depth of 8 feet below the water table. As one of the purposes of the well installation program was to determine the horizontal direction of ground-water flow, two synoptic water-level rounds were completed on May 8 and 9, 1986. The water-level data within the study area show that ground water flows southwesterly toward several brooks that discharge into Round Lake.

The four monitoring wells were analyzed for the Hazardous Substances list of compounds by Cambridge Analytical Associates (Boston, Massachusetts). None of the chemical constituents were detected above the laboratory's detection limits in Wells MW-3 and MW-4. The following compounds were detected in MW-1: bis(2-ethylhexyl) phthalate (5 ug/L), butyl benzyl phthalate (12 ug/L), diethyl phthalate (5 ug/L), benzyl alcohol (3 ug/L), and aroclor 1254 (2.5 ug/L). Bis(2-ethylhexyl) phthalate (270 ug/L), butyl benzyl phthalate (12 ug/L), and trichloroethylene (6 ug/L) were detected in Well MW-2.

Although phthalates are common laboratory contaminants, Cambridge Analytical Associates believes that they were not a problem during the time when these samples were analyzed and that the reported values were not attributable to laboratory artifacts. Therefore, resampling was recommended.

Even though a trace of aroclor 1254 (2.5 ug/L) was reported in one of the four samples, its presence in ground water is not likely due to the depth to water (30 to 40 feet), and the ability of soils to attenuate aroclors. As with the phthalates, resampling was recommended.

Zinc was the only metal parameter detected, as ground-water samples from Wells MW-1 and MW-2 contained 0.06 mg/L and 0.07 mg/L, respectively. These levels were below the Federal drinking-water standard of 5 mg/L.

Shallow soil VOC content was characterized by analyzing the soil atmosphere in 1.5 to 2-foot deep borings, spaced 40 feet apart within a rectangular sampling grid. The soil removed at each sampling station was examined for staining and odors; however, none were present. The borehole atmosphere was analyzed for VOCs using a TIP(TM) photoionization detector. The low VOC concentrations detected by the TIP meter were attributed to naturally-occurring substances present throughout the pine-forested site. This was substantiated by chemical analyses for USEPA priority pollutant VOCs of the two samples with the highest TIP™ readings (20.5 and 22 ppm). No priority pollutant VOCs were found in these samples.

The soil samples collected during the drilling program were also screened in the field for VOCs using the TIP (TM) meter. The highest result (57 ppm) was obtained from the 4 to 5-foot deep sample at boring location B-2. This sample was also analyzed for USEPA priority pollutant VOCs, and none were found. As ambient air within the study area was found to contain unknown, naturally-occurring VOCs at levels up to 0.6 ppm, it is likely that the field determinations of unspecified VOCs were the result of a pine odor in the air or decaying forest matter within the study area.

A magnetometer survey was conducted by Geraghty & Miller personnel over the area of the site where construction activities had been proposed. Magnetic intensity measurements were collected at approximately 550 stations spaced approximately 20 feet apart, the spacing needed to identify objects the size of a 55-gallon drum. The magnetic intensity data were within background levels for the surveyed area. Therefore, the possibility of buried ferro-magnetic metal at this site is extremely remote.

11) **Blasland & Bouck Engineers, P.C., 1986, "Hydrogeologic and Water Quality Investigation at the Saratoga Research and Development Center", December.**

Blasland & Bouck Engineers, P.C. conducted a hydrogeologic investigation at the Malta test station on behalf of NYSERDA in 1986. The purpose of the study was to determine the ground-water flow directions and hydraulic gradients at the site, and to determine if contaminated ground water had migrated or had the potential to migrate from the testing areas into the one-mile non-habitation easement area. Supporting data are provided in Appendices A, B, C, and E.

To determine ground-water flow directions and ground-water quality, Blasland & Bouck installed 11 monitoring wells (2S, 3S, 4S, 4D, 10S, 10D, 11S, 11D, 13S, 13D, and 14D), as shown on Figure 2. Water-level data collected from these wells and several existing wells were used to determine the ground-water flow directions shown on Figure 3. In addition, two temporary well points were installed in Ravine No. 2, to compare ground-water and surface-water relationships.

An aquifer test was also performed by Blasland & Bouck to determine aquifer characteristics. Supply Well No. 1 was pumped for 22.5 hours at 20 gallons per minute (gpm). From this test, Blasland & Bouck determined that the pumping well's radius of influence was at least 1,050 feet, transmissivity was 17,800 gpd/ft, hydraulic conductivity was 24 ft/day and the flow velocity varied between 70 and 166 ft/yr. Geraghty & Miller believes a higher pumping rate is required to stress the aquifer and a longer test is necessary to determine more accurate aquifer characteristics.

The water-quality investigation was designed to sample Supply Well No. 2 for VOCs, semivolatiles, PCBs, aluminum, boron, and nitrogen. Based on those results and consultation with NYSDEC, the parameters selected for subsequent ground-water sampling rounds were VOCs, aluminum, and boron. The ravine well points and surface-water samples from Ravine No. 2 were also analyzed for VOCs, aluminum, and boron. The NYSDEC and NYSDOH also sampled the headwaters from Ravine Nos. 1b, 2a, and 2c in June 1986 and analyzed each sample for VOCs, semivolatiles, and pesticides. In July 1986, NYSDOH sampled Ravine Nos. 3, 4, 5, 6a, 6b, 7, and 8 for VOCs.

In ground water, chloroform was detected in 7 of 15 wells sampled, ranging from 1 to 26 ug/L. Carbon tetrachloride was found in 9 of 15 wells sampled, ranging from 8 to 96 ug/L. TCE was detected in six of the wells ranging in concentration from 11 to 62 ug/L. Acetone was found in two wells, and it is believed to be a laboratory contaminant. Five other organic compounds were detected only once, and are as follows: benzene (Well 4D - 1 ug/L), benzo(a) anthracene (Well 11D - 34 ug/L), di-n-octyl phthalate (Well 11D - 93 ug/L), diethyl phthalate (Well 11S - 56 ug/L), and tetrachloroethene (Well 4D - 1 ug/L).

Blasland & Bouck detected carbon tetrachloride (56 ug/L) and TCE (32 ug/L) in surface-water headwaters in Ravine No. 2a; however, neither compound was found in either the well point or surface-water samples collected farther downstream. The results of the NYSDEC/NYSDOH surface-water sampling programs conducted in June and July, 1986, indicated that no contaminants were found above detection levels.

Blasland & Bouck concluded that ground-water flow across the site is generally from southeast to northwest. A ground-water divide exists and approximately cuts the site in half, in a southeast to northwest direction. Ground-water flow is either to the north or to the west. Ground-water flow is influenced by the presence of ravines which intersect the ground-water flow system. Thus, at the site surface water in the upper portion of the ravines appears to be hydraulically connected to the ground-water flow system. Based on the monitoring network, the ground water has been impacted at certain locations. Surface-water samples from ravines to the north and south of the site show no contamination, except for the ground-water discharge zone in the upper portion of Ravine No. 2a. Blasland & Bouck believed that the water-quality data indicated that the easement area had been impacted. VOCs were not found in surface water or ground water further downgradient from stream sampling point 3 in Ravine No. 2a. Surface-water samples obtained from other ravines around the site did not indicate the presence of VOCs.

Blasland & Bouck concluded that based on the limited hydrogeologic work performed within the easement area, the presence of surface water in the upper portion of the ravines is the result of discharge of ground water that has originated at or has passed through the site. The sampling of surface water within the easement area indicated that, while some compounds appeared to have entered the surface water at one point in the easement area, they did not appear to be leaving the easement area in the surface water. However, the scope of the investigation was limited and examined local ground water/surface water relationships in one ravine and not the entire easement area, which was part of the NYSDOH and NYSDEC study. Therefore, the absence of contamination at the downgradient ground-water and surface-water locations within the easement area does not entirely preclude the presence of an impact at some other location.

12) **NYSERDA, 1987, Septic Tank Sampling and Analysis Program, January.**

NYSERDA sampled the tap water and septic system at a GE/Exxon-Nuclear test station located on Plains Road, approximately 3,500 feet northwest of the Malta test station. Similar sampling was carried out for the tap water and septic system at Power Technology, Inc. (PTI) and Mechanical Technology, Inc. (MTI) located on NYSERDA property within the test station. The data are included in Appendix E.

The results indicate that several VOCs have been found at elevated concentrations in either septic sludge or septic water samples. Trans-1,2-dichloroethene was found at 25,000 ug/kg at PTI and toluene was detected at a concentration of 47,000 ug/kg at the GE-Exxon Nuclear facility. Other VOCs were detected at much smaller concentrations as shown on Tables E-1 and E-2 in Appendix E.

13) **United States Army Corps of Engineers, 1988, "Defense Environmental Restoration Program (DERP) for Formerly Used Sites, Inventory Project Report, Malta Test Station, Malta, New York," June.**

The U.S. Army Corps of Engineers (Huntsville Division) retained O'Brien & Gere, Engineers to perform a site assessment of the Malta Test Station for the New York District. The report included a brief description of the site, photographs of some areas of concern, correspondence concerning the site, findings, and recommendations. At the time the report was prepared, the Corps determined that it would be necessary to remove four 10,000-gallon tanks, two 6,000-gallon tanks, one 5,000-gallon tank, and two 550-gallon fuel storage tanks. All tanks were located below grade. The beneficial use and possible demolition of a rocket-testing tower was discussed. The following areas of uncertainty were described: triangular concrete pads with eyehooks, concrete hatches which cap apparent manholes, and color-coded concrete pylons. Surficial debris and drums were recommended for removal.

Finally, the report recommended the identification, investigation, and removal of suspected waste burial sites that may have impacted ground-water quality, the installation of monitoring wells, and the investigation of materials that were at one time stored in the magazine bunkers.

14) **Dunn-Geoscience Corporation, December 1989, Early-Warning Monitoring System Plan, Malta, New York.**

This program began in 1987 and included the installation of monitoring-well clusters and surface-water sampling locations between the Malta Rocket Fuel Area Site and the Luther Forest Well Field. The program consisted of analyzing ground-water and surface-water samples for volatile organic compounds (VOCs). Quarterly monitoring reports are submitted to the USEPA and GE. Summaries of data are provided in Appendix E.

Since the beginning of the program, methylene chloride has been found and reported as a laboratory artifact at concentrations of less than 5 ug/L. Naphthalene has been detected for the same reason. Carbon tetrachloride has been found on occasion in the upper portion of Ravine No. 2a at similar concentrations; however, it has not been detected in any of the Early Warning System monitoring wells or in surface water closer to the well field. It is believed that this constituent volatilizes into the ambient air prior to the recharge of the surface water into the lower aquifer in which the Luther Forest supply wells are installed. The quarterly monitoring program will continue during the RI program which is to be conducted at the Malta Test Station and its vicinity.

3.1.2 Summary of Existing Hydrogeologic and Analytical Data

In 1985, Geraghty & Miller performed a soil, groundwater and ambient air quality investigation at the Berth 24 test pad located on the Wright-Malta property (Figure 4). Soil samples were collected at the location of monitoring well MW-9S (now destroyed). Water samples were collected from this monitoring well and from Supply Wells 1D and 2D which serve the Wright-Malta test station. No soil contamination was detected. Carbon tetrachloride and trichloroethene were detected in both the monitoring well and water supply samples. A follow-up soil quality investigation was conducted in November 1985 to evaluate soil that was excavated from Disposal Area D-6 and used as cover material at Berth 24 during regrading activities. These data demonstrated the presence of benzene and toluene at one boring location and bis(2-ethylhexyl) phthalate at seven boring locations. The phthalate is suspected to be a laboratory artifact. Data summaries from the 1985 and 1986 Geraghty & Miller investigations are provided in Appendix E.

In 1986, Geraghty & Miller collected shallow soil samples and installed four monitoring wells adjacent to the southeastern boundary of the Wright-Malta parcel (Figure 4). This work was conducted as a site assessment for GE. No priority pollutant VOC contamination was detected in the soil. Water-level measurements demonstrated that ground water flow is to the southwest at this location. Low concentrations of several chemicals were detected at these monitoring wells. A magnetometer survey was also performed and no buried ferromagnetic material was identified. Geologic logs, well construction diagrams, water-level measurements, and analytical data are provided in Appendix A, B, C, and E, respectively.

In April 1985 and August 1986, the NYSDEC/DOH collected water samples from the on-site supply wells. Available data is included in Appendix E; additional data will be obtained, if available, during the literature search (Section 4.2). Ground water from production wells is currently being treated by air stripping, as required by the NYSDEC. Water-quality data that has been developed for this program will also be obtained during the literature search.

In 1986, Blasland & Bouck Engineers, P.C. performed a hydrogeologic and water quality investigation at the MRFA Test Station. Boron, aluminum, carbon tetrachloride and trichloroethene were identified at a number of well locations at the property boundary and in ravine 2A (Appendix E). The NYSDEC and the NYSDOH also collected surface-water samples from ravines near the MRFA Test Station. Specifically, samples were collected at ravines 3, 4, 5, 6A, 6B, 7 and 8 and analyzed for purgeable halocarbons. Available laboratory data are provided in Appendix E. In 1986, Blasland & Bouck collected two samples from ravine 2 (Figure 5) and analyzed them for purgeable halocarbons, aromatic purgeables, acid extractables, base neutrals and organochlorine pesticides. Low concentrations of chloroform, carbon tetrachloride and trichloroethene were reported in ravine 2A by Blasland & Bouck. Laboratory data are provided in Appendix E.

The NYSDEC splits selected ground-water samples from wells installed by Dunn Geoscience Corporation as part of the Early Warning Monitoring System between the MRFA and the Luther Forest Well Field. This work is being conducted in accordance with a work plan submitted to the EPA. Samples have been collected quarterly since 1987 at each of the six wells and four stream locations which currently make up the network. In 1990, four additional wells at the test station (10S, 10D, 13S, and 13D) were added to the monitoring well network. Samples are analyzed for volatile organic compounds. To date, there is no evidence of impact from the MRFA on ground water at the Luther Forest Well Field based on these results (Dunn Geoscience 1989). The data are provided in Appendix E.

At the present time, it is not known whether the information provided above represents a complete history of activities by regulatory agencies at the MRFA site. Efforts to obtain additional information shall be made during the course of the Literature Search described in Section 4.2.

Due to the extensive nature of background reports, a document repository will be established with the USEPA, NYSDEC and the local library. Copies of each report will be available in the document repositories. The test station will also be requested to keep documents on file.

3.2 Remedial Investigation Approach and Objectives

The MRFA site RI is designed to collect, present and discuss data necessary to identify sources of contamination, to determine the nature and extent of contamination, to assess potential risks posed by the site, and to support the development of a feasibility study (FS). To meet these objectives, we have provided a Scope of Work in Section 4.0 of this Revised RI Work Plan. If a subsequent investigation is necessary, based on the results obtained during this phase of the RI, a supplemental RI Work Plan will be developed.

3.3 Preliminary Risk Assessment

The preliminary risk assessment will be used to identify potential human exposure pathways, data needed to assess human exposure through these pathways, and associated risks. This preliminary identification is based on the reported distribution and concentrations of contaminants, site history, land use, hydrogeology and other data in this work plan. Because the available data are not sufficient to define the nature and extent of contamination, this assessment is limited. The RI will obtain the data needed to conduct an evaluation of human health risk which may be associated with exposure to contaminants at the site.

Investigations to date at the MRFA site are summarized in Section 2.0 and the analytical data are provided in Appendices E and F. Media of concern at the site which will be investigated during the RI include surface and subsurface soils, air, ground water, surface water and sediment. The objective of the RI is to determine the nature and extent of contamination at the site and will be met by the sampling program provided in Section 4.0. If additional data are necessary to meet this objective, a focused sampling program can be defined by the data collected during this phase of the RI.

Surface soils, if contaminated, may pose a risk to site workers, visitors and future site users. Subsurface soils do not pose a direct risk but may serve as a source of ground water contamination. Contaminants in ambient air may pose a risk to area residents. Surface water and sediments, if contaminated, may pose a risk to recreational users. Ground water, if contaminated, may pose a risk to off-site supply wells.

3.3.1 Potential Chemicals of Concern

Sampling of soil, septic tanks, sludge, ground water, surface water has indicated the presence of VOCs, phthalates, PCBs and/or metals. A limited number of VOCs, including carbon tetrachloride, trichloroethene, toluene and 1,2-dichloroethene, have been identified.

The presence of phthalates must be confirmed, as these chemicals are common laboratory artifacts. PCB Aroclor 1254 was observed in only one ground water sample, from Well MW-1, at 2.5 ug/l; the presence of this compound must also be confirmed. Metals concentrations must be evaluated with respect to naturally occurring metals in both soil, ground water and surface water. These data may not completely characterize contamination at the MRFA site and, therefore, potential risks cannot be assessed at this time. The RI is designed to collect extensive information on potential contaminants at the site. Both the nature and extent of any contamination will be defined.

3.3.2 Potential Source Areas and Release Mechanisms

Specific areas of concern which will be investigated during the RI are listed in Section 2.3. Historical information and data collected to date indicate that sources of contamination may include buried and surface materials and soils contaminated by previous site activities.

Given the information to date, the potential mechanisms of chemical release from the site include:

- Discharge to ground water
- Shallow ground-water discharge to the ravines
- Surface-water runoff
- Volatilization from surface and subsurface soils to ambient air
- Entrainment of contaminated surface soils in air with deposition on- or off-site

Of the above release mechanisms, release to ground water and surface water have been observed. Ambient air quality data in a limited area have indicated no impact. Data characterizing exposures as a result of the remaining release mechanisms have not been collected to date. Other exposure mechanisms may be identified during the RI.

3.3.3 Potential Exposure Pathways and Receptors

The following exposure pathways were developed on the basis of current site uses only. The final risk assessment will address both existing and potential future uses of the site and surrounding area.

The primary populations that may be exposed include site workers, trespassers, and visitors to the site. Users of the Luther Forest Well Field and residents with private wells may also be exposed if contaminants from the site migrate into the supply wells.

3.3.3.1 Ground Water

On-site supply wells 1D and 2D have been sampled several times and both wells have been shown to contain organic compounds. Ground water from these wells is currently being pumped and treated by an air stripper approved by the NYSDEC. The nearest off-site supply wells are located at the Luther Forest Well Field and are not contaminated. Residents living outside the site easement use ground water as their water supply source. Further information concerning the number of municipal and private wells will be obtained during the Literature Search as part of this RI.

Exposure to contaminants in ground water may occur as a result of:

- Ingestion of contaminated ground water
- Dermal contact with contaminants in ground water

Data to evaluate exposures through these pathways will be collected during the RI.

3.3.2.2 Surface Soils

Subsurface and near surface soil samples taken at the site show concentrations of metals and phthalates; positive photoionization detector (PID) readings were also observed in a limited number of samples. As previously stated, metals concentrations must be evaluated with respect to naturally occurring ambient concentrations and the presence of phthalates must be evaluated as they are common laboratory artifacts. Should surface soil contamination be confirmed, exposures to contaminants may occur as a result of:

- Dermal contact
- Incidental ingestion
- Inhalation of fugitive dust

Data to evaluate these pathways will be obtained during the RI.

3.3.3.3 Air

Indoor and outdoor ambient air samples were collected at Berth 24 and analyzed for volatile organic compounds and a variety of fuels and distillates; however, none were detected. The sampling locations included an indoor sample collected at each of the three levels inside the building and one outdoor sample collected on a platform in the former testing area. Sampling procedures are included in the Geraghty & Miller report for this site (Geraghty & Miller, 1985). Additional ambient air monitoring data will be collected during the RI. Should contamination be observed, exposures may result from the following:

- Inhalation of outdoor air
- Inhalation of indoor air
- Inhalation of fugitive dust

3.3.3.4 Surface Water and Sediments

Ground water at the MRFA site discharges to ravines which may be used for recreational purposes. During the Blasland & Bouck investigation (1986), a sample from Stream 3 was found to contain carbon tetrachloride and trichloroethene (see Appendix E). Low levels of VOCs have occasionally been detected in samples collected by Dunn Geoscience as part of the Early Warning Monitoring System program (Appendix F). As part of the RI, surface water and sediments will be sampled to further evaluate the potential for contaminant migration to surface waters and to obtain information on potential exposures due to surface water and sediment pathways.

3.4 Summary of Additional Data Needs

The objectives of the MRFA site investigation are to obtain the data needed to:

- Estimate the public health and environmental risks which may be associated with the site
- Evaluate potential remedial alternatives applicable to site conditions

The data needed to meet the objectives of the MRFA work plan are:

- Locations and extent of potential source areas at the site
- The nature, concentration and extent of surface soil contamination
- Naturally occurring concentrations of inorganic compounds, specifically metals.

These data will be used to determine whether concentrations of inorganics in on-site soils are above background concentrations.

- The nature, concentration and extent of possible subsurface soil contamination in potential source areas. This information will be used to evaluate the extent to which contaminants may leach to ground water and to select appropriate remedial alternatives, if necessary.

- The nature, concentrations and extent of ground water contamination. This information will be used to assess the risks to receptors and to select appropriate remedial alternatives, if necessary.

- Stratigraphy and ground-water flow directions, both horizontal and vertical; this information will be used to evaluate contaminant migration pathways.

- Hydraulic characteristics of geologic materials at the site. This information will be used to evaluate ground water flow direction and to evaluate the applicability of ground water extraction as a form of treatment.

- The nature, concentration and extent of possible contaminants in surface water and sediments. This information will be used to assess the risks to receptors and to evaluate remedial alternatives.

- The potential effects of the site on ambient air. This information will be evaluated to assess the health risks which may be associated with this pathway.

- The physical and geotechnical characteristics of unconsolidated materials. This information will be used to support the evaluation of remedial alternatives.

3.5 Preliminary Identification of Remedial Actions

3.5.1 Preliminary Identification of Remedial Action Objectives

Although the existing data are inadequate to define potential threats to public health and the environment, several preliminary remedial action objectives may be formulated based on the previous site investigations:

- Control human exposure to contaminants in surface soils.
- Control human exposures to contaminants in surface water.
- Control human exposures to contaminants in air.
- Control human exposures to contaminants in ground water.
- Control the potential for migration of contaminants in surface soil from surface runoff.
- Control the potential for migration of contaminants from soil to ground water.

After data are gathered and evaluated in Section 4.0, of the RI, the list of remedial alternatives will be refined and developed or eliminated, as appropriate. The RI will provide a basis for evaluating these preliminary remedial alternatives. Completion of the RI, including assessment of chemical distribution and migration, will also allow better definition of the potential risks of contact with site contaminants.

3.5.2 Preliminary Identification of General Response Actions, Remedial Technologies, and Alternatives

Four categories of general response actions were identified:

- No action.
- Containment.

- Treatment.
- Disposal.

The media of concern at the site are primarily soil and ground water. For each medium, a preliminary list of remedial alternatives was developed for each of the above categories. The preliminary lists of alternatives, presented in Tables 2 through 4, are intended to provide not only a wide range of applicable alternatives as a starting point for the FS, but a framework within which the RI data needs can be identified. During the FS, the lists of alternatives may be amended with other technologies identified in EPA site publications, ROD data base, or other sources.

Because the "no action," containment, and disposal alternatives are fairly straightforward, the following paragraphs focus on the applicable treatment alternatives only.

3.5.2.1 Soil Treatment and Disposal

The contaminated soil at the site can be remediated by either excavation and on-site or off-site treatment, or in-situ treatment as summarized in Table 2 and discussed below. Table 2 also shows the type of contamination for which each technology is most effective.

3.5.2.1.1 On-site and Off-site Treatment

On-site/off-site treatment technologies may include mechanical (thermal) aeration, incineration, soil washing, chemical fixation, and biological treatment. The treated soil would be disposed of either by off-site landfilling or by use as backfill on-site.

Low temperature thermal stripping involves the contact of clean air with the heated contaminated soils to transfer the volatile organics from the soil into the air system. Depending on contaminant concentrations, the air stream could be combusted in an afterburner or passed through activated carbon for air pollution control.

Soil incineration is a process in which one of several thermal technologies performs different phases of thermal reactions leading to the complete oxidation of organic substances.

Soil washing involves chemical and physical processes. The chemical process uses solvent extraction to remove contaminants (metals and organics) from the soil. Physical processes may include classification of the contaminated soil before extraction, removal of excess moisture from treated soil after extraction, and recovery of the spent solvent. The waste water generated from soil washing could be treated in an on-site water treatment system, and disposed of off-site in either a storm or sanitary sewer, depending on regulatory requirements.

Chemical fixation involves the addition of various cementing agents, such as siliceous material, fly ash, lime, or Portland cement, resulting in a stabilized and solidified product. Commercial proprietary fixation agents and processes can be used for both inorganic- and organic-contaminated soils, although organic soils are more difficult to stabilize by this method.

The biological treatment technology considered for the contaminated soil is land farming, which involves spreading contaminated soil over a prepared treatment area. Depending on the characteristics of the contaminated soil, it may be mixed with nutrient-enriched soil. The moisture, carbon/nitrogen ratio, pH, and nutrient content of the soil are monitored and maintained to enhance microbial metabolism. The hazardous organics would thus be degraded and transformed to nonhazardous substances.

3.5.2.1.2 In-situ Treatment

Technologies able to treat contaminated soil in-place have been considered. These technologies include soil vapor extraction, soil flushing, in-situ chemical fixation, and biodegradation.

In-situ soil vapor extraction involves drawing large volumes of air through the soil to strip volatile contaminants in a manner similar to air stripping of water. This process can be enhanced by injecting stream to improve stripping.

Soil flushing is the in-place washing of contaminants from the soil with a suitable solvent such as water, or a surfactant solution. The contaminated solvent is then pumped to the surface for removal, or on-site treatment and re-injection.

In-situ chemical fixation uses a mechanical mixer/injector to introduce and mix fixation materials directly into the contaminated subsurface materials. The soil is eventually solidified.

In-situ biodegradation is a technique for treating zones of contamination by microbial degradation. The basic concept involves altering environmental conditions to enhance the microbial catabolism of organic contaminants, resulting in their breakdown and detoxification.

3.5.2.2 On-Site Ground-Water Treatment

The contaminated ground water can be pumped and treated on-site or treated in-situ as summarized in Table 3 and discussed below. The EPA Guidance (USEPA 1988a) provides further information on ground-water remediation strategies and technologies.

On-site treatment technologies involve air stripping, carbon adsorption or chemical oxidation for removing VOCs; and carbon adsorption, oxidation, biological treatment, steam stripping, and ion exchange for removing nonvolatile organics.

Air stripping is a mass transfer process in which VOCs in ground water are transferred to the gaseous vapor phase. Generally, organic compounds with a Henry's Law constant of greater than 0.003 can be effectively removed by air stripping. Air stripping is an efficient process to treat ground water with relatively volatile, low solubility organic contaminants.

The process of carbon adsorption involves contacting a waste stream with the carbon that has been thermally activated to increase its surface area, usually by flow through fixed columns. The activated carbon selectively adsorbs constituents in the waste. Activated carbon can be used for the adsorption of volatile and semivolatile organic contaminants, if present in the ground water.

Stream stripping can be used for the removal of volatile and semivolatile compounds from ground water. This process is similar to air stripping except steam is used instead of air. Steam provides heat that increases the volatility of organic compounds and therefore increases mass transfer.

Oxidation involves the addition of chemical agents to convert unsaturated organics, pesticides, and other compounds to simpler less toxic compounds. Chemical oxidation can sometimes be enhanced by an ultraviolet (UV) light source. UV light provides additional energy to an oxidant such as hydrogen peroxide and/or ozone, which increases reactivity with organic compounds.

If the RI results indicate that the ground water is contaminated with metals, chemical precipitation or ion exchanges can be used to remove the metals. Chemical precipitation is a process in which acid or base is added to a solution to adjust the pH to a point where the constituents have their lowest solubility. Metals can be precipitated from solution as hydroxides, sulfides, carbonates, or other insoluble salts. Hydroxide precipitation with lime is most common; however, sodium sulfide is sometimes used to achieve lower concentrations of metal in the treatment effluent. The solids produced are normally removed by settling, with or without filtration. The resulting residuals are metal sludge and the treatment effluent, which has an elevated pH and (in the case of sulfide precipitation) excess sulfides. The addition of diatomaceous earth is required to remove the sulfides, but results in large quantities of sludge. Ion exchange is a process whereby ions are selectively removed from the water and replaced by less harmful ions. Ion exchange is generally more expensive, but can be used to achieve lower effluent limits than hydroxide.

Biological treatment can also be used for destruction of organics in the ground water. This can be accomplished by in-situ biodegradation or in a separate treatment system. The effectiveness of biological ground-water treatment is dependent upon the nature of the chemicals of concern and generally requires the addition of nutrients.

3.5.3 Primary Data Requirements

The proposed RI field investigations are designed to collect data to meet the data requirements shown in Tables 2 through 4. If the tasks described in Section 4.0 do not provide

the data necessary to define the nature and extent of contamination, additional data requirements will be identified.

As the applicability of remedial alternatives to site conditions is evaluated in more detail, additional data may need to be obtained. The data requirements not planned to be collected at this time are: soil bearing strength; vertical soil permeability; soil pH; and contaminant biodegradability.

Baseline air emissions will be estimated using air monitoring. Emissions from alternatives involving excavation or aeration will not be estimated at this time. If these alternatives appear particularly applicable to site conditions, emissions modeling may be proposed as a subsequent investigation.

Soil bearing strength, which is most accurately estimated from consolidation tests, will be assessed qualitatively using the results of the Standard Penetration Tests (SPT), Atterberg, and grain-size analyses. If these results raise questions as to the adequacy of soils to support a cap, consolidation tests may be proposed in a subsequent investigation.

The need for vertical soil permeability may be determined after water-quality data are evaluated. Aquifer characteristics, such as transmissivity, will be determined during the aquifer test which will be used to determine the aquifer's permeability. If the geologic investigation reveals significant differences between horizontal and vertical soil conditions, laboratory permeability tests may be proposed as a subsequent investigation.

Soil pH is a key factor in evaluating the applicability of in-situ biological degradation for soil treatment. However, it is likely that a treatability study would be needed for this alternative, at which time pH would be evaluated in conjunction with other factors such as nutrients, appropriate microorganisms, etc.

Contaminant biodegradability would be addressed through reviews of literature and treatability study data bases. No actual treatability tests are proposed to evaluate biodegradability at this time.

3.5.4 Need for Treatability Studies

Several of the potential remedial action alternatives for the MRFA site may require treatability studies as shown in Tables 2 through 4. To the extent possible, the treatability study data base being developed by the EPA Office of Research and Development (ORD) will be used to provide the data regarding medium-contaminant combinations needed to screen alternatives for the MRFA site. While no treatability studies are planned at this time, they may be added to the work assignment at the conclusion of the currently planned field investigation when the conditions at the site are defined or as part of the remedial design stage. However, existing air stripper data can be used for a treatability study if it is determined that VOCs in ground water require remediation.

Treatability studies are not planned as part of this work plan. Presently, data are insufficient to define contamination and determine the need and type of treatability studies. The need for treatability studies will be considered when data better describing site characteristics is available.

3.6 Data Quality Objectives

Data obtained during the MRFA site RI will be used to make decisions for a variety of purposes including characterizing the nature and quality of soil, sediment, ground water and surface water, identifying sources of contamination, defining the nature and horizontal and vertical extent of contamination, assessing potential health risks, and for the initiation of the development of potential remedial alternatives.

In order to best use data generated during the RI to support the decision-making process, a clear definition of the RI objectives and procedures for collecting data is required. This goal is made easier through the development of data quality objectives (DQOs). DQOs relate the extent and quality of the data to be gathered in the RI to the ultimate end use of the data. DQOs are qualitative and quantitative goals for precision, accuracy, reproducibility, comparability, and completeness specified for each data set. In essence, DQOs are statements that specify the quality of data based on the end uses of the data collected.

Data quality objectives are based on the concept that different data uses may require different levels of data quality. DQOs are defined with respect to types, numbers, and locations of samples that will be collected, and the quality assurance levels associated with the analysis. DQOs are set to clarify the level of uncertainty that a decision maker is willing to accept in making decisions or conclusions based upon the data. The guidance document, "Data Quality Objectives For Remedial Response Activities" (USEPA 1987a) will be used for determining the analytical levels required to obtain confidence levels appropriate for the intended data use. The analytical levels required for specific data uses and the types of analyses needed to achieve an analytical level are presented in Table 5. Where data have multiple uses, the uses will be prioritized and assigned the highest analytical level for a particular use.

The MRFA site RI will generate Levels 1, 2, 4, and 5 analytical data. Level 3 analyses are not planned during the MRFA site RI. Level 1 data are not typically suitable to support the risk assessment and alternatives evaluation. Level 2 analytical data may be used in the alternatives evaluation when accompanied with appropriate QA/QC procedures. The Level 4 and 5 analytical data will have quantitation limits that will allow comparison with ARARs and support risk assessment and remedial action alternatives evaluation. The DQOs for the

sampling activities at the MRFA site are identified in Table 6 and will also be discussed in the POP.

The Level 1 data to be generated at the MRFA site include field screening surveys using photoionization detectors or flame-ionization detectors, oxygen/explosimeters, and scintillometers. Field measurements of water levels and parameters, such as pH, temperature, and specific conductance of water samples are also examples of Level 1 data. These types of data will be used to monitor the health and safety of field personnel, to assist in the determination of soil boring or sampling locations, and for evaluating the adequacy of well development and purging procedures. The geophysical survey using the EM31 instrument to identify the presence of buried magnetic or non-magnetic material will yield Level 1 qualitative data as a guide to placement of boring locations or test pits.

Soil-gas analyses and on-site field screening of soil samples will yield semi-quantitative results of Level 2 qualities. The soil-gas analyses will be supported by QA/QC sample analyses. Based on the results of initial field screening for radiation with a scintillometer, a spectroscope may be used to identify specific radioactive isotopes (Level 2 data).

Laboratory analyses of samples from the MRFA site will be performed to obtain Level 4 data. These analyses will include the routine analytical services (RAS) provided by the Contract Laboratory Program (CLP). Level 4 data have standard detection limits and documentation suitable for the risk assessment and evaluation of potential remedial alternatives.

Level 5 data include non-conventional parameters (i.e, boron which is not on the TCL) and all analyses performed using the CLP Special Analytical Services (SAS). Level 5 data will include analyses for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans in soil. Level 5 data will also include geotechnical parameters and analysis of wipe samples for PCBs or radioactive parameters (gross alpha, gross beta, radium 226, and radium 228) and for radioactivity in sediment samples collected from dry wells at the GE/Exxon Nuclear facility.

A limited quantity of data have been gathered during previous investigations of the MRFA site. Available data (refer to Appendix E) have been reviewed to assess analytical levels. During the performance of RI Task 1 (Literature Search - Section 4.2), a review and evaluation of any newly-obtained data will be made.

The 1987 analytical results of water and sludge samples from the septic tank are assumed to be Level 2 data; however, gas chromatographic analysis (USEPA Method 602) of four samples collected January 12, 1987 were analyzed beyond the recommended 7-day holding time.

Available ground-water data collected by Geraghty & Miller are Level 3 data. The 1986 Blasland & Bouck ground-water analytical results may be considered Level 4 data. QA/QC samples and matrix spike analyses were reported and data qualifiers were indicated on the laboratory data sheets. In addition, personnel from NYSDEC were present during the sampling of monitoring wells and took duplicate samples for some of the wells. Analytical results of samples analyzed by the NYSDEC laboratory were compared with analytical results of duplicate samples analyzed by York Laboratories for Blasland & Bouck.

3.6.1 Special Analytical Services

Special Analytical Services may be necessary to obtain data which are to be evaluated against ARARs. The detection limit for Aroclor 1242 is 0.065ug/L according to EPA Method 608. Detection limits for the remaining Aroclors are undetermined and can only be determined at the time of analysis. A second, confirmatory round of ground-water samples from all monitoring wells is planned as part of the RI activities described in this work plan. The need for other specialized analytical methods will be determined at that time.

4.0 WORK PLAN TASKS FOR THE REMEDIAL INVESTIGATION

4.1 Statement of Work

The statement of work (SOW) outlines the RI investigation to be conducted at the MRFA site in the Towns of Malta and Stillwater, New York. Figures 4 and 5 include all areas proposed for investigation. Except as indicated, all soil, sediment, sludge, and water samples will be analyzed for the Target Compound List (TCL) of parameters plus boron (Table 7), unless a modified list of compounds has been approved by the EPA. For the purpose of this study, reference to the TCL will include boron as a constituent. Laboratory analysis will be performed for the TCL compounds plus 30 Tentatively Identified Compounds (TICs) in accordance with Contract Laboratory Program (CLP) protocols, which include up to 10 volatile organic compounds (VOCs) and 20 semivolatile compounds (SVs) of greatest apparent concentration that are not targeted. Organic compounds will be analyzed using gas chromatograph/mass spectrometer (GC/MS) methods as specified in the CLP procedures. The analyte list may be reduced in subsequent phases (or sampling rounds) if the initial analyses indicate that fractions of the TCL (e.g., metals) are not present at levels which exceed background in an area being investigated. A summary of DQOs and data gathering requirements is provided in Table 6.

4.2 Literature Search

A literature search will be conducted early in the RI (see schedule in Figure 6) to further determine the history of operations at the site, as well as geologic, hydrogeologic, and environmental quality information. The literature search will include:

1. Wherever possible, persons associated with the site will be interviewed. Persons to be contacted and interviewed during the literature search will include all persons believed to have substantive knowledge of:

    (a) hazardous substances used or generated at the site and their chemical and physical properties;

    (b) quantities of such material used;

    (c) transportation of such material to or from the site;

    (d) treatment, storage and disposal practices or any other handling of such material.

    (e) Personnel with potential knowledge of (a) through (d) above will be identified through personnel and employment records available to GE and NYSERDA and will be contacted by letter.

2. Publications and reports containing information on regional and site geology/hydrogeology that are available as of the writing of this RI Work Plan will be reviewed and evaluated.

3. An evaluation of historical aerial photographs, historical maps, and infrared photographs obtained from the USGS National High Altitude Program and/or

other sources will be conducted. Efforts will be made to obtain and review any additional historical maps and photographs from site owners or operators. Areas of soil disturbance or construction activity that may be related to the release or threatened release of hazardous substances at the site will be identified and mapped. Information obtained from available documents, reports, and from interviews with former or current site employees or others will be evaluated and relevant data will be used to assist in identifying areas of soil disturbance or construction activity.

4. An investigation will be performed to determine, to the extent possible, the nature of the chemicals used at the site, the storage and disposal of such chemicals onsite, and the chemical and physical properties of those chemicals not listed on the TCL that were detected in historical sample analyses (based on information obtained during the literature search).

5. A review and evaluation (1) will be conducted to: identify and/or describe activities that took place that may be related to the release or threatened release of hazardous substances at the site, (2) determine where such activities took place, and (3) determine when such activities took place.

6. A review of available regulatory agency files will be conducted to obtain data from any existing permits, sampling episodes, or historical reports. This will include, but will not be limited to, Resource Conservation and Recovery Act (RCRA) Part A, Part B, or other permits and NYSDEC Division of Air Permits and data concerning the air stripper in use on the Wright-Malta property.

7. A New York State 1A Cultural Resource Survey will be conducted to determine the site status with respect to the National Historic Act.

8. A review of available regulatory agency files will occur to obtain data on the number, depth, well construction, and any existing water-quality data for all public and private water supply wells within a three-mile radius of the site.

9. A Literature Search Report for the MRFA site will be provided to EPA before field investigations begin. That report will be updated at a later date to reflect any additional information obtained during the RI field investigation and a final literature search report will be included as an appendix to the RI report. The report will include:

   a. A summary of site history based upon the literature search including a history of operations (e.g., a description of the nature and duration of each entity's involvement at the site).

   b. Identification, including name and current address of all individuals contacted for information on past and present activities at the site and a summary of the corresponding information that he/she provided.

   c. A summary of each document reviewed that provided information about the site and a list of any documents identified that could not be obtained.

   d. The name and current address of each owner of record of property that borders the site, and a map showing property boundaries and ownership on the site and adjacent to the site.

   e. Maps, at a scale such as 1 inch equals 50 or 100 feet, depicting (a) the location of all known underground and overhead utilities at the site; and (b) the locations of all potential areas of activity or disturbance that are not already included in the RI Work Plan as areas of concern.

f. A description, including number, depth, well construction, and any existing water-quality data for all public water supply wells between one and three miles from the site and all private water supply wells within three miles from the site will be provided if such information is available.

4.3 Field Investigation

Field investigation of each area of concern shall generally include a soil-gas survey, a geophysical survey, and investigations of the nature and extent of contamination of the soil, surface water and sediment, ground water, and air. The methods proposed for these investigations are described below. Technical justifications are provided in the area-specific sections that follow, and detailed procedures for implementation of each task shall be included in the Project Operations Plan (POP).

In addition to field investigation of the specific areas of concern listed in the Site Description Section, the following tasks shall be performed as part of the field investigation: a site wide soils survey, a background soils survey, investigations of site hydrogeology and aquifer hydraulic properties, investigation of surface water, investigation of air quality, and a security survey. A wildlife biologist will survey the MRFA site for the purpose of meeting the State of New York's requirement for a Step I Habitat-Based Assessment. The Step I Habitat-Based Assessment describes the national resources within a half-mile radius of the site in terms of the vegetative cover types and associated fish and wildlife populations. It includes a study of significant habitats, wetlands, and regulated streams and lakes of the site and/or within a minimum of nine miles downstream of the site.

A cover type map, a list of special resources and a habitat description will be produced. It will be accompanied by a resource characterization of the site listing the fish and wildlife species which would utilize the habitats shown on the cover type map.

identified. Prior to the survey, the GC will be calibrated with carbon tetrachloride, trichloroethylene, toluene, and 1,2-trans-dichloroethylene since these contaminants have been identified at the site and, thus, are good indicators of potential source areas. Each of these standards will be prepared by introducing a known volume of the compound into a known volume of organic-free air. The detection limits for each of the four compounds using each GC detector will be provided in the POP. Wherever possible, samples will be collected from a stainless-steel probe driven a minimum of three feet into the overburden. Detailed sampling and analytical procedures will also be provided in the POP.

The soil-gas survey data will be used to identify "hot spots" and to estimate the extent of VOCs in soil gas. Initial grid spacings will be determined based on the size of the specific area of concern. Sampling points will be spaced a maximum of 50 ft apart to provide adequate areal coverage. The grid size has been chosen based on the sizes of the sites to be investigated and prior experience with soil-gas surveys. A larger grid spacing (100 ft) was selected for Disposal Area D-3, and the triangular parcel of land adjacent to the southern corner of the test station due to the large size of these areas. Should the outermost grid points exhibit VOCs, the soil gas survey will be expanded to the extent feasible. Additional samples will be collected, in accordance with the grid spacing specified for the specific area of concern, until VOCs are not detectable. Should this approach result in a soil-gas survey which is unreasonably extensive, a contingency plan may be required (see Section 5.4). Soil-gas survey grids for each area of concern are provided in Figure G-1 through G-28 in Appendix G. Locations may be modified to adjust to field conditions.

Unidentified peaks that are detected during soil-gas surveys will be identified through laboratory analysis of soil samples which are also planned as described in Section 4.5. Details of the soil-gas survey including sample collection methods will be provided in the POP. The dry wells are located in a number of areas and will be addressed by the soil-gas surveys planned for the specific areas. Figures have not been provided for the septic tank areas because we do not know the dimensions of these areas. Figures have also not been provided for the underground storage tanks since we do not know which tanks will be included in the survey.

A figure will be provided for the survey to be conducted at the GE/Exxon Nuclear building once a map is obtained. Maps that cannot be completed for the literature search report will be forwarded under separate cover.

4.5 Investigation of Soil

A soil boring program will also be conducted at several site areas. This program will be comprised of soil samples taken from soil borings drilled in storage, disposal, rocket test gantry/complex, fuel-mixing operation, lagoon, and underground and aboveground storage tank areas, leach fields, test pits, drainage ditches, and monitoring well boreholes. The soil borings will be drilled in the "hot spots" identified by the soil-gas survey. Planned soil borings will be drilled and sampled for laboratory analysis even if hot spots are not identified. Samples obtained will be analyzed for the CLP TCL of parameters plus boron, unless a modified list of compounds is approved by the USEPA. Samples obtained in the vicinity of the GE/Exxon-Nuclear test station (see Figure 5) will also be analyzed for radioactivity.

Split-spoon samples will be collected at intervals specified in the relevant tasks. Soil samples for laboratory analysis will be selected from the split-spoon samples based on field screening with a photoionization detection instrument and/or the physical appearance of the soil. Detailed field screening procedures will be provided in the POP.

The number of soil samples planned for each specific area of concern is based upon the size of the area, i.e., more samples are planned in larger areas. Test pits are planned in those areas which may have had drums disposed because drums are frequently disposed over wide areas in shallow soils and excavations provide more subsurface area to examine. The locations for soil sampling are based on historical information regarding activities at the site. Analytical results of soil sampling will be assessed in conjunction with soil-gas survey data and ground-water quality data to determine the need for additional soil borings to adequately define source areas. Specific plans require drilling to a maximum depth (e.g. 6 ft or 10 ft, etc.) or into 2 feet of undisturbed soil, whichever is a greater depth. Anticipated depths in some areas are based replace the TCL parameters. Sampling activities will be conducted in a phased approach to determine if the initial sampling of these areas warrants sampling of every area.

a. A literature search will be conducted to determine the site history of the areas of concern, including a review of infrared photographs to be obtained from the USGS National High Altitude Program and/or other sources.

b. A site reconnaissance tour will be conducted to observe and select the areas which will be included in the survey.

c. A geophysical survey will be conducted (if necessary) and a soil sampling plan will be identified after the areas of concern have been determined.

4.5.2 Background Soils Survey

A background soils survey will be conducted to provide a statistical data base for comparison and assessment of the on-site concentrations.

a. Three soil borings will be drilled in undisturbed areas on the easement property, approximately 50 ft beyond the perimeter fenceline of the Test Station, and on an approximate 120 degree spacing around the Test Station (see Figure 5). The borings will be continuously sampled to a depth of 6 ft below ground surface.

b. One sample from each boring from the 0 to 2 ft interval will be submitted for laboratory testing of the TCL metal parameters plus boron and inorganic parameters. In addition, one sample will be collected at one location, to be analyzed for the full TCL, to confirm that the locations are appropriate for background samples. An HNU or other PID instrument will be used to screen all three boreholes and the samples with the highest PID reading, if any, will be selected for TCL analysis. If no PID readings are observed, the sample for full

TCL analysis will be selected at random unless visual observation indicates the possibility of contamination.

c. If the sampling described in (a) and (b) above does not adequately characterize background concentrations, additional soil sampling may be required.

4.6 Geophysical Survey

A geophysical survey will also be conducted at the MRFA site to determine the presence of buried magnetic or nonmagnetic material at selected site locations. Three methods are commonly used to detect buried metal. These are electromagnetic induction methods, usually using the EM31 instrument, electromagnetic reflection methods, which use ground penetrating radar, and magnetic methods, where a magnetometer is used. The magnetic method is the easiest to use, generally has the greatest penetration, and is not influenced by the local geology, but it detects only ferrous objects. The electromagnetic induction method using an instrument such as the EM31 detects any electrical conductor, is more influenced by the local geology than the magnetic method and generally has somewhat less penetration. Ground penetrating radar has the greatest resolution and can detect all kinds of metal and other features, but it is the method most influenced by geology. Underground and overhead utilities will be identified prior to conducting the survey.

The goal at the MRFA site is to search for buried drums to a depth of about 10 ft. Several areas may contain small and length limited targets, which may include stainless steel drums, and non-metallic fiber reinforced plastic drums. As part of the literature search, information concerning the storage and disposal of chemicals at the site will be reviewed. The potential for buried drums of any construction to be present at the site will be assessed during the literature search. If the literature search indicates that chemicals were used at the site which would have been stored in metallic drums, the electromagnetic induction method will be used. If the presence of fiber-reinforced, non-metallic drums is indicated, ground penetrating radar will be used. The instrument(s) will be used with a data logger to record the data. The data will be downloaded to a computer and a contour map plotted of the in-phase and out-of-phase signals for each area.

Raw data will be presented in both graphic and tabular form in the RI Report. A grid spacing of 25 to 50 ft will be used at the specific areas of concern. This spacing is based on depth of buried material, the size of the area to be investigated, and prior experience with geophysical surveys. Geophysical survey grids for each area are shown in Figure H-1 through H-13 in Appendix H. Locations may have to be modified to adjust to field conditions. Further details of geophysical survey procedures will be provided in the POP. References to geophysical surveys in Section 4.0 refer to geophysical surveys performed with an EM31 instrument as described in this section.

4.7 Investigation of Ground Water

During the RI, data will be collected to characterize site hydrology, in order to determine the nature and extent of ground water contamination, and to provide information for suitable remedial alternatives. Twenty-three new monitoring wells will be installed at the site to supplement the existing ground-water monitoring network (Figure 5). In some cases, two-well clusters (one shallow and one deep well) will be installed. The downgradient well locations have been selected in areas which we believe are close enough to the areas of concern to determine whether ground water has been impacted, yet they are not so far from those areas as to miss any constituents of concern. The new well locations are as follows:

- four new shallow and deep well clusters (eight wells) in downgradient directions along the northwestern boundary of the main testing area;

- one well cluster (two wells) downgradient of Power Technology Inc. (PTI) in the easement area;

- one well cluster (two wells) downgradient of Berth 24 in the easement area;

- one new shallow well in the north-central test station area, upgradient of PTI;

- one new shallow well to form a cluster with existing supply Well 1D;

- one new shallow well upgradient of existing supply Well 2D;

- three new shallow wells at the northern boundary of the site (northwestern corner near GE-Exxon Building), in order to determine ground-water flow in this area;

- one new shallow well downgradient of Area A;

- one new shallow well downgradient of Disposal Area D-4; and

- one new shallow well downgradient of Disposal Area D-5.

- one new shallow well upgradient of Disposal Area D-6.

- one new shallow well downgradient of Disposal Area D-6.

All new wells will be drilled using hollow-stem auger equipment. An alternative drilling method may be proposed for the deep wells if hollow-stem auger is found to be infeasible during the drilling program. The wells will be installed as described in Section ?

Two to five synoptic rounds of water-level measurements will be made at all new and existing wells and subsequent rounds will determine seasonal water-level fluctuations. Two rounds of ground-water samples will be collected from each new monitoring well and tested for the TCL parameters. If two rounds of ground-water samples at downgradient wells show nondetectable results yet contamination has been detected at potential source areas, EPA may decide that additional testing or some further form of investigation is needed and the PRPs will discuss such investigation or testing with the EPA.

4.7.1 Installation and Sampling of New Monitoring Wells

New monitoring wells will be installed at 23 locations to supplement the existing ground-water monitoring network. The purpose of these wells is to expand the site hydrogeologic characterization into downgradient areas, and in known disposal areas, define ground-water flow patterns, and investigate the horizontal and vertical extent of contaminant migration.

Several locations have been selected in easement areas downgradient of Berth 24 and downgradient of the former PTI test station. Specific details for geologic logging and well installation will be provided in the POP; however, some of the details include:

a. The new shallow wells will be drilled using hollow-stem auger equipment. The wells will be screened in the upper 10 ft of the saturated zone, anticipated to be 35 to 45 ft below land surface. Each shallow monitoring well will be constructed of 2-inch diameter, flush-joint stainless-steel casing with 10 ft of 2-inch, 0.010-slot stainless-steel screen.

b. The new deep wells will also be drilled using hollow-stem auger equipment. The wells will be screened just above the relatively low permeability silt and clay zone at the bottom of the aquifer, approximately 60 to 80 ft below land surface. Each deep monitoring well will be constructed of 4-inch diameter, flush-joint stainless-steel casing with 10 ft of 4-inch 0.010-slot stainless-steel screen. If hollow stem auger drilling is infeasible, alternative methods will be proposed. Every effort will be made to avoid using the mud rotary method of drilling; however, this method may be considered if the hollow-stem auger method and other methods are not feasible.

c. At each shallow well location, soil samples will be collected with a split-spoon sampler at 2-ft intervals within the first 10 ft, at 5-ft intervals to the bottom of the boring, and at changes in lithology. At each deep well location, split-spoon samples will be collected at 5-ft intervals, from the depth of the bottom of the shallow borehole in the cluster to the confining layer. The samples will be geologically logged and retained. At each location, a shelby tube sample will be collected from the lacustrine blue clay. The shelby tube samples will be analyzed by a geotechnical laboratory to determine the hydraulic conductivity of this unit. The laboratory hydraulic conductivity, vertical flow gradients, and water quality in the deep wells will be used to evaluate the ability of the lacustrine blue clay to act as an aquitard. The potential for contaminant migration to bedrock will be assessed based on these data.

d. Soil samples for TCL parameters will be collected from the transition zone above the blue clay layer at each of the three Shelby tube sample locations. This will assist in determining the potential for contamination of the bedrock aquifer.

e. The horizontal locations and vertical measuring point elevations (relative to NGVD) of each of the newly installed monitoring wells will be established by a New York-licensed surveyor after completion.

f. Two to five synoptic rounds of water-level measurements will be made at all new and existing wells to determine seasonal water-level fluctuations.

g. Two rounds of ground-water samples will be collected from each new monitoring well and tested for the TCL parameters. If Special Analytical Services are necessary to meet ARARs and TBCs, they will be considered in the second round of ground-water sampling.

h. Geophysical logs (natural gamma) will be obtained from three selected wells to provide additional data for geological interpretation of site conditions.

i. The three deep boreholes for geophysical logging will be selected to provide adequate spatial coverage of the Test Station property. The boreholes will be logged with a Mount Sopris II Logging System for natural gamma. Raw and tabulated data will be provided in the RI report. Further details of the geophysical logging will be provided in the POP.

j. Only potable water will be used, if necessary, during drilling and will be sampled and analyzed for the TCL plus boron as a quality control measure.

k. Drill cuttings will be drummed and the drummed cuttings will be labeled and stored until soil-quality and/or water-quality data are received. Prior to ultimate disposal, a TCLP analysis of the drummed cuttings may be necessary. The issue of disposal will be discussed during the FS.

l. Development and purge water from the new monitoring wells will be drummed or stored in an aboveground tank. The issue of ultimate disposal will be based on ground-water quality from the wells and will be addressed during the FS.

m. Potential well development methods include pumping and surging or air lift. The wells will be pumped and surged, if possible; air lift will be used if pumping and surging do not achieve development goals. The development goals include 50 nephelometric turbidity units or less and stabilization of pH, conductivity, and temperature. Detailed procedures will be provided in the POP.

n. After development, ground water will be purged and sampled using dedicated Teflon™ bailers or pumps to be specified in the POP. Dedicated equipment reduces the potential for cross contamination.

4.7.2 Sampling of Existing Monitoring Wells and Supply Wells

Existing monitoring wells and supply wells will be sampled for TCL parameters.

a. A ground-water sample will be collected from each of the three supply wells (1D, 2D, and 3D) and tested for the TCL parameters.

b. A ground-water sample will be collected from each of 15 existing monitoring wells (shallow wells 2S, 3S, 4S, 10S, 11S, 13S, MW-1, MW-2,MW-3, MW-4 and deep wells 4D, 10D, 11D, 13D, and 14D) and tested for the TCL parameters.

c. A second sampling round of new and existing wells will be necessary to confirm the results obtained during the first round. The second round of samples will be analyzed for the full TCL or SAS may be needed.

4.8 Aquifer Testing

During the progress of the RI, data will be collected and evaluated on a continuing basis to determine the most suitable location for aquifer testing. At a minimum, the data to be evaluated will include geologic conditions (as documented in drilling logs), hydraulic properties (to be estimated from slug tests) and locations and design of existing wells. In addition, the optimum location for aquifer testing may be influenced by the results of the literature search, soil-gas surveys, or analysis of ground-water quality.

We will attempt to conduct a 48- to 72-hour pumping test at either supply well 1D or 2D to determine aquifer hydraulic properties. A step test may be necessary prior to the pumping test to determine the optimum pumping rate. Data from the pumping test will be used to determine aquifer coefficients of transmissivity and storage and the capture zone of the well. If either Well 1D or 2D is not capable of supplying a yield necessary to stress the aquifer, a test well will have to be installed in the most appropriate area of the site (i.e., that which may require remediation through a pump and treat system).

a. Two new well clusters and one deep well (a total of five wells) will be installed for the specific purpose of obtaining water-level measurements. The wells will be installed using similar methods as for the proposed new monitoring wells.

b. Baseline trends will be established by continuous measurements of water levels in selected monitoring wells for at least 3 days prior to the start of pumping. During the test (throughout the pumping and recovery periods), water levels will be recorded frequently at wells within 800 ft of Well 1D (the anticipated radius of influence) and at regular, but less frequent intervals, at wells beyond this distance. A full round of water-level measurements will be obtained at the end of the drawdown period.

c. Ground-water samples will be collected from Well 1D at the end of the drawdown and recovery periods to evaluate changes in ground-water chemistry as a result of pumping. The ground-water samples will be tested for VOCs or those analytes deemed appropriate based on the two rounds of ground-water sampling for TCL parameters conducted prior to the pumping test. A list of analytes for pumping test samples will be proposed to EPA based on these data.

d. Slug testing of selected wells will be conducted to provide additional data on the aquifer's hydraulic conductivity in areas of the site not influenced by the aquifer test. The wells be selected for slug testing will located in areas of the test station that may require remediation and/or areas where data gaps exist.

e. Aquifer testing will be performed after water-quality data from the new and existing wells are received. The selected method for disposal of pumped water will be decided based upon the ground-water quality.

4.9 Investigation of Surface Water and Sediment

Surface-water samples will be obtained during the RI from on-site surface waters, quench pits, and lagoons. In addition, several ravines exist at and in the vicinity of the MRFA site, each of which have been sampled previously by either New York State regulatory agencies or private consultants. Existing surface-water data will be compiled and evaluated and data gaps identified in order to determine if it is necessary to obtain surface-water samples in addition to those stipulated in this work plan. The need for additional surface-water samples will be determined in consultations with EPA to address data gaps, if they exist, based on the DQOs (Section 3.7). The tasks for the investigation of surface water and sediment are as follows:

a. A compilation and evaluation of existing surface-water data will be performed. Sampling locations will be mapped, analytical data will be presented in tables and/or graphs, and an analysis of the data will be provided. Data gaps will then be identified.

b. Sampling of surface water and sediment will be conducted at the NYSDOT disposal Area D-3 (Section 4.15), (Sections 4.23), and the MTI Test Station Lagoon (Section 4.24) the existing pond and drainage ditch.

c. Additional surface-water sampling will not be required if the PRPs can demonstrate to EPA's satisfaction that existing data adequately represent the quality of surface water at each sampling location.

d. Additional surface-water and sediment sampling will only be required where data gaps exist or where contamination has previously been found. Upon EPA approval, these samples may be analyzed for a modified list of compounds based on the results of the initial sampling round and based on chemicals migrating to these areas via ground water from potential source areas. TOC analyses of sediment will be collected during the second phase of ground-water sampling. The TOC data will be compared with sediment ARARs or TBCs.

Sediment samples will be collected from dry wells, surface waters, lagoons, rocket test quench pits, and on-site septic systems. A field reconnaissance will be performed after a rainfall in an effort to identify ground-water seeps to the ravines. If seeps are observed, a sediment sample will be collected at a seep location in each Ravine selected for sampling and analysis of TCL plus boron.

4.10 Investigation of Ambient Air Quality

4.10.1 Ambient Air Quality During RI Activities

An investigation of ambient air quality will be performed to determine the presence of VOCs prior to any intrusive RI activity. Protocols for the analysis of ambient air quality in the breathing zone during intrusive RI activities will be included in the HASP.

a. An analysis of regional and localized meteorological conditions, including prevailing wind directions, will be performed.

b. An upwind air-quality survey will be conducted with direct reading instruments (DRIs), such as HNu or TIP meters, to establish background conditions.

c. An initial walk-through survey of the site will be performed using DRIs at ground level and at the breathing zone level to determine general ambient air quality and to locate areas where concentrations are higher than ambient air quality (hot spots).

d. If the results of the initial ambient air quality survey indicate that hot spots exist, further evaluation of these areas will be conducted using portable GC equipment.

e. Ambient air quality will be monitored outside the exclusion zone fenceline on days of heavy drilling.

4.10.2 Background Air Quality

As part of the proposed remedial investigation (RI) for the MRFA site, a background air monitoring program will be conducted to assess the nature and extent of air contaminants in the vicinity of the former Test Station. Upwind and downwind sampling will be performed at the site perimeter to characterize the concentration of VOCs and total suspended particulate matter (TSP) in the ambient air. The above compounds are believed to be associated with the use of a number of constituents derived from former on-site rocket fuel testing.

The net downwind concentration for the compounds in question will be compared with ambient air Multimedia Environment Goals (MEGs)(EPA 1979) and with New York State Air Guide-1 ambient guideline concentrations (NYSDEC 1986). These data will also serve as input for the baseline risk assessment to gauge the potential health effects of release via the air pathways. The results from this baseline air quality study will be contrasted with results from a second investigation performed during site remediation, if remediation is determined to be necessary. In this manner, any degradation in air quality attributable to the remedial technology will be assessed. The combination of background and during-remediation studies will furnish the data necessary to safeguard public health with respect to off-site migration of contaminants via the air pathway.

Pertinent site information will be reviewed prior to the preparation of a detailed field sampling plan for implementation during the RI background air monitoring program. The field sampling plan will address, in detail, the actual field sampling techniques to be employed, the calibration methods and the quality assurance measures to be followed during the program. The present work plan summarizes the compounds of concern, the general field sampling approach and the equipment to be used for the background and during-remediation studies.

Based on our current knowledge of the site, a 3-day upwind and downwind air monitoring program for characterization of subject compounds will be performed. A sample duration of 4 hours per test will permit suitable quantities of subject compounds to be obtained thus meeting the detection limits of the chosen analytical procedures. This program is intended to produce data indicative of air quality with regard to VOCs and TSP at the property line over a finite time period. As samplers will be maintained downwind of the site, measured values will approximate a worst-case situation as could potentially be experienced by a downwind receptor at the site perimeter.

Target volatile organic compounds (VOCs) designated by the test program will be obtained on a Tenax adsorbent medium in accordance with applicable specifications of Method TO-1. Based on Geraghty & Miller's experience, these sampling specifications have been shown to provide representative sampling data. Samples will be analyzed for volatile organic constituents by a thermal desorption purge and trap technique in accordance with EPA Method 5040/8240. Compound separation will be achieved by a gas chromatographic procedure employing a mass spectrometer (GC/MS) for sample quantification and confirmation. Specific compounds of concern will comprise the EPA Method 8240 list. In addition, other tentatively identified compounds will be reported as determined from the GC/MS scan. Table 7 presents the 8240 list of target VOCs for the ambient air investigation.

Total suspended particulate matter (TSP) will be determined through the use of high-volume air samplers in accordance with the method presented in 40 CFR, Part 50 Appendix B. A glass fiber filter will be utilized for the gravimetric determination of particulate matter concentrations.

Prior to performing field measurements on each day of the test program, 1 upwind and 2 downwind sampling sites will be selected with the aid of a portable wind indication system. Selection of the upwind station will be made in an attempt to characterize the background ambient air while the downwind locations will be chosen to represent air quality near the downwind perimeter and to reflect the quality of the air affecting the local population. These selections will be deferred until the day of testing at which time current meteorological data will be reviewed. By deducting upwind levels (background) from downwind concentrations, the true impact of the site on ambient air quality can be determined. During each test period, meteorological data including ambient temperature, soil surface temperature, barometric pressure, wind speed and direction, will be recorded at 15-minute intervals. Once testing commences, should recorded wind direction indicate a shift in wind direction, the test will be temporarily stopped to permit an assessment of the true wind direction. In the event that a sustained shift in average wind direction of greater than a 45-degree angle occurs, the sampling stations will be repositioned to maintain their upwind/downwind orientation with respect to the site.

The above sampling program will be performed on 3 consecutive days to adequately characterize the upwind and downwind concentration of the aforementioned compounds in the vicinity of the site under present conditions. Identical procedures will be instituted if remediation is necessary to determine any degradation in air quality. Quality assurance measures incorporated into the test program will include the use of collocated samplers and a series canister to assess potential VOC breakthrough as well as trip blanks.

4.11 Investigation of Scrap Metal Storage Areas S-1, S-2, and S-3

Storage Areas S-1, S-2, and S-3 were used for aboveground storage of scrap metal and miscellaneous metal parts. S-1 is approximately 75 ft by 100 ft; S-2 is approximately 100 ft by 100 ft; and S-3 is approximately 60 ft by 270 ft (Appendix D).

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas survey sampling locations for areas S-1, S-2, and S-3 are shown on Figures G-1, G-2, and G-3, respectively.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in these areas. The geophysical survey grids for areas S-1, S-2, and S-3 are shown on Figures H-1, H-2, and H-3, respectively.

c. Two soil borings will be drilled in S-1; two soil borings will be drilled in S-2; and three soil borings will be drilled in S-3. All borings will be drilled in the "hot spots" as identified by the soil-gas survey. The soil borings will be drilled and sampled even if hot spots are not identified. The borings will be continuously sampled to a depth of 6 ft or until 2 ft of undisturbed material is encountered, whichever is greater.

d. One sample from each boring will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA.

4.12 Investigation of Chemical Storage Area S-4

Storage Area S-4 is a 20 ft by 30 ft concrete pad which was used for aboveground storage of chemical wastes (Appendix D).

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas survey sampling locations are shown on Figure G-4.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in this area. The geophysical survey grid is shown on Figure H-4.

c. Three exploratory soil borings will be drilled near the pad perimeter. The borings will be continuously sampled to a depth of 6 ft or until 2 ft of undisturbed material is encountered, whichever is greater.

d. One sample from each boring will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA.

4.13 Investigation of Former Burning Pit D-1

Disposal Area D-1 was an open burning pit, consisting of a cylindrical sheet metal casing 25 ft in diameter and 15 ft deep, set into the ground. The pit was used to incinerate readily-burnable material, such as waste paper and cartons (Appendix D).

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas sampling locations are shown on Figure G-5.

b. One exploratory soil boring will be drilled through the burning pit. If the soil-gas survey does not indicate the presence of VOCs, a soil boring will be drilled in the center of the burning pit. The boring will be continuously sampled until the natural soil below the base of the fill is reached.

c. One sample from the boring will be submitted for laboratory testing of the TCL parameters plus dibenzo-p-dioxins and dibenzofurans. Dibenzo-p-dioxins and dibenzofurans will be analyzed because chemicals of this nature have reportedly been determined to be present in soot (USEPA 1980).

4.14 Investigation of Solid Waste Disposal Area D-2

Disposal Area D-2 is a low flat area, approximately 75 ft by 150 ft where solid wastes were stored and disposed to a depth of 3 to 4 feet (C.T. Male 1979). Some wastes were covered with sandy soil. The depth of accumulated material was estimated to be 3 to 4 ft deep (Appendix D).

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas survey sampling locations are shown on Figure G-6.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in this area. The geophysical survey grid is shown on Figure H-5.

c. Three exploratory soil borings will be drilled in the area. The borings will be continuously sampled to a depth of 6 ft or until 2 ft of undisturbed material is encountered, whichever is greater.

d. One sample from each boring will be submitted for laboratory analysis of the TCL parameters unless a modified list of compounds is approved by EPA.

4.15 Investigation of NYSDOT Disposal Area D-3

Disposal Area D-3 is in a ravine (1b on Figure 4) along the primary access road and was reported to have been used by the NYSDOT for disposal of earthen and construction waste. The ravine is approximately 160 ft by 160 ft, and is 30 ft deep (Appendix D).

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas survey sampling locations are shown on Figure G-7.

b. Two exploratory soil borings will be drilled in the area, if possible. (The nature of the disposed material may interfere.) The borings will be continuously sampled until 2 ft of the natural soil below the base of the fill is reached. Should disposed material interfere, the location will be noted and, if necessary, drilling will cease.

If drilling is stopped, a second attempt to drill the boring will be made within 6 feet of the first hole. If interference again occurs, a test pit will be dug at that location.

c. One sample from each boring or test pit will be submitted for laboratory analysis of the TCL parameters unless a modified list of compounds is approved by EPA.

d. Surface-water and sediment samples will be collected from the brook at the base of the fill area and analyzed for the TCL parameters.

4.16 Investigation of Drum Disposal Areas D-4 and D-5

Disposal Areas D-4 and D-5 were identified to contain 5-gallon and 50-gallon empty steel chemical drums buried approximately 10 ft deep (C.T. Male, 1979). Area D-4 is approximately 160 ft by 180 ft, and area D-5 is approximately 100 ft by 160 ft (Appendix D).

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas survey sampling locations for areas D-4 and D-5 are shown on Figure G-8 and G-9, respectively.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in these areas. The geophysical survey grids for Areas D-4 and D-5 are shown on Figure H-6 and H-7, respectively. Area D-4 must be cleared of surface storage of scrap metal and machinery now being stored there. The scrap material will be temporarily stored at a site to be selected by Wright-Malta.

c. Four test pits will be excavated in Area D-4 and three test pits will be excavated in Area D-5 to determine the nature of the subsurface materials and of any anomalies present as determined by the geophysical survey. The test pits will be sampled to a depth of 10 ft or until 2 ft of undisturbed material is encountered, whichever is greater. This depth was selected based on information provided in the C.T. Male study. Test pits are preferred to soil borings at these locations because of the dimensions of the disposal areas.

d. One sample from each test pit will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA.

e. One shallow monitoring well will be installed downgradient of each disposal area and sampled for the TCL parameters unless a modified list of compounds is approved by EPA.

f. Any scrap metal or machinery which is excavated will be moved manually or, if necessary, with heavy equipment to onsite storage. Methods of disposal, if necessary, will be considered during the feasibility study.

4.17 Investigation of Drum Disposal Area D-6

Disposal Area D-6 is the location where a buried stainless steel drum of triethyl aluminum was discovered and where industrial wastes may have been buried (O'Brien and Gere, 1986). Wright-Malta and/or the NYSDEC will be asked to identify the location and size of Disposal Area D-6.

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting test pit locations. The soil-gas survey sampling locations are shown on Figure G-10.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in this area. The geophysical survey grid is shown on Figure H-8.

c. Two test pits will be excavated in the area to determine the nature of the subsurface materials and assess any anomalies identified during the geophysical survey. Should this area be substantially larger than what is shown on Figure 5, additional test pits may have to be excavated. The test pits will be sampled to a depth of 10 ft or until 2 ft of undisturbed material is encountered, whichever is greater. Test pits are preferred to soil borings in this area because the objective is to investigate the presence of buried drums. A wider area can be investigated with a test pit than a soil boring. A depth of 10 ft has been selected based on statements by C.T. Male that this is the approximate depth of disposal. If field observation indicate disturbed soil at the 10 ft depth, excavation will continue until 2ft of undisturbed soil is encountered.

d. One sample from the test pit(s) will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA.

e. One upgradient and one downgradient shallow well will be installed at the locations shown on Figure 5.

4.18 Investigation of Rocket Test Gantries

The rocket test gantries/test complexes may have been used in the past to test various rocket fuel propellants, propulsion systems, the material and shape of rocket exhausts, and cryogenic research. These tests may have been carried out at test gantries/test complexes No. 1, 2, 3, 4, 5, 6, 15, 20, 21, 24, and 25. The test complex numbers are indicated on Figure 2.

a. Rocket test gantries/test complexes will be identified.

b. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs in the soil in areas where cleaning operations and drainage from these areas may have occurred, prior to selecting soil boring locations. The soil-gas sampling locations for the test structures (as numbered above) are shown on Figures G-11 through G-21.

c. Two to four soil borings will be drilled in each area. The borings will be continuously sampled to a depth of 6 ft or until 2 ft of undisturbed material is encountered, whichever is greater.

d. One sample from each boring will be submitted for laboratory analysis of the TCL parameters unless a modified list of compounds is approved by EPA.

e. At the rocket test gantries, one water sample will be collected from each quench pit (approximately 3 pits) and will be analyzed for the TCL parameters unless a modified list of compounds is approved by EPA. Samples will be collected from as near the center of the pit as possible, approximately half way down the water column, using a bottom-filling bailer. Sediment, if present, will be collected and analyzed in the same manner. A sediment sample will be collected from the bottom of each quench pit.

4.19 Investigation of Area A

Area A was historically used for fuel-mixing operations. Area A is approximately 200 ft by 300 ft.

a. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas sampling locations are shown on Figure G-22.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in this area. The geophysical survey grid is shown on Figure H-9.

c. Six exploratory soil borings will be drilled in the area. The borings will be drilled to a depth of 6 ft or until 2 ft of undisturbed material is encountered, whichever is greater.

d. One sample from each boring will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA.

e. One shallow monitoring well will be installed downgradient of the area and sampled for TCL parameters unless a modified list of compounds is approved by EPA. The well location will be determined after other planned wells northwest and southwest of Area A have been installed and water-level data have been obtained to ensure that ground-water flow direction has been defined. This is necessary to locate the proposed well downgradient of Area A.

4.20 Investigation of Septic Tanks/Leach Fields

Seven septic tanks are known to have been used on the property. It is not clear how many septic systems are presently being used. Septic tanks are located near Wright-Malta Buildings 13, 14, 16 (paved over), and 17, and at MTI, PTI, and GE-Exxon Nuclear facilities. The septic system adjacent to a former one-man guard house (Building 16) was only used by guards and has been paved over; therefore, it will not be investigated. The septic tanks at the MTI, PTI, and GE-Exxon Nuclear facilities have recently been tested for VOCs and pumped out by NYSERDA. However, if these tanks are not empty, they will be resampled and tested for TCL parameters, unless a reduced list of compounds has been approved by EPA. If the tanks are empty, previous analyses of sludge samples will be used to assess conditions within the septic systems.

a. An inventory of all on-site septic systems will be performed including an investigation of each septic tank's use, to the extent possible.

b. One sludge sample from each septic system listed above will be tested for TCL parameters unless a modified list of compounds has been approved by EPA with the exception of the system which served Building 16. The purpose of the sludge sample is to confirm existing data from the septic systems.

c. A soil-gas survey will be conducted to screen soil gas for VOCs prior to selecting soil boring locations. Figures for the soil-gas grids will be provided as part of the literature search since the dimensions of these areas are not known at this time. If the data are not available for the literature search report, the grids will be provided under separate cover.

d. One soil boring will be drilled in each leach field to a depth below the base of the leach field.

e. One sample from each boring will be submitted for laboratory analysis of a modified list of parameters based on the results of the sludge sample analysis. If the septic tanks are empty, results of previous analyses will be used. A PID instrument will be used to screen soil samples and the samples with the highest reading will be submitted for laboratory analysis. If contamination is detected by the laboratory, additional soil sampling locations will be proposed to determine the vertical concentration gradient.

4.21 Investigation of Dry Wells

An unknown number of dry wells exist at the site. Dry wells may exist at or near MTI, PTI, and the Wright-Malta facilities. At the GE/Exxon-Nuclear building, it has been reported that one dry well is connected to a floor drain within the building and others are used to recharge storm-water from roof runoff. If it can be determined that the dry wells used for storm-water recharge could not physically have been used for the disposal of chemicals, based on their construction, these dry wells will not be investigated. Where sampling is required, health and safety precautions will be taken to protect workers from any fugitive emissions or dust.

a. An inventory of on-site dry wells will be performed, including connecting pipes and floor drains. If based on their investigation, the PRPs conclude that dry wells used for stormwater recharge at the GE/Exxon Nuclear Building could not serve as sources of contaminants, the PRPs will propose to EPA that these dry wells need not be investigated further. If EPA determines that additional investigation is warranted, the PRPs shall propose methods for further investigation as required by EPA.

b. A sediment sample from each dry well identified as a potential contaminant source will be collected for analysis of TCL parameters unless a modified list of compounds is approved by EPA.

c. Radioactivity will be included as an analytical parameter for sediment samples collected from any dry well at the GE/Exxon-Nuclear test station.

4.22 Investigation of Filled-In Ponds

Four filled-in ponds are present on the property. Two are located west of PTI near the fire lane, (near Buildings 6 and 7) the third is located at the PTI test station, and the fourth is located near the magazine area at the southern boundary of the site. The buildings are shown on Figure 2.

a. A soil-gas survey will be conducted at each filled-in pond to screen soil gas for the presence of VOCs prior to selecting trenching locations. The soil-gas sampling locations at filled-in ponds near Buildings 6 and 7, PTI and the magazine area are shown on Figures G-23 through G-26, respectively.

b. A geophysical survey will be conducted to determine if buried magnetic or nonmagnetic material is present in these areas. The geophysical survey grids for the filled-in ponds near Buildings 6 and 7, PTI and the magazine area are shown on Figures H-10 through H-13, respectively.

c. The nature of the subsurface materials and any anomalies identified during the geophysical survey will be assessed. To provide adequate areal coverage, one trench will be excavated at the two smallest filled-in pond areas and two trenches will be excavated at the two largest pond locations.

d. One sample from each trench will be submitted for laboratory analysis of the TCL parameters unless a modified list of compounds is approved by EPA. In conjunction with the soil-gas survey, one sample per trench is adequate to determine whether contamination is present in this area.

4.23 <u>Investigation of Existing Pond and Drainage Ditch</u>

The pond in the north-central site area collected discharge from the various test installations. Some of the discharge to the pond was received via a drainage ditch, which runs through the central site area, past the Berth 1 through Berth 4 facilities.

a. A soil-gas survey will be conducted along the length of the ditch and in the vicinity of the pond to screen soil gas for the presence of VOCs prior to selecting soil boring locations. The soil-gas survey sampling locations are shown on Figure G-27.

b. One sample of the water and two samples of the sediment in the pond will be collected and tested for the TCL parameters unless a modified list of compounds is approved by EPA.

c. Three sediment samples will be collected in the drainage ditch, spaced out along its length.

d. One sample from each sampling location within the ditch will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA. If it is determined that samples from the ditch are

contaminated, additional sampling to define the concentration gradient will be proposed.

4.24 Investigation of Lagoon at MTI Test Station

A plastic-lined lagoon exists in the western portion of the MTI test station that was reported to have been used for cooling water.

a. One sample of the water and one sample of the sediment in the lagoon (if present) will be collected and sampled for the TCL parameters unless a modified list of compounds is approved by EPA.

b. A monitoring well cluster will be installed at the perimeter of the main testing area to determine ground-water quality downgradient of the lagoon and to evaluate vertical hydraulic gradients using water-level measurements.

c. Two soil borings will be drilled adjacent to the lagoon area and sampled to a depth of 6 ft or until 2 ft of undisturbed material is encountered. One sample from each boring will be submitted for laboratory analysis of the TCL parameters unless a modified list of compounds is approved by EPA.

4.25 Investigation of a Clearing in the Woods Called the Ice Pond

A clearing in the woods is visible on aerial photographs outside of the perimeter fenceline to the west of the MTI test station (visible in historical aerial photographs). A plastic-lined lagoon (called the ice pond) was reported to exist at one time and pieces of torn plastic are reported to still be visible. The purpose of the old lagoon was reported to be for research on spray cooling, and chemicals were not reported to have been used in the study.

a. As part of the literature search, a record search will be performed to determine whether chemicals were used in this area. If it is determined to EPA's satisfaction that chemicals were not used, no additional work will be done. If it is unclear whether chemicals were used, the investigation will consist of subtasks b through e, below.

b. The cleared area will be inspected to ascertain the nature of its use, if possible, and potential presence of waste materials, if any. If the literature search and inspection indicate chemical usage in the area, sampling locations will be selected.

c. A soil-gas survey will be conducted to screen soil gas for the presence of VOCs prior to selecting soil boring locations.

d. Two exploratory borings will be drilled in this area (Figure 5). The borings will be continuously sampled to a depth of 6 ft below ground surface or until 2 ft of undisturbed material is encountered, whichever is greater.

e. One sample from each boring will be submitted for laboratory testing of the TCL parameters unless a modified list of compounds is approved by EPA.

4.26 Investigation of GE-Exxon Nuclear Test Station

This test station is located within the easement area at the northwestern perimeter of the site. It has been used for several purposes which may have included uranium enrichment research.

a. A walk-through survey of the buildings and grounds, including utility bunkers and the deep caisson under the tower building, will be made with a real-time detection instrument to assess the potential presence of residual radiation, if any. A scintillometer will be used to measure total counts of radiation. Readings will be evaluated in terms of available information regarding natural background levels of radiation as well as a walk-through survey of areas, such as wooded areas, believed to be unaffected by test station activities. If necessary, a spectroscope may be used to identify specific radioactive isotopes.

b. The dry wells, utility bunkers and deep caisson will be investigated for the presence or possible presence of contamination. The investigation will include locating and mapping each dry well, utility area and the deep caisson, determining the contents of each, gathering available information on historical use, and sampling, if warranted. The dry wells will be sampled as described in Section 4.21.

c. A soil-gas survey will be performed at the mound located behind the test station to screen soil gas for VOCs prior to selecting a soil boring location.

d. A soil boring will be drilled in the mound to a depth of 6 ft or until 2 ft of undisturbed material is encountered. The work will include scanning the soil with a real-time radiation detector as the borehole is advanced, and the analysis of one soil sample for radiation parameters based on the results of the real-time radiation detector.

e. One soil sample from each boring will be submitted for laboratory analysis of the TCL parameters unless a modified list of compounds is approved by EPA.

f. Three monitoring wells will be installed at the GE Exxon-Nuclear Building to determine ground-water flow direction and ground-water quality at that part of the site (see Section 4.7.1). Proposed monitoring well locations are shown on Figure 5.

g. If levels of radiation of concern are detected, wipe sampling of potentially contaminated surfaces will be conducted.

h. All surface features and sampling locations will be indicated on an appropriate scale map prepared as part of the RI.

4.27 Investigation of PTI Test Station

Activities at the PTI test station have included work using electrical equipment that included transformers which contained PCB oils. At the present time, transformers are no longer present at the site and a PCB sampling program was carried out prior to their removal. These data will be evaluated prior to selecting sampling locations. Soil samples will be collected from areas in which PCBs were reportedly used. Soil samples will be analyzed for TCL plus boron unless a modified list of compounds has been approved by EPA. Special Analytical Services may be necessary to achieve detection limits at or below potential ARARs and TBCs.

a. If earth-moving activities have occurred in these areas, soil borings will be drilled to a depth of 6 ft or until 2 ft of undisturbed material is encountered, whichever is greater. The soil boring locations will be based on a soil-gas survey in order to select the most appropriate locations. One sample will be collected from each boring per area and analyzed for the TCL parameters. Determinations regarding earth-moving activities will be based upon the results of the literature search, including a review of aerial photographs, maps, records, and interviews with former employees.

b. If earth-moving activities did not occur at this site, soil boring locations will be based on other data in (a.) above other than the aerial photographs.

c. Wipe samples will be collected from selected locations inside the building for PCB analysis from areas that may have resulted in discharges outside the building.

4.28 Investigation of Underground Storage Tanks

Numerous storage tanks contained a variety of fuels and pressurized gases during various periods in the operation of the test station. An inventory of all tanks, regardless of use, and their contents, past, if available, and present will be complied for all underground tanks during the literature search.

Estimates of the number of underground tanks range from 40 to 50. This may include tanks which contained VOCs, including alcohols, non-VOCs, petroleum products, and/or pressurized gases. Tanks that only contained petroleum products or pressurized gases, as documented by records or due to their location and piping system (i.e., No. 2 fuel tanks connected to heating systems), will not be investigated. Tanks containing petroleum products are excluded from pressurized gases would be expected to volatilize and have no impact on soil or water.

a. An inventory of all underground storage tanks and information regarding past use will be compiled based on a review of records and discussion with present or former test station personnel. The tank locations and piping systems will be mapped (if possible) and the substances which were stored in each tank will be determined (if possible).

b. The nature and volume of the tank contents will be determined through interviews and a record review, including tanks that contained petroleum products or pressurized gases. Wright-Malta Corporation, owner of some of the tanks, will be asked to provide information concerning the present contents of the tanks. Soil samples as described below will be carried out regardless of whether tanks are currently empty or full.

c. The area in the vicinity of each tank will be inspected for stained surficial soil. If stained soil is present, the stained area will be mapped and one surface soil sample will be collected from the stained area at each tank and will be analyzed for TCL parameters, unless a modified list of compounds has been approved by EPA. However, stained soil will not be sampled if a soil boring is advanced in the stained area. In that case, the sample with the highest PID measurement will be analyzed for TCL parameters. If stained soil is not observed, the procedures in (d.) and (e.) below will be followed. Soil samples will be collected regardless of whether tanks are full or empty.

d. At tanks that were used solely for VOC products (and are not considered petroleum products), a soil-gas survey will be conducted at each tank. Figures for the soil-gas grids will be provided as part of the literature search since it is not known which tanks will be included in the investigation at this time.

e. At tanks that were not used solely for VOC products (and are not considered petroleum products), two soil borings will be drilled at each tank in areas most likely to be contaminated, to be selected based on soil-gas survey results.

f. One sample per boring will be submitted for laboratory analysis of TCL parameters unless a modified list of compounds is approved by EPA.

If based on their investigations, the PRPs believe that any underground tanks could not serve as potential sources of contamination, the PRPs will propose to EPA that these tanks need not be investigated further. If EPA determines that additional investigation is warranted, the PRPs shall propose methods for further investigation as required by EPA.

4.29 Investigation of Aboveground Storage Tanks

A number of aboveground storage tanks exist at the site, such as those located in the fuel-mixing area (Area A). This may include tanks which contained VOCs, alcohol, non-VOCs, petroleum products and/or pressurized gases. An inventory of all tanks, regardless of use, and their contents, past, if available, and present, will be compiled for all aboveground tanks during the Literature Search. Tanks that contained only pressurized gases will not be investigated. In addition, tanks that only contained petroleum products, as documented by records or due to their location and piping system (i.e., No. 2 fuel tanks connected to heating systems), will not be investigated further.

a. An inventory of all aboveground storage tanks and past use will be compiled, if available, based on a review of records and discussion with present or former test station personnel. The tank locations and piping systems will be mapped (if possible) and the substances which were stored in each tank will be determined (if possible).

b. The nature and volume of the tank contents will be determined through interviews and a record review, including tanks that contained petroleum products or pressurized gases.

c. Each tank will be visually inspected for soundness and integrity, and for stained surficial soil. If stained soil is present, the stained area will be mapped and one surface soil sample will be collected from the stained area at each tank and will be analyzed for TCL parameters unless a modified list of compounds is approved by EPA. However, stained soil will not be sampled if a soil boring is advanced in the stained area. In that case, the sample with the highest PID measurement will be analyzed for TCL parameters. If stained soil is not observed, the procedures in (d) and (e) below will be followed.

d. At tanks that were used solely for VOC products (and are not considered petroleum products), a soil-gas survey will be conducted at each tank. Figures for the soil-gas grids will be provided as part of the literature search sine it is not known which tanks will be included in the investigation at this time.

e. At tanks that were not used solely for VOC products (and are not considered petroleum products), two soil borings will be drilled at each tank in locations most likely to be contaminated, based on soil-gas survey results.

f. One sample per boring will be submitted for laboratory analysis of TCL parameters unless a modified list of compounds is approved by EPA.

If based on their investigations, the PRPs believe that any aboveground tanks could not serve as potential sources of contamination, the PRPs may propose to EPA that these tanks need not be investigated further. If EPA determines that additional investigation is warranted, the PRPs shall propose methods for further investigation as required by EPA.

4.30 Magazine Area

The magazine area consists of four bunkers which are or have been used for the storage of chemicals, explosive materials, and ordnance.

a. The contents of each bunker will be inventoried by examining available records and interviewing appropriate personnel. A physical inspection of the bunkers will be made consistent with the prudent concern for safety.

b. The following investigation will be conducted after the literature search and inspection of the bunkers, unless the literature search and inspection discloses that such investigation may be unsafe to persons or property. A plan for investigating this area consistent with the prudent concern for safety will be submitted to EPA after the literature search has been completed and the PRPs have determined the appropriate sampling locations and methods in the magazine area. Appropriate investigations will be undertaken to determine whether site contamination exists. Specifically, soil samples, soil borings, soil-gas surveys, and monitoring well installation, will be evaluated for the magazine area and a determination made of which types of investigations are appropriate.

c. If the literature search and inspection discloses that the investigation described in b. above would be unsafe to persons or property, EPA, the respondents and their contractors, and representatives of DOD, including munitions experts, will confer to develop a form of investigation that is safe to persons and property.

4.31 Investigation of the Triangular Parcel of Land Adjacent to the Southern Corner of the Test Station

Contaminants have been observed in this area, which is hydraulically upgradient of the fenced portion of the Test Station.

a. A soil-gas survey will be performed to screen VOCs in this area. The soil-gas survey sampling location are shown on Figure G-28.

b. Monitoring Wells MW-1, MW-2, MW-3, MW-4, and MW-14D will be sampled during the sampling of existing monitoring wells and supply wells.

4.32 Quality Control Sampling

The level of effort associated with the collection and testing of quality control samples will constitute a significant portion of the field activities. Detailed quality assurance/quality control procedures will be contained in the Quality Assurance Project Plan (QAPP) contained in the POP.

a. Field replicate samples will be collected at an approximate frequency of 10 percent for ground-water and surface-water samples, and will be tested for the

VOC parameters. Field replicate samples will not be collected for the other media (soils, sediments, storage tank contents, etc.).

b. Field blank or equipment rinseate samples will be collected at an approximate frequency of 10 percent for ground-water, surface-water, soil and sediment samples, and will be tested for TCL parameters unless a modified list of compounds is approved by EPA.

c. Trip blank samples will be included with each shipment of samples and will be tested for VOCs.

d. A sample of the water used in the mud-rotary drilling circulating fluid during the installation of new deep wells will be tested for TCL parameters unless a modified list of compounds is approved by EPA.

4.33 Site Security

A survey of site security will be made during the period of the literature search is being conducted. In addition to assessing the condition of fencing and surveillance systems, the need for additional security outside the main test station, specifically, the NYSDOT disposal area and the GE Exxon-Nuclear test station, will be evaluated. If it is determined that either of these areas is a threat to human health and/or the environment, the owners will be requested to install a fence. The results of the security survey shall be presented to EPA and, if EPA determines that additional security is needed, the PRPs will submit a proposal addressing security concerns.

4.34 Sample Analysis and Validation

All surface soil, subsurface soil, ground-water, and surface-water/sediment samples to be collected during the Field Investigation will be analyzed according to EPA CLP procedures. The data generated will be validated according to EPA Region II data validation procedures. The data validation will verify that the analytical results obtained followed the protocols specified in the POP, and are of sufficient quality to be relied upon in performing the risk assessment, selecting and screening potential remedial action alternatives and supporting a Record of Decision (ROD) for the site.

Validation of existing data for the site is not planned and, therefore, is not included in this task.

The soil-gas samples will be analyzed in the field. The data will be used for screening purposes only and, therefore, will not be validated.

All samples collected during the RI, and then analyzed through the CLP, will be subjected to data validation using the following EPA Region II procedures:

- CLP Organics Data Review and Preliminary Review SOP No. HW-2 Revision No. 6, March 1989 (USEPA Region II, 1989).

- Evaluation of Metals Data for the Contract Laboratory Program, SOP No. HW-2, Revision No. 8, December 1988 (USEPA Region II, 1988).

When validating PCDD/PCDF data, the data validator will use SOP No. HW-5, "CLP Dioxin (2,3,7,8-TCDD) Data Review, Revision II, December 14, 1987," as a guideline. Because the PCDD/PCDF is a more complex analysis than 2,3,7,8-TCDD, the data validator will also refer to the SAS request prepared for PCDD/PCDF and the analytical method SW846 8280 to determine if the analysis was performed as requested and if the data are usable. The data validator will also use professional judgment from both laboratory and validation experience in evaluating the PCDD/PCDF analytical data.

Validation of analytical data will be performed by experienced chemists whose data validation packages have previously been accepted by EPA Region II and the NYSDEC. The samples collected during the RI are to be analyzed for the parameters described in Section 4.0 and outlined in Table 5 of this work plan. Additional information on sample collection, analytical methods, detection limits, and QA/QC samples will be provided in the POP for the RI.

The proposed analytical program includes QA/QC samples, such as duplicate, field blank, trip blank, and matrix spike/matrix spike duplicate (MS/MSD) samples. These QA/QC samples will be collected as outlined in Section 4.32. Duplicate samples will be analyzed at a minimum frequency of 1 per 20 or less samples. Field blanks will be taken on each sampling day, for each matrix and for each analytical parameter. Duplicate samples and field blanks will be analyzed for the same parameters as the original samples. Trip blanks will accompany each aqueous organics sample batch and will be analyzed for TCL volatile organics only. The PCDD and PCDF analyses require that performance evaluation samples and blind/known blanks be analyzed.

4.35 Data Evaluation

This task includes review of existing data for the site that were not available at the time of preparation of the work plan. Data collected during previous sampling events performed by others at the MRFA site and the data to be collected during this RI will be organized, reviewed, and carefully evaluated to satisfy the objects of the investigation. The data will be analyzed to evaluate site contamination, identify ground-water flow direction, evaluate potential sources of contamination, and describe site geology and hydrogeology. When feasible, the data evaluation task will be performed concurrently with the field investigation, and sample analysis/validation.

Field data and laboratory analytical data will be entered into a data base. Boring logs will be prepared for all completed borings, and stratigraphic information developed from site borings will be displayed as cross sections of the site. Water-level elevations will be used to develop plot(s) of piezometric surfaces, if possible. Hydraulic gradients will be evaluated as appropriate. The analytical data for each medium sampled will be tabulated to illustrate the distribution of detected contaminants of concern.

The data will be evaluated to determine the need for subsequent investigation. The data will be submitted to EPA at the end of the first phase of investigation. This submittal will include tables and figures, well logs and geologic cross sections, and a description of site geology and hydrogeology. A short bullated list of the major contamination findings of the investigation will be prepared. The list will be limited to which media were found to be contaminated, the most prevalent compounds, and the areal extent of the contamination found. Detailed evaluation and write-up of the geology/hydrogeology, analytical data, comparison to ARARs, risk-based evaluation of the data, remedial alternatives evaluation, and other detailed evaluation of the results will be performed as part of the RI and FS reports.

If EPA decides, based on the submitted data, that a Phase II investigation is needed, a scope will be developed as part of the Phase II project planning task, and a Phase II implementation document prepared and submitted to EPA for review and approval. If Phase II work is not needed, the project will proceed directly to the risk assessment, RI report, and FS.

4.36 Health and Environmental Risk Assessment

The data collected during the RI will be used to calculate the potential risk to human health and the environment posed by any contamination found at the MRFA site. The Health and Environmental Risk Assessment (RA) will be performed by the EPA.

4.36.1 Preliminary Identification of Applicable or Relevant and Appropriate Requirements (ARARs) and Information To Be Considered (TBC)

Under CERCLA Section 121 (d) (1), the intent of remedial action is to attain a reduction of hazardous substances released into the environment and to control future releases to a level that assures acceptable protection of human health and/or the environment. The potential ARARs that should be considered in the evaluation of the no action remedial alternative for the MRFA site are chemical-, location-, and action-specific. Specifically, the following potential ARARs will be considered in the RI at the site:

4.36.1.1 Chemical-Specific

- Federal and New York State Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) (40 CFR § 141 and 10 NYCRR Part 5), and non-zero federal MCLGs (NCP, Section 300.430(a)(1)(iii)(F)).

- RCRA Ground Water Protection Standards Maximum Concentration Limits (40 CFR§ 264).

- New York State Pollutant Discharge Elimination System (SPDES) Standards for Stormwater, Runoff, and Surface Water/Ground Water Discharges (6 NYCRR Parts 750-757).

- Clean Water Act, Water Quality Criteria (Gold Book, May 1, 1987).

- New York State Ground Water Quality Standards (6 NYCRR Part 703).

- New York State Surface Water Quality Standards for the Upper Hudson River Drainage Basin (6 NYCRR Part 702).

- New York State Classification and Standards of Quality and Purity (6 NYCRR Part 701), Criteria Governing Thermal Discharges (6 NYCRR Part 704), and Effluent Standards and/or Limitations for Discharges to Class GA Waters (6 NYCRR Part 703.6).

- National Ambient Air Quality Standards (NAAQS) (40 CFR § 50.6 and § 50.7) and New York State Air Quality Standards (6 NYCRR Part 257).

- National Emissions Standards for Hazardous Air Pollutants (NESHAPs).

- New York State Department of Health Part 5: Drinking Water Supplies of the New York Sanitary Code.

- New York State Division of Water Technical and Operational Guidance Series: (1.1.1) Ambient Water Quality Standards and Guidance Values.

- New York State List of Hazardous Substances (6NYCRR Part 597)

4.36.1.2 Location-Specific

- New York State Freshwater Wetlands Permit Requirements and Classifications (6 NYCRR Parts 633 and 664).

- New York State Raw Water Supply Sources (6 NYCRR Part 170).

- Endangered Species Act. Because of the possibility that federal endangered species and/or critical habithe Endangered Species Act will be evaluated (See Section 4.2 -Literature Search).

- New York State Endangered and Threatened Species of Fish and Wildlife Program (6 NYCRR Part 182). Inconsultation with the NYSDEC, Geraghty & Miller will determine whether or not the MRFA site is in an area where New York State endangered species exists (see Section 4.2).

- Farmland Protection Policy Act. Because part of the site is an actively managed forest area, it may be a potentially significant agricultural land and the Farmland Protection Policy Act may be a potential ARAR. The United States Department of Agriculture/Soil Conservation Service will be consulted and, if significant agriculture land is or would be affected, an impact assessment will be completed during the RI (see Section 4.2).

- New York State Notice of Intent for Farm and Agriculture (1 NYCRR Part 371).

- National Historic Preservation Act. There is evidence in the archaeological literature of prehistoric and historic occupation of the

Malta-Stillwater region. To initiate compliance with the National Historic Preservation Act, a State IA Cultural Resource Survey will be performed to assess the cultural resource sensitivity of the site (see Section 4.2. This will include a review of the local logging industry activities to determine if historically significant structures and facilities (such as mills, camps, and logging roads) will be affected.

4.36.1.3 Action-Specific

- Federal and New York State Hazardous Waste Management Requirements (capping requirements, on-site containment, dust control, tank storage, and general closure standards) (40 CFR § 262 and 6 NYCRR Parts 370-372).

- New York State SPDES Procedures for Discharge to Surface Water (Reintroduction of Treated Effluent) (6 NYCRR Parts 750-757).

- Federal and New York State Hazardous Waste Manifest Requirements for OffSite Waste Transport (40 CFR § 262 and 6 NYCRR Part 372).

- New York State Solid Waste Management Requirements for Nonhazardous Waste (6 NYCRR Part 360).

- Department of Transportation (DOT) Rules for Hazardous Materials Transport (49 CFR § 171).

- New York State Air Emission Requirements (6 NYCRR Parts 200, 211, 212, 257).

- Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (40 CFR § 268).

- Occupational Safety and Health Administration (OSHA) Standards for Hazardous Material Response (29 CFR §§ 1904, 1910, 1926).

- Standards for Hazardous Waste Transporters (40 CFR § 263).

In addition to the ARARs listed above, the following information will be considered as part of the RI:

- New York State Releases of Hazardous Substances Reporting Response and Corrective Action (6NYCRR Part 595).

- New York State Registration of Hazardous Substance Bulk Storage Tanks (6NYCRR Part 596).

- New York State Use and Protection of Waters (6NYCRR Part 608).

- New York State Registration of Petroleum Storage Facilities (6NYCRR Part 612).

- New York State Handling and Storage of Petroleum (6NYCRR Part 613).

- New York State Standards for New and Substantially Modified Petroleum Storage Facilities (6NYCRR Part 614).

4.36.1.4 To Be Considered (TBC) Information

Executive Order 11990, Protection of Wetlands. Although most of the MRFA site is upland, the RI Work Plan includes a task for the delineation of wetlands (for example, Area D-3) (see Section 4.2 - Literature Search). If the RI indicates move ment of contaminants into wetlands areas or if wetlands have already been affected, a wetlands assessment will be included as part of the feasibility study (FS).

New York State Sediment Criteria, December 1989. The criteria address the effect of non-polar organic chemicals in sediment. If the RI indicates the presence of these chemicals in sediment, the criteria will be considered.

A Summary of all ARARs and TBCs potentially applicable to the MRFA site is presented in Table 9. The list of ARARs and TBCs will be updated as necessary during the RI when additional ARARs and TBCs may be identified for the site.

5.0 PROJECT MANAGEMENT

5.1 Data Management Procedures

Field sampling and analytical procedures for the acquisition and compilation of field and laboratory data are subject to data management procedures. Data management procedures are necessary for field activities, sample management and tracking and document control and inventory. DQOs will govern the data management procedures used. The following data management procedures will be followed; further details will be provided in the POP.

The RI will generate an extensive amount of information, the quality and validity of which must be consistently well documented because this information will be used to support remedy selection decisions any legal or cost recovery actions.

Therefore, field sampling and analytical procedures for the acquisition and compilation of field and laboratory data are subject to data management procedures. DQOs will govern the data management procedures used, and the POP will identify both field-collected and analytical data. Information to be recorded will include sampling information, recording procedures, sample management, and QC concerns. The discussion on data management procedures is divided into three categories: field activities, sample management and tracking, and document control and inventory.

5.1.1 Field Activities

During site characterization and sampling, consistent documentation and accurate record keeping procedures will be followed because subsequent decisions will be made on the basis of information gathered during these tasks. Aspects of data management for sampling activities during site characterization will include:

- Quality Assurance/Quality Control (QA/QC) Plans -- These documents provide records of responsibility, adherence to prescribed protocols, nonconformity events, corrective measures, and data deficiencies. QA/QC plans will be discussed in detail in the POP.

- A Data Security System -- This system will include measures to be taken in the field to safeguard chain-of-custody records and prevent free access to project records, thereby guarding against accidents or intentional loss, damage, or alteration. The Data Security System will be discussed in detail in the POP.

- Field Logs -- The daily field logs are the primary record for field investigation activities and will include a description of any modifications to the procedures outlined in the work plan, field sampling plan, or health and safety plan, with justifications for such modifications. Field measurements include pH, temperature, conductivity, water flow rates, air quality parameters, and soil characteristics and field observations will be recorded directly onto project log sheets. Health and safety monitoring, sampling locations, sampling techniques, and a general description of daily activity will be included in the daily log. Any unusual occurrences or circumstances will be documented in these logs and can be used for reference in determining the possible causes for data anomalies if discovered during data analysis. Data will be recorded directly and legibly onto project sheets. Changes made to original notes will not obliterate the original information and will be dated and signed. Standard format information sheets will be used whenever appropriate and will be retained in permanent files. Samples of standard Geraghty & Miller logs and a discussion of each use will be provided in the POP.

Documentation involved in maintaining field sample inventories and proper chain-of-custody records may include the following:

- Sample Identification Matrix
- Sample Tag
- SAS Packing List
- Chain-of-Custody Form
- Notice of Transmittal

5.2 <u>Sample Management and Tracking</u>

A record of sample shipments, receipt of analytical results, submittal of preliminary results for QA/QC review, completion of QA/QC review, and evaluation of the QC package will be maintained to ensure that only final and approved analytical data are used in the site analysis. In some instances, the use of preliminary data may be warranted to prepare internal review documents, begin data analysis while minimizing lost time for the turnaround of QA/QC comments, and to continue narrowing remedial action alternatives. Preliminary data used in analyses must be updated upon receipt of official QA/QC comments and changes. Sample results will not be incorporated in the site characterization report unless accompanied by QA/QC comments.

The DQOs for each task involving sample analysis specify whether the information is valid with qualifiers or not and specify which qualifiers can invalidate the use of certain data. Acceptability of data quality is not established until the reviewed QA/QC package accompanies the analytical data.

The acceptable QA/QC package will be defined in the approved site QAPP, as provided in the POP, for each task. Nevertheless, the DQOs outlined for the use of the data will dictate the level of review required.

5.3 Document Control and Inventory

Sample results will be managed in a standardized form to promote easy reporting of data in the site characterization report. Precautions will be taken in the analysis and storage of the data collected during site characterization to prevent the introduction of errors or the loss of misinterpretation of data. The document inventory and filing systems may be set up on the basis of serially numbered documents, manual or automated. The relationship of this filing system to the Administrative Record is discussed in the "Interim Guidance on Administrative Records for Selection of CERCLA Response Actions" (USEPA, Draft 1988).

5.4 Contingency Plans

Problems may occur during remedial planning projects. Given the importance of schedule and budget to the MRFA RI, examples of contingency plans designed to counter potential problems will be developed. Table 9 illustrates contingency plans for several potential problems that may arise at the MRFA site. Implementation of the contingency plans will require work plan amendments in most cases.

5.5 Project Schedule and Deliverables

The AO sets out the project schedule and required deliverables. A detailed schedule is provided as Figure 6.

5.6 Project Management, Organization and Key Technical Personnel

Details of project management will be provided in the Project Operations Plan. The project organization and key technical personnel are provided in Figure 7 of this RI work plan. Curriculum vitae for all personnel listed in Figure 7 are provided in Appendix F.

6.0 RI REPORT PREPARATION

The RI report will be prepared in accordance with "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (USEPA 1988). The RI report will include, but not be necessarily limited, to the following:

- Introduction, including site background;
- Findings of the site characterization tasks and conclusions based on the data;

- Baseline risk assessment;

- All supporting figures, including ground-water flow maps, geologic cross sections, surface and downhole geophysical survey logs; tabulated chemical data and supporting documentation; data validation summaries;

The RI report will also include an appendix containing calculation sheets that provide equations, conversion factors, input values, technical references, and calculations for all values calculated as part of the RI.

Respectfully submitted,

GERAGHTY & MILLER, INC.

Laine Vignona

Laine Vignona
Senior Scientist

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LV/DC:vk
December 6, 1990

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Table 1. Long-Term Monthly Precipitation and Temperature, National Climatic Data Center, Albany, New York.

Long-Term (30-Year) Mean Monthly Precipitation (Inches)

Month	Precipitation	Month	Precipitation
January	2.47	July	3.49
February	2.20	August	3.07
March	2.72	September	3.58
April	2.77	October	2.77
May	3.47	November	2.70
June	3.25	December	2.59

Long-Term (30-Year) Mean Monthly Temperature (°F)

Month	Temperature	Month	Temperature
January	25.7	July	74.0
February	26.7	August	71.7
March	35.7	September	63.7
April	48.4	October	53.1
May	59.9	November	41.7
June	69.0	December	29.4

Table 2. Preliminary Identification of Remedial Alternatives for Soil, Malta Rocket Fuel Area Superfund Site, Towns of Malta and Stillwater, Saratoga County, New York.

Response Action	Remedial Alternative	Applicable Contaminants	Primary Data Requirements	Treatability/ Bench Scale Test Required
No action	Fences Groundwater monitoring Surface water monitoring Deed restrictions	All	Air emissions TOC Soil permeability Horizontal and vertical extent of contamination	No
Containment	Capping	All	Horizontal extent of contamination Physical properties of soils (bearing strength, grain size distribution, Atterberg limits)	No
	Vertical barrier	All	Horizontal and vertical extent of contamination Depth to groundwater	Yes
Treatment	Low temperature thermal stripping	VOCs	Standard parameters*	Yes
	Incineration	Organics	Standard parameters* BTU content	No
	Soil washing	Non-volatile & metals	Standard parameters* TOC	Yes
	Chemical fixation	Ltd. organics & metals	Standard parameters* Oil and Grease, TOC	Yes
	Biological treatment	Organics	Standard parameters* TOC, pH Contaminant biodegradability	Yes
	In situ soil vapor extraction	VOCs	Standard parameters* Soil permeability Depth to groundwater	Yes

*Standard parameters:

Contaminant concentrations
Volume of contaminated soil
Physical properties of soils
(grain size distribution,
Atterberg limits, moisture content,
Bulk, density).

Table 2. Preliminary Identification of Remedial Alternatives for Soil, Malta Rocket Fuel Area Superfund Site, Towns of Malta and Stillwater, Saratoga County, New York.

Response Action	Remedial Alternative	Applicable Contaminants	Primary Data Requirements	Treatability/ Bench Scale Test Required
Treatment (continued)	In situ soil flushing	Non-volatiles & metals	Standard parameters* Soil permeability Depth to groundwater	Yes
	In situ chemical fixation	Ltd. organics & metals	Standard parameters* Depth to groundwater	Yes
	In situ biodegradation	Organics	Standard parameters* TOC, pH, Contaminant biodegrability Soil permeability Depth to groundwater	Yes
Disposal	Offsite landfill	All	Standard parameters* RCRA parameters	No
	Onsite landfill	All	Standard parameters* RCRA parameters	No

*Standard parameters:

Contaminant concentrations
Volume of contaminated soil
Physical properties of soils
(grain size distribution,
Atterberg limits, moisture content,
Bulk, density).

Table 3. Preliminary Identification of Remedial Alternatives for Groundwater, Malta Rocket Fuel Area Superfund Site, Towns of Malta and Stillwater, Saratoga County, New York.

Response Action	Remedial Alternative	Applicable Contaminants	Primary Data Requirements	Treatability/ Bench Scale Test Required
No action	Well restrictions Groundwater monitoring Alternative water supply	All	Hydrogeology (groundwater flow direction/gradient) Contaminant concentrations Areal & vertical extent of contamination (affected aquifers)	No
Treatment	Air stripping	VOCs	Standard parameters*	No
	Chemical oidation	Organics & metals (Fe, Mn)	Standard parameters*	No
	Carbon adsorption	Organics	Standard parameters* DOC	No
	Biological treatment	Organics	Standard parameters*	Yes
	In situ biodegradation	Organics	Standard parameters*	Yes
	Steam stripping	Organics	Standard parameters*	No
	Chemical precipitation	Metals	Standard parameters* Ionic form of metal contaminants	Yes
	Ion exchange	Metals	Standard parameters* Ionic form of metal contaminants Major anions and cations**	Yes
Disposal	Recharge to groundwater	All	Local regulatory requirements	No
	Storm sewer	All	Local regulatory requirements	No
	Sanitary sewer	All	Local regulatory requirements	No

*Standard parameters:

Hydraulic characteristics of aquifer (results of pump tests)
Hydrogeology (groundwater flow direction/gradient)
Areal & vertical extent of contamination (affected aquifers)
Contaminant concentrations (including dissolved and total metals)
Iron, manganese, pH, alkalinity, TOC, TDS

**Major anions and cations:

Na, K, Ca, Mg, Fe, Mn, sulfate, phosphate, chloride, nitrate, silicate

Table 4. Preliminary Identification of Remedial Alternatives for Surface water and Sediments, Malta Rocket Fuel Area Superfund Site, Towns of Malta and Stillwater, Saratoga County, New York.

Response Action	Remedial Alternative	Applicable Contaminants	Primary Data Requirements	Treatability Bench Scale Test Required
Surface Water				
No action	Continued Monitoring Institutional Controls	All	Extent of contamination	No
Containment	Basins, Dikes, berms, etc.	All	Extent of contamination Rainfall data Topography Drainage characteristics Soil erosion potential	No
Diversion	Excavation, dikes, trenches	All	Extent of contamination Soil characteristics Rainfall data Drainage characteristics	No
Collection	Pumping	All	Extent of contamination Volume of water Recharge rate	No
Treatment	In-situ biodegradation	VOCs	Extent of contamination Degradability Nutrient requirements	Yes
Sediments				
No action	Continued monitoring	All	Extent of contamination	No
Removal	Dredging	All	Extent of contamination	No
Containment	Berms, dikes, etc.	All	Extent of contamination Rainfall data	No

Table 5. Summary of Analytical Levels Appropriate to Various Data Uses.

Data Uses	Analytical Level	Type of Analysis
• Assist in identifying sample locations • Site characterization • Monitoring during implementation • Health and safety	Level 1 - (Screening)	• Total organic/inorganic vapor detection using portable instruments • Field test kits - pH, conductivity, temperature
• Relative concentrations • Site characterization • Evaluation of alternatives • Engineering design • Monitoring during implementation	Level 2 - (Field Analysis)	• Variety of organics by GC; inorganics by AA; XRF • Tentative ID: analyte specific • Detection limits vary from low ppm to low ppb • Portable/mobile instrumentation
• Confirmational, but with less documentation • Risk assessment • PRP determination • Site characterization • Evaluation of alternatives • Engineering design • Monitoring during implementation	Level 3 - (Engineering)	• Organics/inorganics using EPA procedures other than CLP Can be analyte-specific • RCRA characteristic tests
• Rigorous • Risk assessment • PRP determination • Evaluation of alternatives • Engineering design	Level 4 - (Confirmational)	• TCL organics/inorganics by GC/MS; AA; ICP • Low ppb detection limit
• Site-specific conditions/ parameters • Risk assessment • PRP determination	Level 5 - (Nonstandard)	• Nonconventional parameters • Method-specific detection limits • Modification of existing methods • Appendix 8 parameters • TICs

Source: USEPA, 1987a

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

1. Remedial Action Objective

Control human exposure to contaminants in air

Media

Air

Objective of Program

- o Characterize air quality
- o Identify areas of concern
- o Evaluate areas of concern

Contaminants of Concern

VOCs
Particulates

Type of Investigation

- o Ambient air quality
- o Background air quality

Prioritized Data Uses

- o Site screening
- o Health & Safety
- o Risk Assessment

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
o Analyzes meteorological conditions	N/A	N/A
o Conduct upwind and site survey using	1	Refer to Section 4.10.1
o Evaluate area of concern using portable GC	2	Refer to Section 4.10.1
o Monitor during drilling period	1	Refer to section 4.10.1
o Conduct upwind and downwind air monitoring program	2	Refer to Section 4.10.2

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

2. Remedial Action Objective

Control human exposure to contaminated surfaces

Media

Surface soils/structures

Objective of Program

- o Verify site security
- o Locate potential source areas
- o Characterize extent of surface contamination
- o Evaluate direct contact exposures
- o Evaluate remedial alternatives

Contaminants of Concern

Metals
PCBs
Radioactivity

Type of Investigation

- o Surface Soil Samples
- o Field Reconnaissance
- o Wipe Samples

Prioritized Data Uses

- o Site Screening
- o Health & Safety
- o Risk Assessment
- o Remedial Alternatives

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
o Conduct security survey of site	N/A	Refer to Section 4.33
o Conduct scintillometer survey	1	Refer to Section 4.26
o Analyze areas of concern with spectroscope	2	Refer to Section 4.26
o Collect wire samples from areas of radiation concern	5	Refer to Section 4.26
o Conduct sitewide surface soils survey	N/A	Refer to Section 4.51
o Collect wop sample from area of PCB concern	5	Refer to Section 4.27
o Collect surface soil samples from areas of concern	4	Refer to Section 4.28, 4.29

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

3. Remedial Action Objective

Control human exposure to contaminants in surface water and sediments

Media

Surface water/sediments

Objective of Program

- o Assess background conditions
- o Identify potential contaminants
- o Characterize contaminants
- o Evaluate potential contamination migration
- o Evaluate remedial alternatives

Contaminants of Concern

Specific contaminants cannot be identified at this time.

Radioactivity

Type of Investigation

- o Literature Search
- o Field Reconnaissance
- o Soil-Gas survey
- o Surface water/Sediment samples

Prioritized Data Uses

- o Site Screening
- o Health & Safety
- o Site Characterization
- o Risk Assessment
- o Remedial Alternatives

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
o Conduct literature search	N/A	Refer to Section 4.9
o Conduct field reconnaissance after rainfall	N/A	Refer to Section 4.9
o Identify data gaps	N/A	Refer to Section 4.9
o Conduct soil-gas survey of existing pond, lagoon, and drainage ditch	2	Refer to Section 4.23, 4.24
o Collect surface water samples	4	Refer to Section 4.15, 4.23, 4.24
o Collect sediment samples	4	Refer to Section 4.15, 4.23, 4.24

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

4. Remedial Action Objective

Subsurface soil/groundwater contamination with VOCs

Media

Soil-gas

Objective of Program

- o Soil-gas sampling to evaluate
  - Source areas
  - Shallow soils contamination by VOCs
  - Possibly groundwater contamination by VOCs

Contaminants of Concern

- o VOCs
- o Other specific contaminants cannot be identified at this time

Type of Investigation

Soil-gas survey

Prioritized Data Uses

- o Evaluate potential source areas
- o Refine soil boring locations

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
Conduct soil-gas survey at selected locations using portable GC	2	Refer to Section 4.4, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.22, 4.25, 4.28, 4.29, 4.31

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

5. Remedial Action Objective

Control potential for migration of contaminants from subsurface source materials

Media

Subsurface source materials and soils

Objective of Program

- o Evaluate buried source materials/soils

Contaminants of Concern

Specific contaminants cannot be determined at this time

Type of Investigation

- o Geophysical Survey
- o Test pits of selected areas of concern
- o Soil sample collection

Prioritized Data Uses

- o Site Screening
- o Site Characterization
- o Remedial Alternatives

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
Conduct electromagnetic induction method geophysical survey	1	Refer to Sections 4.11, 4.12, 4.14, 4.16, 4.17, 4.19, 4.22
Excavate test pits at selected areas of concern	N/A	Refer to Sections 4.17, 4.22
Collect soil samples of test pits	4	Refer to Sections 4.17, 4.22
Collect samples from septic tanks	4	Refer to Section 4.20

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

6. <u>Remedial Action Objective</u>

Control the potential for migration of contaminants from soil to ground water

<u>Media</u>

Soil, unconsolidated deposits

<u>Objectives of Program</u>

- o Assess background conditions
- o Evaluate source areas
- o Evaluate subsurface geology
- o Identify contaminants
- o Characterize nature and extent of soils contamination

<u>Contaminants of Concern</u>

VOCS
Other specific contaminants cannot be identified at this time

<u>Type of Investigation</u>

Soil borings
Test Pits
Formation/sludge sampling
Geophysical logging
Field screening
Shelby tube sampling
Geotechnical analysis

<u>Prioritized Data Uses</u>

- o Site Characterization
- o Risk Assessment
- o Site-specific parameters

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
Conduct literature search	N/A	Refer to Section 4.2
Conduct background soils survey	4	Refer to Section 4.5.2
Collect split-spoon soils samples during well drilling program	5	Refer to Section 4.7.1
Collect shelby tube samples of 1 lacustrine blue clay during well drilling	5	Refer to Section 4.7.1

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
Conduct natural gamma geophysical logs of selected locations	2	Refer to Section 4.7.1
Conduct soil boring program at selected locations	4 or 5 depending on location	Refer to Section 4.11, 4.12, 4.13, 4.14, 4.15, 4.18, 4.19, 4.20, 4.23, 4.24, 4.25, 4.26, 4.27, 4.28, 4.29
Conduct geotechnical analyses on soils	2 or 5	Refer to Section 3.5.3
Excavate test pits or test trenches at at selected locations	4	Refer to Section 4.15, 4.16, 4.17, 4.22
Collect sludge/sediment samples from selected locations	4 or 5 depending on location	

7. Remedial Action Objective	Media
Control human exposures to contaminants in ground water	Groundwater
Objective of Program	**Contaminants of Concern**
o Evaluate subsurface geology/hydrogeology o Identify constituents of concern o Evaluate groundwater contamination o Access exposures to contaminated groundwater o Evaluate Remedial alternatives for groundwater	VOCs Other specific contaminants cannot be identified at this time
Type of Investigation	**Prioritized Data Uses**
o Sampling of existing wells o Installation and sampling of monitoring wells o Water level measurements o Aquifer testing	o Site Characterization o Risk Assessment o Remedial Alternatives

Table 6. Summary of Data Quality Objectives and Data Gathering Requirements During Remedial Investigation, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

Data Gathering Program	Appropriate Analytical Level	Analyses Planned
Install 21 new monitoring wells	N/A	Refer to Section 4.7
Collect synoptic rounds of water level measurements	1	Refer to Section 4.7
Collect water samples from new monitoring wells	4	Refer to Section 4.7.1
Collect water samples from existing wells	4	Refer to Section 4.7.2
Collect 2nd round of water samples from all wells	4	Refer to Section 4.7.2
Evaluate available data to determine aquifer test location	N/A	Refer to Section 4.8
Conduct aquifer testing program	varies; 1, 2, and 4	Refer to Section 4.8

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Table 7. Target Compound list for Analyses at Malta Rocket Fuel area Site, Towns of Malta and Stillwater, New York.

Volatiles	Semi Volatiles	
Chloromethane	Phenol	Acenaphthene
Bromomethane	bis(2-Chloroethyl)ether	2,4-Dinitrophenol
Vinyl chloride	2-Chlorophenol	4-Nitrophenol
Chloroethane	1,3-Dichlorobenzene	Dibenzofuran
Methylene chloride	1,4-Dichlorobenzene	2,4-Dinitrotoluene
Acetone	Benzyl alcohol	Diethylphthalate
Carbon Disulfide	1,2-Dichlorobenzene	4-Chlorophenyl phenyl ether
1,1-Dichloroethylene	2-Methylphenol	Fluorene
1,1-Dichloroethane	2,2'-oxbis(1-Chloropropane	4-Nitroaniline
1,2-Dichloroethylene(total)	4-Methylphenol	4,6-Dinitro-2-methylphenol
Chloroform	N-Nitroso-di-n-propylamine	N-nitrosodiphenylamine
1,2-Dichloroethane	Hexachloroethane	4-Bromophenyl phenyl ether
2-Butanone	Nitrobenzene	Hexachlorobenzene
1,1,1-Trichloroethane	Isophorone	Pentachlorophenol
Carbon tetrachloride	2-Nitrophenol	Phenanthrene
Vinyl acetate	2,4-Dimethylphenol	Anthracene
Bromodichloromethane	Benzoic acid	Di-n-butyl phthalate
1,2-Dichloropropane	bis(2-Chloroethoxy)methane	Fluoranthene
cis-1,3-Dichloropropene	2,4-Dichlorophenol	Pyrene
Trichloroethene	1,2,4-Trichlorobenzene	Butyl benzyl phthalate
Dibromochloromethane	Naphthalene	3,3'-Dichlorobenzidine
1,1,2-Trichloroethane	4-Chloroaniline	Benz(a)anthracene
Benzene	Hexachlorobutadiene	Chrysene
trans-1,3-Dichloropropene	4-Chloro-3-methylphenol(p-chloro-m-cresol)	bis(2-Ethylhexyl)phthalate
Bromoform	2-Methylnaphthalene	Di-n-octyl phthalate
4-Methyl-2-pentanone	Hexachlorocyclopentadiene	Benzo(b)fluoranthene
2-Hexanone	2,4,6-Trichlorophenol	Benzo(k)fluoranthene
Tetrachloroethene	2,4,5-Trichlorophenol	Benzo(a)pyrene
Toluene	2-Chloronaphthalene	Indeno(1,2,3-cd)pyrene
1,1,2,2-Tetrachloroethane	2-Nitroaniline	Dibenz(a,h)anthracene
Chlorobenzene	Dimethyl phthalate	Benzo(g,h,i)perylene
Ethyl Benzene	Acenaphthylene	
Styrene	2,6-Dinitrotoluene	
Total Xylenes	3-Nitroaniline	

Table 7. Target Compound list for Analyses at Malta Rocket Fuel area Site, Towns of Malta and Stillwater, New York.

Pesticides/PCBs	Metals
alpha-BHC	Aluminum
beta-BHC	Antimony
delta-BHC	Arsenic
gamma-BHC (Lindane)	Barium
Heptachlor	Beryllium
Aldrin	Cadmium
Heptachlor epoxide	Calcium
Endosulfan I	Chromium
Dieldrin	Cobalt
4,4'-DDE	Copper
Endrin	Iron
Endosulfan II	Lead
4,4'-DDD	Magnesium
Endosulfan sulfate	Manganese
4,4'-DDT	Mercury
Endrin ketone	Nickel
Methoxychlor	Potassium
alpha-Chlordane	Selenium
gamma-Chlordane	Silver
Toxaphene	Sodium
AROCLOR-1016	Thallium
AROCLOR-1221	Vanadium
AROCLOR-1232	Zinc
AROCLOR-1242	Cyanide
AROCLOR-1248	
ARCLOR-1254	
AROCLOR-1260	

Table 8. Analytical Parameters for Ambient Air Monitoring, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater Saratoga County, New York.

Volatile Organic Compounds
By Method 8240

Parameter	
Chloromethane	1,2-Dichloropropane
Bromomethane	trans-1,3-Dichloropropene
Vinyl Chloride	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride	1,1,2-Trichloroethane
Acetone	Benzene
Carbon Disulfide	cis-1,3-Dichloropropene
1,1-Dichloroethene	2-Chloroethyl Vinyl Ether
1,1-Dichloroethane	Bromoform
trans-1,2-Dichloroethene	2-Hexanone
Chloroform	4-methyl-2-pentanone
1,2-Dichloroethane	Tetrachloroethene
2-Butanone	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride	Ethyl Benzene
Vinyl Acetate	Styrene
Bromodichloromethane	Total Xylenes
1,1,2,2-Tetrachloroethane	

Table 9. Preliminary Identification of ARARs and TBCs

Chemical-Specific ARARs

Federal and and New York State Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) (40 CFR § 141 and 10 NYCRR Part 5), and non-zero Federal MCLGs (NCP, Section 300.430(a)(1)(iii)(F)).

RCRA Ground Water Protection Standards Maximum Concentration Limits (40 CFR§ 264).

New York State Pollutant Discharge Elimination System (SPDES) Standards for Stormwater, Runoff, and Surface Water/Ground Water Discharges (6 NYCRR Parts 750-757).

Clean Water Act, Water Quality Criteria (Gold Book, May 1, 1987).

New York State Ground Water Quality Standards (6 NYCRR Part 703).

New York State Surface Water Quality Standards for the Upper Hudson River Drainage Basin (6 NYCRR Part 702).

New York State Classification and Standards of Quality and Purity (6 NYCRR Part 701), Criteria Governing Thermal Discharges (6 NYCRR Part 704), and Effluent Standards and/or Limitations for Discharges to Class GA Waters (6 NYCRR Part 703.6).

National Ambient Air Quality Standards (NAAQS) (40 CFR § 50.6 and § 50.7) and New York State Air Quality Standards (6 NYCRR Part 257).

National Emissions Standards for Hazardous Air Pollutants (NESHAPs).

New York State Department of Health Part 5: Drinking Water Supplies of the New York Sanitary Code.

Table 9. (continued) Preliminary Identification of ARARs and TBCs

New York State List of Hazardous Substances (6NYCRR Part 597).

Location-Specific ARARs

New York State Freshwater Wetlands Permit Requirements and Classifications (6 NYCRR Parts 633 and 664).

New York State Raw Water Supply Sources (6 NYCRR Part 170).

Endangered Species Act.

New York State Endangered and Threatened Species of Fish and Wildlife Program (6 NYCRR Part 182).

Farmland Protection Policy Act.

New York State Notice of Intent for Farm and Agriculture (1 NYCRR Part 371).

Action-Specific ARARs

Federal and New York State Hazardous Waste Management Requirements (40 CFR § 262 and 6 NYCRR Parts 370-372).

New York State SPDES Procedures for Discharge to Surface Water (6 NYCRR Parts 750-757).

Federal and New York State Hazardous Waste Manifest Requirements for Offsite Waste Transport (40 CFR § 262 and 6 NYCRR Part 372).

New York State Solid Waste Management Requirements for Nonhazardous Waste (6 NYCRR Part 360).

Table 9. (continued) Preliminary Identification of ARARs and TBCs

DOT Rules for Hazardous Materials Transport (49 CFR § 171).

New York State Air Emission Requirements (6 NYCRR Parts 200, 211, 212, 257).

RCRA Land Disposal Restrictions (40 CFR § 268).

OSHA Standards for Hazardous Material Response (29 CFR §§ 1904, 1910, 1926).

Standards for Hazardous Waste Transporters (40 CFR § 263).

New York State Releases of Hazardous Substances Reporting, Response and Corrective Action (6NYCRR Part 595).

New York State Registration of Hazardous Substance Bulk Storage Tanks (6NYCRR Part 596).

New York State Use and Protection of Waters (6NYCRR Part 608).

New York State Handling and Storage of Petroleum (6NYCRR Part 612).

New York State Handling and Storage of Petroleum (6NYCRR Part 613).

New York State Standards for New and Substantially Modified Petroleum Storage Facilities (6NYCRR Part 614).

To Be Considered (TBC) Information

Executive Order 11990, Protection of Wetlands.

New York State Sediment Criteria (December 1989).

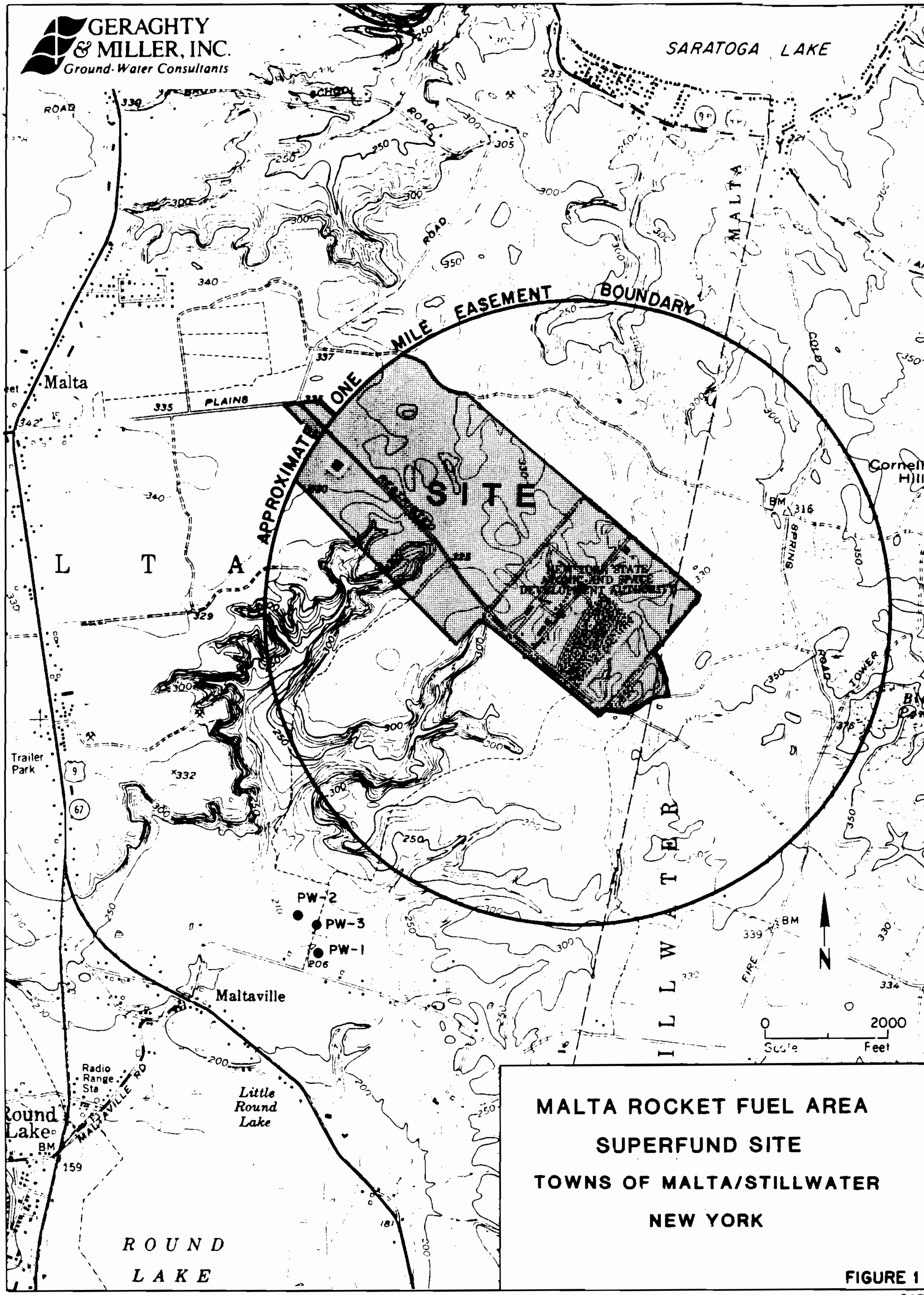
Table 9. (continued)

To Be Considered (TBC) Information

New York State Ambient Water Quality Standards and Guidance Values (NYTOGS Section 1.1.1).

Table 10. Contingency Plans for Potential Problems, Malta Rocket Fuel Area Site, Towns of Malta and Stillwater, Saratoga County, New York.

Potential Problem	Contingency Plan
Changes are made in program guidance.	Consult with EPA and incorporate appropriate new guidance into project deliverables.
Bad weather forces cancellation of scheduled sampling trip	Reschedule CLP space and coordinate with EPA.
Scheduled work does not delineate extent of existing contamination	Work with EPA to quickly scope alternative plan.
Soil gas survey is unreasonably estensive and does not delineate extent of existing contamination	Work with EPA to quickly scope alternative plan.
CLP data are received late	Work overtime when data are received to get back on schedule. Request preliminary data without review and do preliminary in-house QA/QC review. Adjust schedule if necessary.
Legal access or easements cannot be obtained.	Request assistance of EPA.
EPA deadlines move up	Accelerate schedule with overtime, additional staff, dual tracking of project elements, or a combination of the three.
Data gathered in the remedial investigation provide unexpected results (contamination) much better or worse than expected, more contaminants detected, drums discovered, etc.	Schedule immediate review of facts with EPA and develop work plan amendment to cover changed scope of work and schedule.
Delay in procurement of subcontractor	Accelerate schedule or extend deliverable schedule with overtime, additional drill rigs or select another bidder. Consult with EPA on schedule and adjustments.

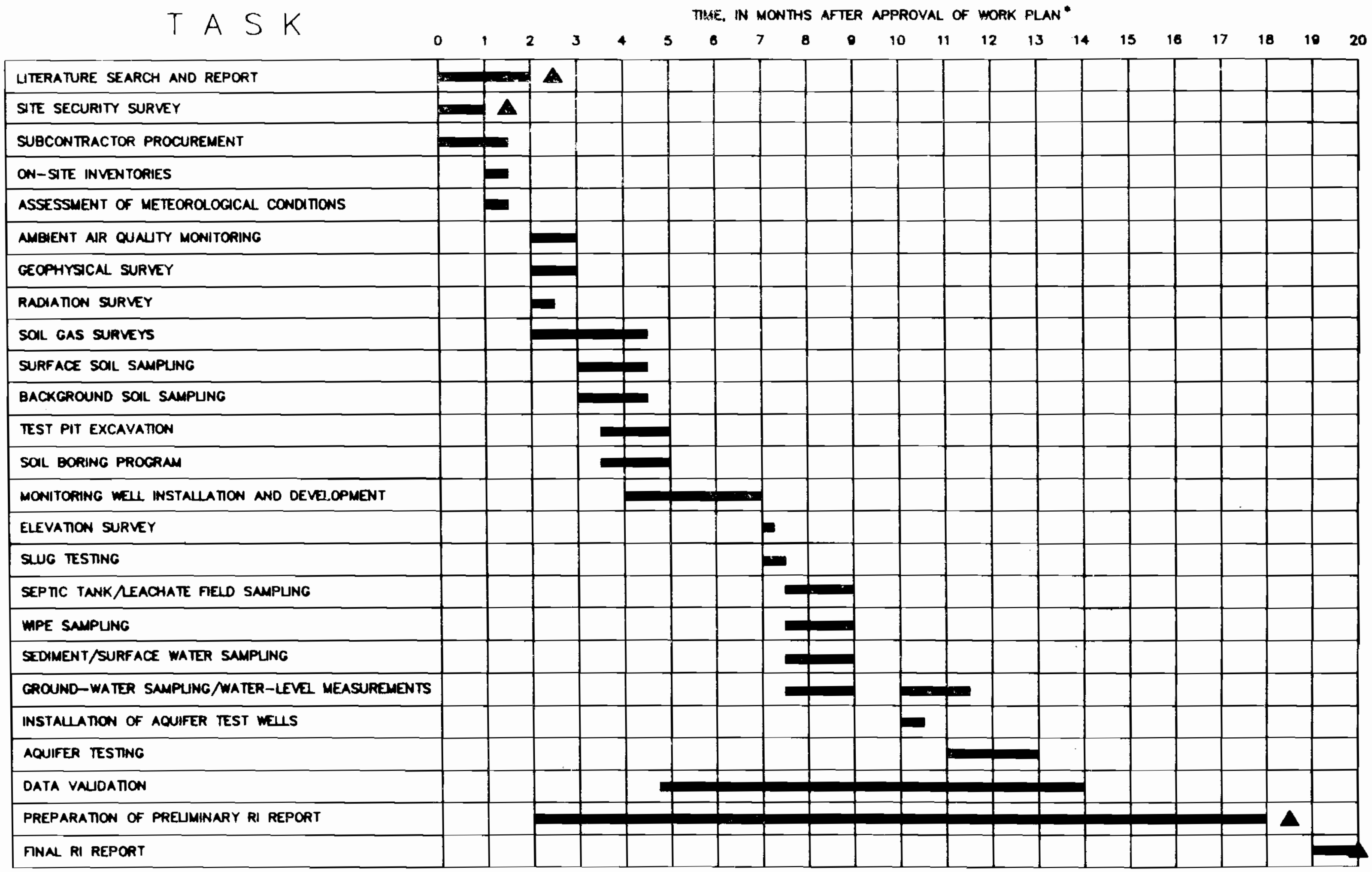


MALTA ROCKET FUEL AREA
SUPERFUND SITE
TOWNS OF MALTA/STILLWATER
NEW YORK

FIGURE 1

1208

DWG. DATE: 02DEC90 | PRJCT. NO.: NY04605 | FILE NO.: 990 | CAD FILE: INVST-S2 | CHECKED: L. VIGNONA | APPROVED: D. COLTON | DRAFTER: W.H. CICIO



* INCLUDES LABORATORY TURNAROUND TIME BUT DOES NOT SHOW TIME FOR AGENCY REVIEW

▲ DELIVERABLE

SCALE
TIME IN MONTHS AFTER APPROVAL

GERAGHTY & MILLER, INC.
Environmental Services

PROPOSED SCHEDULE OF REMEDIAL INVESTIGATION ACTIVITIES

MALTA ROCKET FUEL AREA
SUPERFUND SITE

FIGURE
6

Figure 7. Malta Rocket Fuel Area Project Organization

PROJECT OFFICER
Dennis Colton
Hydrogeologist

PROJECT MANAGER
Laine Vignona
Hydrogeologist

FIELD MANAGER
To Be Determined
Hydrogeologist

REMEDIAL INVESTIGATION TEAM

- Technical Specialists

Andrew J. Barber
Geochemistry, Health & Safety,
Quality Assurance/Quality Control

Laine Vignona
Hydrogeology

To Be Determined
Hydrogeology & Drilling Techniques

- Technical Staff

Thomas C. Eng
Health & Safety

To Be Determined
Sampling

To Be Determined
Sampling

Irene Vera
Field G.C. Operator

Gisella M. Spreizer
Statistics

James Rumbaugh
Computer Modeling

- Geraghty & Miller Risk Evaluation Group

- Geraghty & Miller Environmental Communications

Judith Miller

- Contractors
Drilling - To Be Determined
Laboratory - To Be Determined