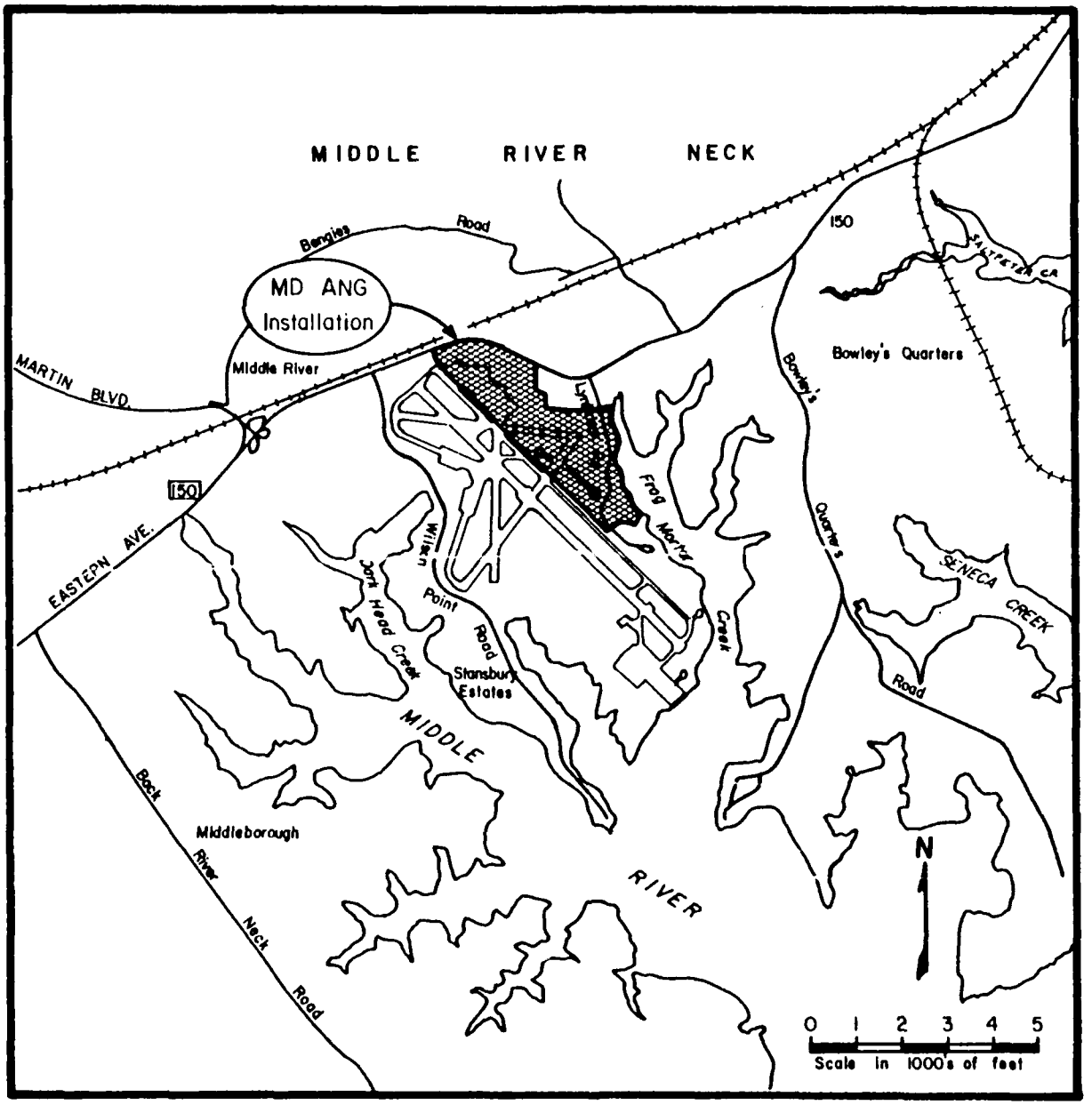
INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

Maryland Air National Guard Base
Martin State Airport
Baltimore, Maryland

HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
Operated by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-840R21400



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Maritn State Airport
Baltimore, Maryland

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Preliminary Assessment of suspected hazardous waste sites at the Maryland Air National Guard Base, Martin State Airport, Baltimore, Maryland. The study was conducted under the Air National Guard's Installation Restoration Program.

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PRELIMINARY ASSESSMENT

MARYLAND AIR NATIONAL GUARD
MARTIN STATE AIRPORT
BALTIMORE, MARYLAND

JULY 1988

PREPARED FOR:
NATIONAL GUARD BUREAU
WASHINGTON, D.C. 20310

PREPARED BY:
HAZWRAP SUPPORT CONTRACTOR OFFICE
OAK RIDGE, TENNESSEE 37831
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE DEPARTMENT OF ENERGY UNDER CONTRACT DE-AC05-87OR21642

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The Automated Sciences Group, Inc. (ASG) was retained in January 1988 to conduct The Installation Restoration Program (IRP) Preliminary Assessment of the Maryland Air National Guard (ANG), Martin State Airport, Baltimore, Maryland (hereinafter referred to as the Base), under contract No. DE-AC05-87OR21642. The Preliminary Assessment included the following:

- An onsite visit including interviews with 20 Base employees conducted by ASG personnel during 26-29 January 1988.
- The acquisition and analysis of pertinent information and records on industrial chemical usage and past waste generation and disposal at the Base.
- The acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies.
- The identification of sites on the Base which may be potentially contaminated with industrial chemical materials.
- Recommendations for follow-on activities.

B. Major Findings

The major operations of the ANG that have used and disposed of industrial chemical materials/wastes include aircraft maintenance; aerospace ground equipment (AGE) maintenance; ground vehicle maintenance; petroleum, oil, and lubricant (POL) management and distribution; and air weapons control. The operations involve such activities as corrosion control, nondestructive inspection (NDI), fuel cell maintenance, engine maintenance, hydraulics,

structural repair, and wheel and tire maintenance. Waste oils, recovered fuels, paint wastes, spent cleaners, acids, strippers, and solvents were generated by these activities.

Interviews with 20 installation personnel and a field survey resulted in the identification of fifteen disposal and/or spill sites at the Base. Sites 1-12 are potentially contaminated with industrial materials resulting from Air National Guard (ANG) operations. There was no evidence of any contamination from ANG operations present at sites 13-15. The following are the identified sites:

- Site No. 1 - Old Underground POL Storage Area
- Site No. 2 - Leaking Underground Storage Tank (Bldg 1080)
- Site No. 3 - Hazardous Waste Collection Area (Bldg 1060)
- Site No. 4 - Leaking Underground Storage Tank (Bldg 1100)
- Site No. 5 - Leaking Underground Storage Tank (Bldg 1120)
- Site No. 6 - Old Aircraft Wash Rack (Bldg 2040)
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- Site No. 9 - New Fire Training Area (Bldg 2070)
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- Site No. 12 - Gun Butts
- Site No. 13 - Vehicle Maintenance (Bldg 2110)
- Site No. 14 - Non-Potable Wells
- Site No. 15 - National Pollutant Discharge Elimination System (NPDES) Areas

Sites 1-12 were assigned a Hazard Assessment Score (HAS) utilizing the Air Force Hazard Assessment Rating Methodology (HARM). There was no visible evidence or analytical results of contamination present at Site No. 12. However, based on interviewee responses and past usage of the area, it was rated. No HARM ratings were assigned to sites 13-15.

Sites 1, 9, and 10 had been previously evaluated by Hazardous Materials Technical Center (HMTC) during the conduct of Phase I Records Search dated February 1986. HMTC also evaluated sites 13-15. Since no evidence of any contamination from ANG operations was present at these sites, it was their opinion that these sites did not require scoring under the HARM methodology.

C. Conclusions

Sites 1-12 were identified as potentially contaminated and are considered to have the potential for contaminant migration. There was no evidence of any contamination from ANG operations present at sites 13-15.

Site No. 1 - Old Underground POL Storage Area (HAS-70)

This site contained four 25,000 gallon Underground Storage Tanks (UST) which were installed in 1958 and removed in December 1986. The presence of noticeable odors, the results of soil sample analyses, and the shallow water table are the basis for the conclusion that this site represents a potential threat to local surface and ground water.

Site No. 2 - Leaking Heating Oil UST (HAS-76)

This tank was installed during the 1960s and was removed from service in late fall 1987 when leak test results (October 1987) indicated that fuel oil had leaked from the tank thereby representing a potential threat to ground water.

Site No. 3 - Hazardous Waste Collection Area (HAS-59)

The area to the west of Building 1060 was a major point for the collection of liquid waste materials for many years. Interviewee responses indicate that spillage occurred in the area thereby representing a potential threat to ground water.

Site No. 4 - Leaking Heating Oil UST (HAS-76)

This tank was installed during the 1960s and was removed from service in late fall 1987 when leak test results (October 1987) indicated that fuel oil had leaked from the tank thereby representing a potential threat to ground water.

Site No. 5 - Leaking Heating Oil UST (HAS-76)

This tank was installed during the 1960s and is still being used by Building 1100. Leak test results (October 1987) indicated that fuel oil has leaked from this tank thereby representing a potential threat to ground water.

Site No. 6 - Old Aircraft Wash Rack (HAS-58)

This area was used as an area to wash aircraft for many years. A variety of industrial cleaning materials was used. Runoff from this operation represents a potential threat to local surface and ground water.

Site No. 7 - Removed Underground MOGAS Tank (HAS-70)

In February 1987, a MOGAS tank was removed from the area north of Building 1140. Analyses of ground-water samples indicated the presence of volatile halocarbons and aromatics.

Site No. 8 - Motor Vehicle Wash Area (HAS-50)

Since 1980, the area northwest of Building 2110 has been used for motor vehicle washing. The wash water flows into a sand trap which feeds into an oil/water separator. The oil fraction flows into a holding tank while the oil-free water fraction flows into the sanitary sewer. Interviewee testimony indicates that the trap had overflowed on at least one occasion and that the overflow may have entered an open drainage ditch thereby representing a potential threat to local surface and ground water.

Site No. 9 - New Fire Training Area (HAS-63)

This site consisted of an unlined, earthen/graveled area used for fire fighting training from 1975 to 1979. Several drums of JP-4 and other flammables were burned during each fire training exercise. This site is being considered due to the possibility that a portion of the flammables remained to seep into the soil or to run off into surface drainage.

Site No. 10 - Old Fire Training Area (HAS-69)

This site consisted of an unlined, earthen/graveled area used for fire fighting training from 1957 to 1974. Several drums of JP-4 and other flammables were burned during each fire training exercise. This site is being considered due to the possibility that a portion of the flammables remained to seep into the soil or to run off into surface drainage.

Site No. 11 - Aboveground POL Storage Area (HAS-72)

This area was constructed in 1986 and consists of two 210,000 gallon above-ground JP-4 (jet fuel) storage tanks. Each tank area is enclosed within a structured containment area and contains a sump or catch basin for the collection of water and/or fuel spills. The basins flow into exterior catch basins which discharge into an oil/water separator.

During the early morning hours of 31 July 1987, an unauthorized fuel transfer operation caused a fuel spill at the JP-4 Fuel Storage Area. After fuel recovery operations, some of the JP-4 fuel was unaccounted for. Considering the results of shallow soil boring sample analyses, the observation of a sheen on a drainage ditch 200 feet downstream, the shallow water table, and the close proximity to the Chesapeake Bay, this site presents a high potential contamination threat to local surface and ground water.

Site No. 12 - Gun Butt (HAS-36)

The Gun Butt is a structure constructed by the previous tenant as an area for test firing weapons. The MD ANG utilized the area for test firing F-86 aircraft 50-caliber weapons which may pose potential threat of lead contamination to the local surface and ground water.

Site No. 13 - Vehicle Maintenance (No Rating)

Vehicle maintenance activities in Building 2110 involve the storage and distribution of MOGAS and diesel fuel. These fuels are stored in underground storage tanks. The motor pool also uses and disposes of

potentially hazardous wastes. There was no evidence indicating that any significant spill or disposal problems have ever been associated with the shops in this building. Therefore, no HARM rating is necessary.

Site No. 14 - Nonpotable Wells (No Rating)

There are two wells on Base. One is located behind the K.O. Building (Building 5045), and the other is near the munitions facility (Building 5100). These wells have been sampled and analyzed several times, and results have indicated levels of chlorobenzene that were present at or slightly above the detection limit. These wells are no longer utilized for drinking water but are used for process water for other activities at these locations. No direct source for the possible contamination has been determined. For this reason, this site has not received a HARM rating.

Site No. 15 - National Pollutant Discharge Elimination System (NPDES) Areas (No Rating)

The State of Maryland's Aviation Administration maintains a NPDES permit for waste stream discharges at the Martin State Airport. The Maryland Aviation Administration indicated that there are no problem discharge areas at Maryland ANGB. Therefore, no HARM rating of such areas is necessary.

D. Recommendations

Initial investigative stages of the IRP Site Investigation are recommended for Sites 1-12 which have been identified as potential hazardous waste and/or spill sites. At sites 13-15, no evidence of contaminating events as a result of ANG activities was found. Therefore, these sites do not warrant any further IRP action.

I. INTRODUCTION

A. Background

The 175th Tactical Fighter Group (TFG) and the 135th Tactical Airlift Group (TAG), Maryland Air National Guard (ANG) are located at the Martin State Airport, in Baltimore County Maryland (hereinafter referred to as the Base). The airport is a state owned facility situated 10 miles east of the City of Baltimore and has been used by the ANG since 1955. Over the years the types of military aircraft based and serviced there varied and included both piston and turbine powered aircraft. Both past and present operations have involved the use of potentially hazardous materials and the disposal of wastes. Because of the use of these materials and the disposal of the resultant wastes, the National Guard Bureau (NGB) has implemented its Installation Restoration Program (IRP).

The Department of Defense (DOD) Installation Restoration Program (IRP) is a comprehensive program designed to:

- Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on DOD installations, and

- Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

The operational activities of the IRP are currently defined and described as follow:

Preliminary Assessment (PA) - A records search designed to identify and evaluate past disposal and/or spill sites which might pose a potential and/or actual hazard to public health, welfare, or the environment.

Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - The Site Investigation consists of field activities designed to confirm the presence or absence of contamination at the sites identified as a result of

the PA. The Remedial Investigation consists of field activities designed to quantify the types and extent of contamination present, including migration pathways.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests are required which may necessitate the installation of monitoring wells or the collection and analysis of water, soil, and/or sediment samples. Careful documentation and quality control procedures, in accordance with CERCLA/SARA guidelines, ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contamination migration. The findings from these studies result in the selection of one or more of the following options:

- o No further action - Investigations do not indicate harmful levels of contamination and do not pose a significant threat to human health or the environment. The site does not warrant further IRP action and a Decision Document (DD) will be prepared to close out the site.

- o Long-term monitoring - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.

- o Feasibility Study - Investigations confirm the presence of contamination that may pose a threat to human health and/or the environment, and some form of remedial action is indicated. The Feasibility study is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action by the ANG with concurrence by state and/or federal regulatory agencies.

Remedial Design/Remedial Action (RD/RA) - The RD involves formulation and approval of the engineering designs required to implement the selected remedial action. The RA is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in-situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

Research and Development (R&D) - R&D activities are not always applicable for an IRP site, but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that can not be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

Immediate Action Alternatives - At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate actions, such as limiting access to the site, capping or removing contaminated soils and/or providing an alternate water supply may suffice as effective control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. Purpose

The purpose of this IRP Preliminary Assessment is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on the Base. The potential for the migration of contaminants is evaluated by visiting the Base, reviewing existing environmental information, analyzing Base records concerning the use and generation of potentially hazardous materials and/or wastes, and conducting interviews with past and present Base personnel who are familiar with past material management activities. Relevant information collected and analyzed as a part of the Records Search included the history of the Base, with special emphasis on the history of the shop operations and their past materials and/or waste management procedures; the local geological, hydrological, and meteorological conditions that may affect migration of contaminants; local land use, public utilities, and zoning requirements that affect the potential for exposure to contaminants; and the ecological settings (e.g., environmentally sensitive habitats, or evidence of environmental stress).

C. Scope

The scope of this Preliminary Assessment is limited to spills, leaks, or disposal procedures on the Base or on property for which the Air National Guard was the sole user, and includes:

- an onsite visit;
- the acquisition of pertinent information and records on past materials use and waste generation and disposal practices at the Base;
- the acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat, and utility data from various Federal, Maryland State, and local agencies;

- o a review and analysis of all information obtained;
- o the identification of possible contaminant sources, migration pathways, and receptors of said contaminants; and
- o the preparation of a report.

The onsite visit and interviews with past and present personnel were conducted during the period 26-29 January 1988. The ASG effort was conducted by the following individuals:

- o Mr. Richard J. Burtnett, Project Manager, Aerospace Safety Engineer;
- o Mr. David R. Styers, Chemist/Civil Engineer/Health Physicist;
- o Mr. Thomas Ward Dilworth, Geologist/Civil Engineer; and
- o Mr. Mick Wiest, Environmental Scientist

Resumes are included as Appendix A.

In addition, Mr. Tom Webb of PEER Associates was present during the initial stages of the assessment for the purpose of assisting ASG personnel in the scheduling and conduct of on base activities.

Individuals from the ANG who assisted in the preliminary assessment include:

- o Mr. Daniel P. Waltz, Project Officer, Hydrogeologist, ANGSC/DER;
- o LTC. Henry C. Shero, Base Civil Engineer;
- o CPT. Scott A. Kearby, Asst. Base Civil Engineer; and
- o M/SGT. Charles A. Smith, 175th TAC Clinic/SGPB;

and other selected members of the MD ANG. The Point of Contact at the Base was CPT. Scott A. Kearby, Assistant Base Civil Engineer.

D. Methodology

A flow chart of the IRP Preliminary Assessment Methodology is presented in Figure 1. This Preliminary Assessment Methodology, to the greatest extent possible, ensures a comprehensive collection and review of pertinent site specific information and is utilized in the identification and assessment of potential waste spill/disposal sites.

The Preliminary Assessment began with a site visit to the Base to identify all shop operations or activities on the installation that may have utilized potentially hazardous materials or generated potentially hazardous wastes. Next, an evaluation of past and present material and/or waste handling procedures at the identified locations was made to determine whether environmental contamination may have occurred. The evaluation of these past practices was facilitated by extensive interviews with 20 past and present ANG personnel familiar with the various operating procedures at the installation. These interviews were also utilized to define the areas on the Base where any waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

Historical records contained in the Base files were collected and reviewed to supplement the information obtained from interviews. Using the information outlined above, a list of past waste spill/disposal sites on the Base was compiled for further evaluation. A general survey tour of the identified spill/disposal sites, the Base, and the surrounding area was conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention was given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geological, hydrological, meteorological, developmental (land use and zoning), and environmental data for the area of study were also obtained

INSTALLATION
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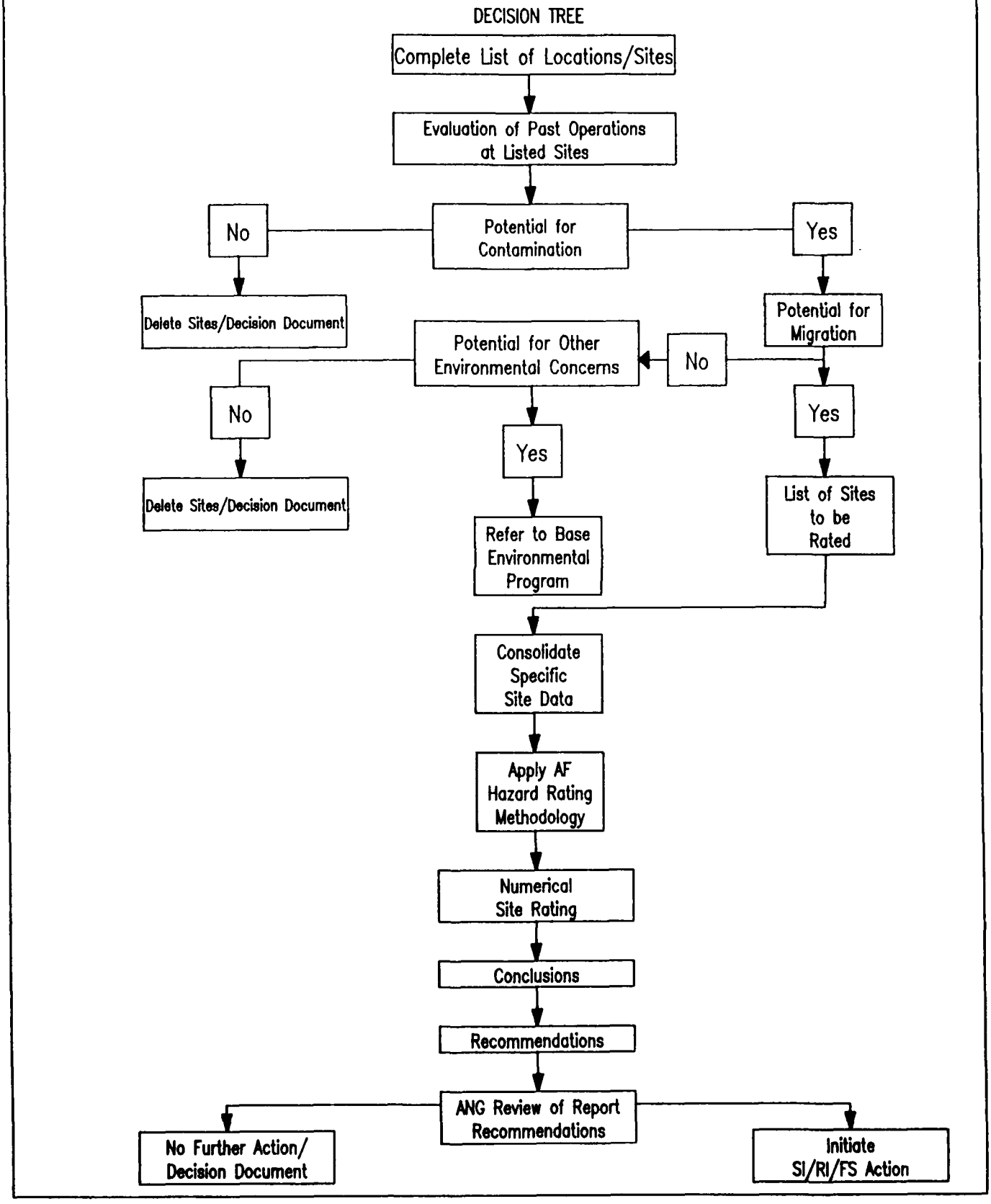
Figure 1
Methodology Flow Chart



from appropriate Federal, State, and local agencies as identified in Appendix B. This information was gathered in order to be used in the determination of possible receptors and migration pathways. Following a detailed analysis of all the information obtained, twelve of the fifteen sites were identified as potentially contaminated with materials resulting from ANG operations. The potential for contaminant migration exists at sites 1-12. There was no evidence of any contamination from ANG operations present at sites 13-15. Where sufficient information was available, sites were numerically scored utilizing the Air Force Hazard Assessment Rating Methodology (HARM). A description of HARM is presented in Appendix C. Copies of completed Hazardous Assessment Rating Forms are found in Appendix D. Follow-up investigations have been recommended for sites 1-12. No further IRP action is recommended for sites 13-15.

II. INSTALLATION DESCRIPTION

A. Location

The 175th TFG and the 135th TAG are located at the Martin State Airport, approximately 10 miles east of the center of the City of Baltimore, Maryland, in Baltimore County (see Figure 2 for site location and Figure 3 for the immediate surrounding area). The Base occupies 175 acres in the northern portion of the airport complex. Figure 4 displays the Air National Guard property studied for this Preliminary Assessment.

B. Organization and History

The Maryland ANG's 175th TFG was activated in August 1946, as the 104th Tactical Fighter Squadron. It was equipped with P-47 aircraft and located at Harbor Field, Baltimore, Maryland. During the 1953-55 time period, it was equipped with F-86 aircraft with the unit's location split between Friendship Airport and Harbor Field Airport, Baltimore, Maryland. In June 1955, it moved to the Base. The first aircraft to be stationed at the Base was the F-86. In October 1962, the 104th was reorganized and redesignated the 175th TFG. In January 1970, the 175th converted to the A-37 aircraft and in October 1979, converted to the A-10 aircraft which it presently operates.

The 135th TAG was activated in September 1955, as the 135th Air Resupply Group. It was equipped with HU-16 aircraft and based at Harbor Field, Baltimore, Maryland. On 1 April 1960, the unit was transferred to a site southwest of the Base at the Martin State Airport. The group underwent a number of missions and equipment changes during the period to 1 April 1977. At that time, the group was reorganized and designated the 135th TAG and equipped with C-7 aircraft. On 1 October 1980, the group converted to C-130 aircraft which it presently operates and in June 1981, moved to its present facilities on the Base.

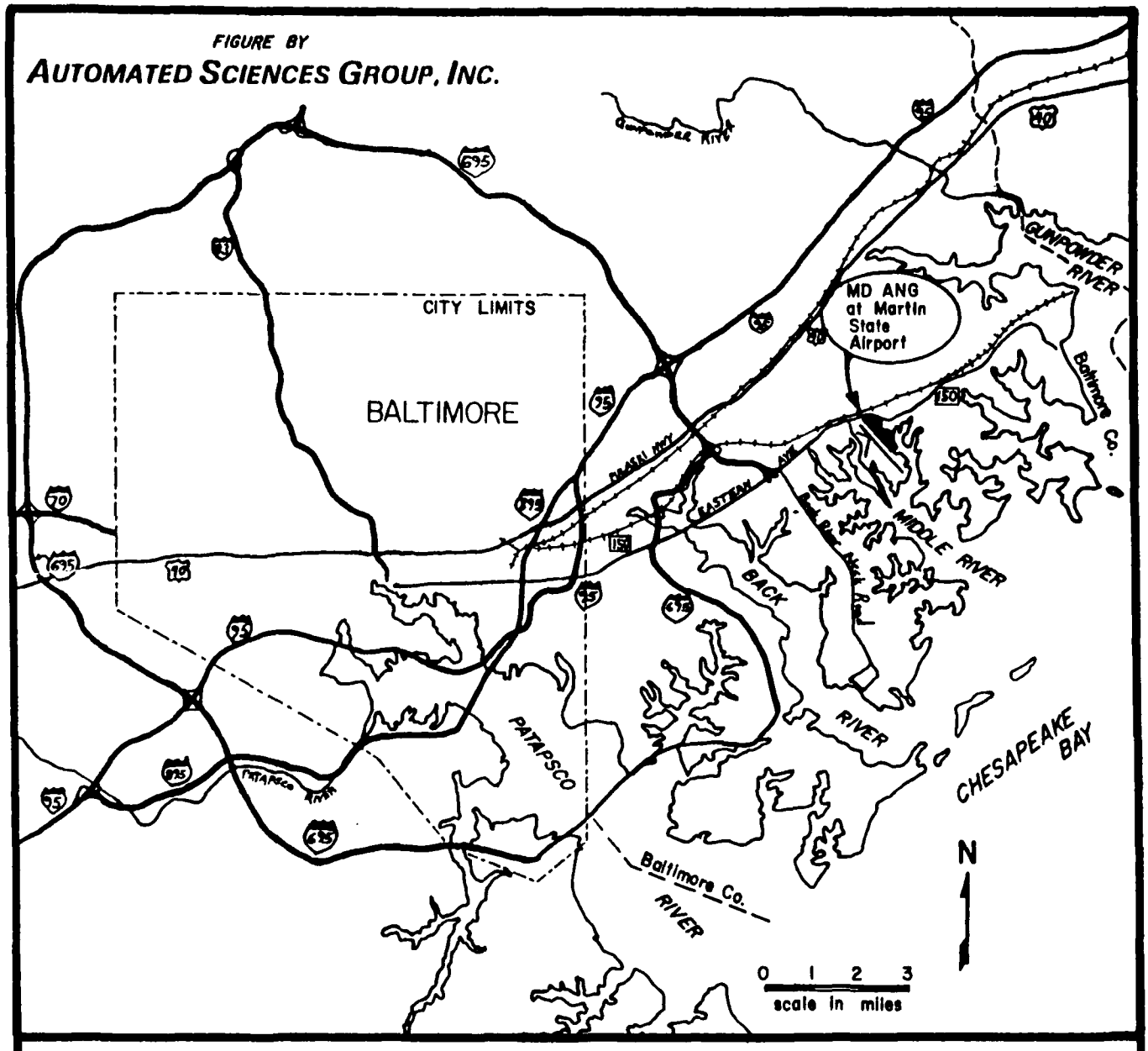


Figure 2. Site Location Map of Maryland Air National Guard, Martin State Airport, and Baltimore, MD.

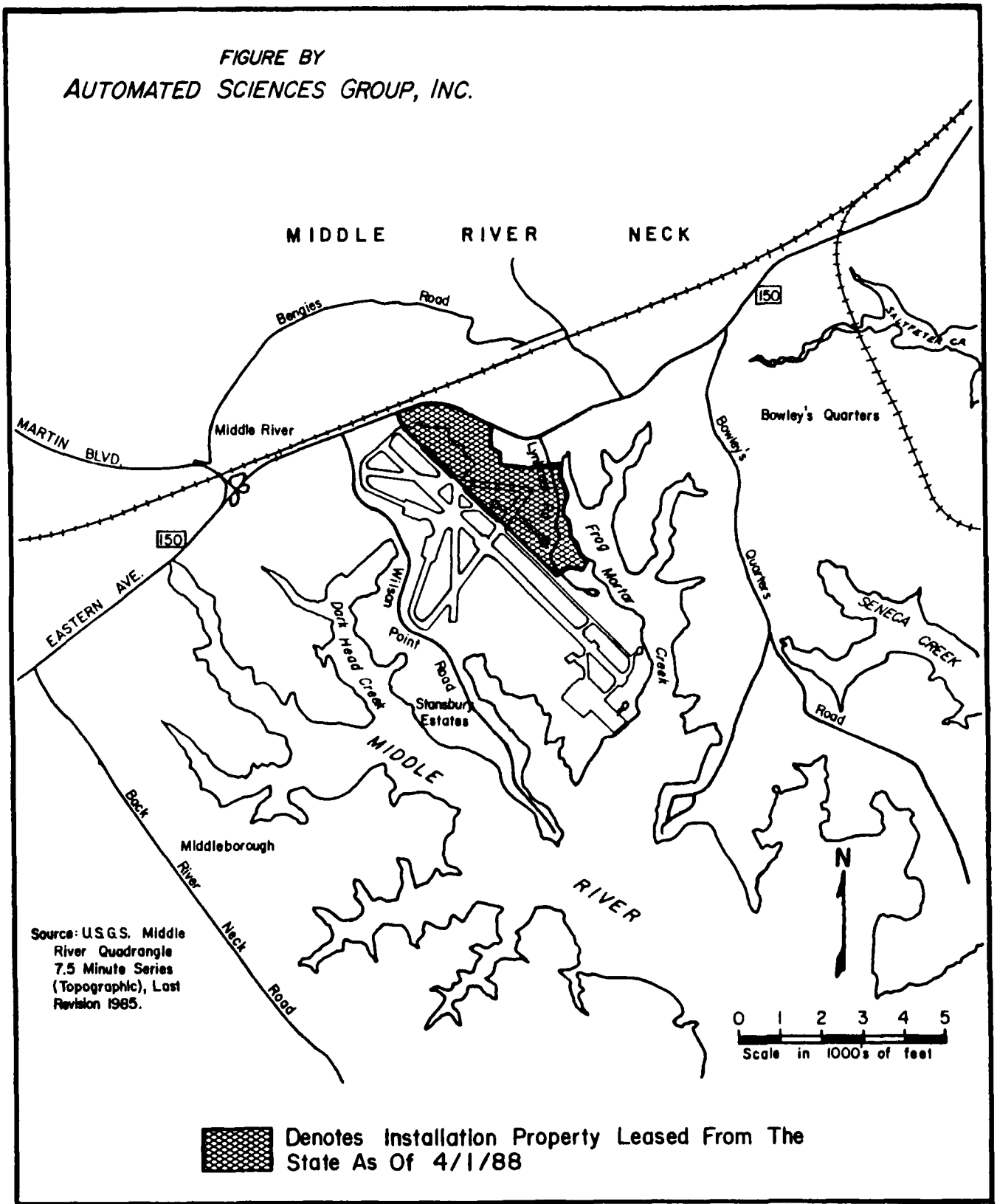


Figure 3. MD ANG Installation and Immediate Surrounding Area.

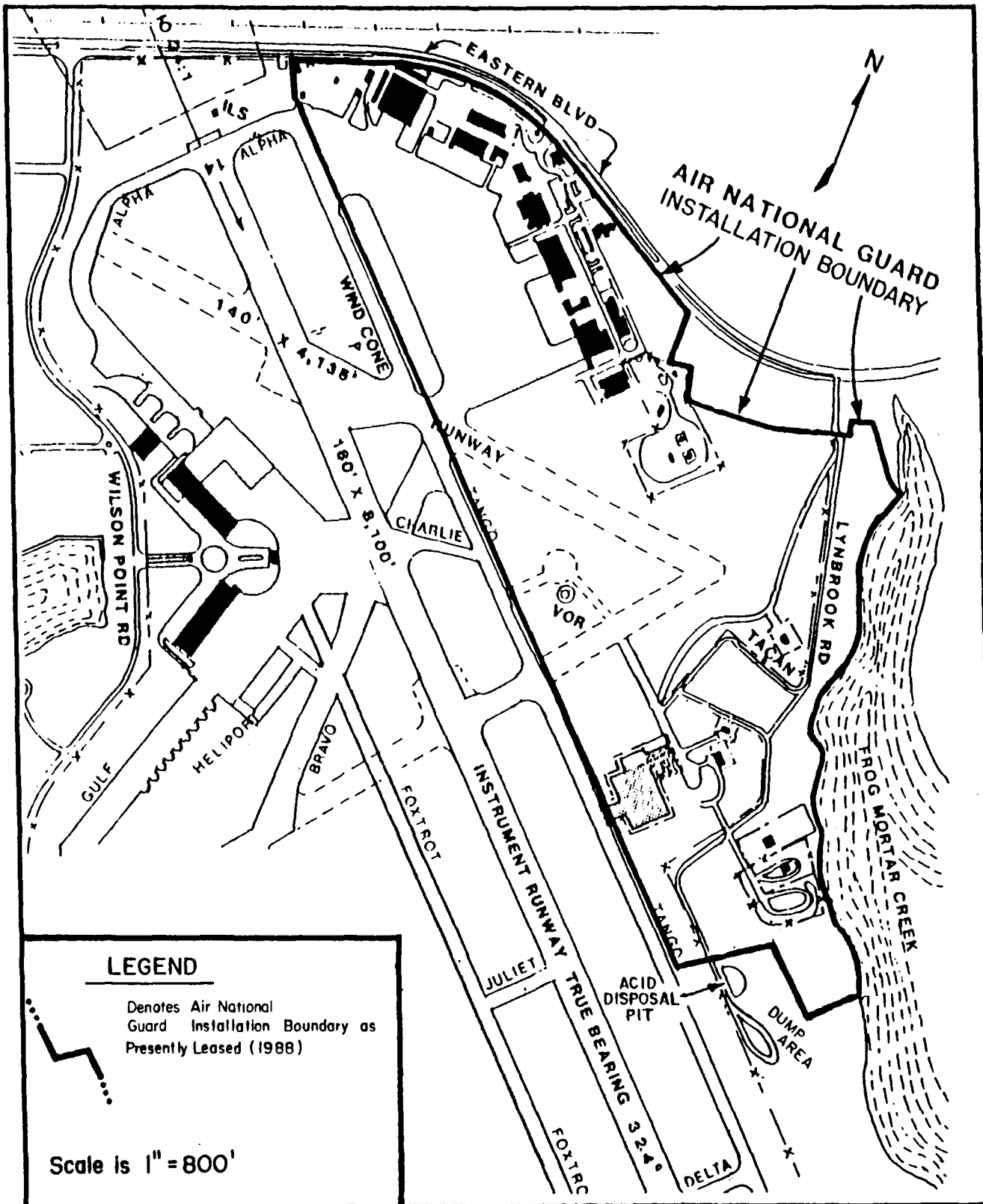


Figure 4. Installation Boundary Map

Source: ANG 175th C.E. Flight, Martin Airport - ANG Baltimore, MD BASE PLAN, 1 August 85

III. ENVIRONMENTAL SETTING

A. Meteorology

Annual precipitation amounts can vary by several inches in the Baltimore area. This is probably due to the moderating effects induced by the Chesapeake Bay. The following list of annual precipitations reveals such differences:

- o Baltimore-Washington International Airport, located approximately 8 miles southwest of downtown Baltimore, reports an annual average of 41.84 inches;
- o Baltimore City reports 43.39 inches;
- o Towson, located approximately 5 miles north of downtown Baltimore, reports 46.71 inches; and
- o Chestertown, located approximately 25 miles east of Baltimore, across the Bay on Delmarva Peninsula, reports 43.94 inches.

Since the MD ANG Base at Middle River is situated so close to the bay, it is likely that it receives rainfall amounts similar to Baltimore City which is also on the bay. A good working value would therefore be 43.5 inches annually. The calculation of net precipitation was carried out according to the method outlined in the Federal Register (47 FR 31224, 16 July 1982) and resulted in a value of 7.5 inches per year. Rainfall intensity based on the 1 year, 24 hour rainfall (47 FR31235, 16 July 1982, Figure 8) is 2.7 inches.

B. Geology

The Middle River area of Baltimore County is situated on the unconsolidated to semiconsolidated Potomac Group sediments of lower Cretaceous age. These sedimentary deposits are composed of clay, silt, sand, and gravel due to the differing environments that formed them, and are divided into three major formations: the Patapsco, the Arundel, and the Patuxent (listed in order of

increasing age). These lower Cretaceous sediment beds overlie Precambrian and/or Paleozoic basement rocks comprised of gneiss, schist, and gabbro located at depths of from 300 to 375 feet beneath the MD ANG Base.

The Patuxent formation is the lowest lying bed. It outcrops parallel to the Fall Line, generally dipping towards the southeast at approximately 80 feet per mile. Its thickness ranges from 50 to 250 feet but with a gradual increase in thickness occurring towards the dip direction. The top of the Patuxent formation ranges from 200 feet below sea level at the northwest corner of the MD ANG site to about 250 feet below sea level at the southeast end of the site. The lithology of the Patuxent is typified by sand and gravel interbedded with discontinuous lenses of clay silt. The sand and gravel are mostly composed of quartz. The bed exhibits an overall upward gradation change with the coarser gravel and sand in the basal portion, while the upper portions are composed of finer sands and silty clay.

The Arundel formation overlies the Patuxent and ranges from 25 to 200 feet thick, becoming thicker towards the southeast dip direction. Indirect evidence suggests that the Arundel is approximately 100 to 150 feet thick where it underlies the Base. The typical Arundel lithology is clay with interbedded lenses of silty clay where the predominant mineral constituents are illite and kaolinite. Lignitic material is also common.

The Patapsco formation is the uppermost sediment bed underlying the site. It too dips towards the southeast at approximately 80 feet per mile. The range of thickness for this formation can be from 0 to 200 feet thick with thickening of the bed generally occurring down dip towards the southeast. The thickness of the Patapsco underneath the Base appears to extend from near ground surface to a depth of 100 to 140 feet, being more shallow at the northwest end of the Base. The lithology of the Patapsco is composed of interbedded sand, silts, and clays with the major minerals being quartz, illite, and kaolinite.

A well, drilled about 1.5 miles south of the MD ANG Base, indicated that the Patapsco occurred from ground surface to 101 feet below the surface, the Arundel occurred from 101 to 220 feet, and the Patuxent occurred from 220 to probably 350 feet. All measurements were taken from ground surface (Bennett and Meyer, pp. 389-90, also Plate 5). The generalized well log for this well is shown in Table 1.

The soils of the MD ANG Base are mainly represented by the soil type Mattapex-Urban land complex but with two small parcels listed as Woodstown loam and one small parcel listed as man made land (probably generated from dredging in the surrounding waterways). Locations of the different soil types on Base property can be found in Figure 5, Soil Map and Surface Water Drainage Patterns. The following soil descriptions were derived from Soil Survey, Baltimore County, Maryland (1976).

- Mattapex - Urban land complex: Consists of soils of the Mattapex series that have been cut, filled, graded, or otherwise reworked for non-farm uses. The Mattapex series itself consists of deep, moderately well-drained, level to gently sloping soils of the uplands of the Coastal Plain. These soils were apparently formed from older deposits of silty material which had been underlain by coarser sediments. The MD ANG Base appears to have been graded in most areas. Permeability is often moderately slow. These soils are usually strongly to very strongly acid and have a high available moisture capacity.

- Woodstown loam: The Woodstown series consists of deep, moderately well-drained, level to gently sloping soils on the uplands of the Coastal Plain. The parent materials were probably unconsolidated sediments composed mostly of sand but with some silts and clays. The loam specified here tends to contain more silt and less sand than the basic series. This soil tends to be well suited to cultivated crops, pasture, and trees; however, artificial drainage is usually needed for most crops. Permeability is moderate. Soils are very strongly acid to extremely acid.

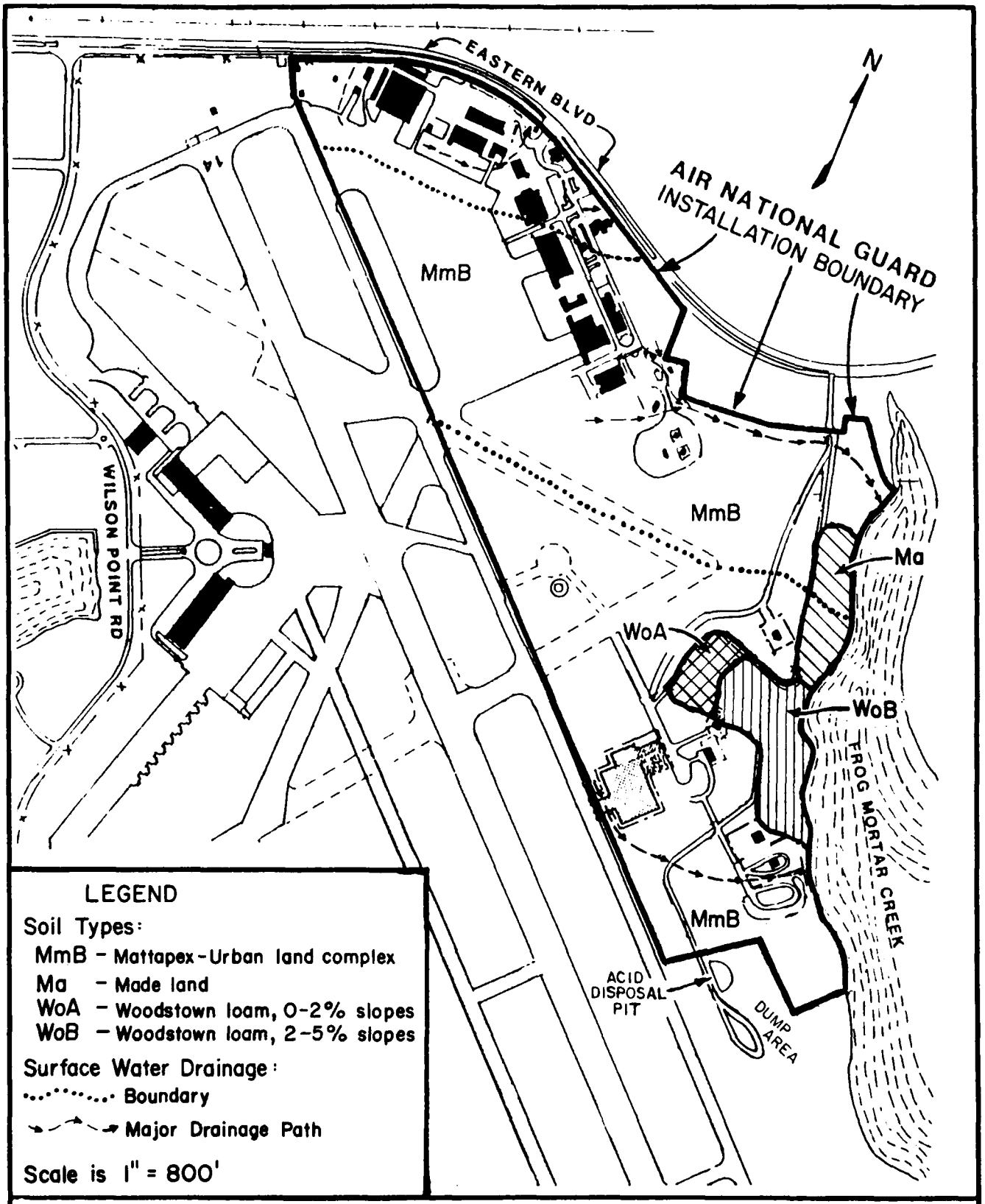


Figure 5. Soils Map and Surface Water Drainage Patterns

Source: ANG 175th C. E. Flight, Martin Airport - ANG Baltimore, MD BASE PLAN, 1 August 85

GENERALIZED WELL LOG FOR WELL Bal Ff 20

FORMATION	THICKNESS (feet)	DEPTH BELOW SURFACE (feet)
Patapsco Formation		
Clay, red	15	15
Sand, coarse	7	22
Clay, red	36	58
Sandstone	3	61
Sand , fine	3	64
Clay, red	6	70
Sand, coarse	4	74
Clay, red	6	80
Sand, fine	4	84
Clay, red	10	94
Sand, fine	6	100
Sandstone, very hard	1	101
Arundel Formation		
Clay, red	119	220
Patuxent Formation		
Sandstone	1	221
Sand, coarse	3	224

Crystalline bedrock would probably be encountered at 350 feet depth from surface.

Elevation at the well site was recorded as 10 feet above sea level.

Table 1 Generalized well log of nearby well showing typical stratigraphy underneath MD ANG Base. Taken from Bennett and Meyer, 1952, pp. 389-90, also Plate 5.

C. Hydrology

A discussion of the hydrology at the Base is necessary in order to provide a framework for the possible pathways along which contaminants could travel. This subject is divided into two parts, surface water and ground water. This information is intended to be an aid in conceptualizing a pathways model to be used in the determination of possible waste migration.

Another purpose for considering the Base hydrology is to assist in the determination of the possible reception of any contamination that could migrate along existing pathways.

1. Surface Water

Flood data for the Base are illustrated on the Flood Insurance Rate Map (FIRM) of Baltimore County. This map was generated by the National Flood Insurance Program and was obtained from the Baltimore County zoning office in Towson, Maryland. It indicates that the Base does not lie in a flood plain associated with a 100 year flood.

The Base is basically bounded by water on three sides; directly on only one. The drainage on the Base can be divided into three areas. Figure 5, Soils Map and Surface Water Drainage Patterns, shows the boundaries between these areas as well as major paths of drainage. The older portion of the Base facilities feeds into drainage ditches and underground storm sewers which empty into the open drainage ditch along the south side of Eastern Boulevard. This ditch travels less than a mile to its discharge point into Frog Mortar Creek. The new facilities, including most of the Aircraft parking ramp, drain into ditches and underground drains which discharge into the large drainage ditch that runs from just north of the new POL storage facility east into Frog Mortar Creek. The drainage in and around the containment for the new POL facility also discharges into this large drainage ditch. However, drainage from the POL interior containment and runoff from the C-130 aircraft parking ramp passes through an oil/water separator first. The third surface drainage pathway covers the rest of the

Base. This involves the area south and east of the new POL facility and extends to the southernmost boundary of the newly acquired property around the munitions facilities.

The Maryland State Department of Environmental Protection, Department of Natural Resources, has restricted shellfish harvesting in these waterways. Fecal coliform levels have sometimes been slightly elevated particularly after a moderate rainfall drains into the waterways. The cause for this is most likely due to population increases and changing land use.

2. Ground Water

Ground-water supplies in the Baltimore area are mostly obtained from two separate aquifers, the Patuxent and the Patapsco formations. While the Patuxent is the major aquifer utilized, especially in Baltimore city itself, the Patapsco becomes more commonly used east and northeast of the city (e.g., the Middle River Area where the MD ANG Base is located).

The Patuxent formation crops out in a band running alongside the Fall Line and dips southeast towards the Chesapeake Bay. The underlying crystalline basement rocks tend to be relatively impermeable, as compared to the Patuxent, and serve as a lower confining unit. The Arundel clay overlies the Patuxent and serves as the upper confining unit with permeabilities estimated from 10^{-9} to 10^{-11} feet per second. The Patapsco formation overlies the Arundel and is generally unconfined in much of the Baltimore area, including the MD ANG Base. However, some areas of compacted fill may affect the behavior of the underlying water table. Earthworking activities usually alter the structure, porosity, and permeability of the reworked soils; this is particularly true when soils are compacted. The construction activities that have occurred on the Base have produced localized lenses of less permeable, tightly packed soil fill upon which the buildings rest. The presence of these lenses may alter the immediate soil permeability and therefore may locally depress the water table immediately beneath such lenses of compacted fill.

The Patuxent aquifer is recharged directly by rainfall in its outcrop area. The net precipitation that actually percolates into the aquifer averages about one to three inches per year. Some recharge to or discharge from the Patuxent may occur through the Arundel if there is a significant difference in the hydraulic heads of the Patuxent relative to the Patapsco. Some Pleistocene erosional channels may have breached the Arundel clay in places (as has happened in the harbor area of Baltimore City) allowing for transfer of ground water between the Patapsco and the Patuxent.

The hydrologic boundaries of the Patuxent generally coincide with its local recharge and discharge areas. The discharge occurs for the most part beneath the Chesapeake Bay with only a small component passing under the Bay to the Delmarva Peninsula. The Patapsco discharges directly into the Chesapeake Bay.

These two aquifers have been heavily pumped for industrial purposes over the last 100 years which has resulted in brackish water intrusion of the Patapsco. Most of the pumping from the Patapsco in the heavily industrialized area of Baltimore was abandoned throughout the period of the late 1940's and through the 1950's which has allowed the water levels in the Patapsco to return to near normal prepumping levels. Although the Patuxent is well protected from brackish water intrusion in most areas, the breaching of the Arundel clay in the harbor near the Canton and Fairfield districts, combined with the heavy industrial pumping, has induced a brackish water plume approximately four miles in diameter. This plume remains a major water quality problem in the harbor area.

Despite the consequences of over-pumping mentioned in the previous paragraph, the ground-water quality in the Middle River area remains relatively uncontaminated. Turbidity is probably one of the major complaints reported in some Patapsco wells. The majority of the wells in the area around the Base tap the Patapsco. These wells vary greatly in depth depending on the location of water-bearing lenses of coarser

sediments. There are probably between 15 to 20 wells within a one mile radius of the Base. Most of these are domestic wells. Municipal water is now supplied to this area. Although they represent possible receptors of contaminated ground water, many of these wells are probably no longer used for drinking water.

Although the direction of ground-water flow has not been directly observed at the Base, it can be assumed that the surficial (water-table) aquifer will tend to flow away from topographic rises and toward open water. Actual field determination of site specific ground-water gradients is not within the scope of this Preliminary Assessment. Such a determination would take place during the next IRP activity.

D. Background Levels

The amount of useful information concerning the geochemical background levels in the local soil and groundwater was fair to satisfactory. The Maryland Geological Survey's "Report of Investigations No. 43" includes a section on ground-water geochemistry of the lower Cretaceous aquifers. However, the closest sampled well that taps the surficial Patapsco Aquifer is located approximately 6.5 miles southwest of the Base. This well is identified as U.S.G.S Well No. Fe 68 with state permit No. BA-73-6533 and is located near the Dundalk district. Since this is the closest sampling location to the Base, it represents the best estimate, from available data, of the Patapsco geochemistry around the Base. The sample data are listed below. The samples were taken 26 July 1982.

Major dissolved constituents and nutrients:

- Silica - 7.0 milligrams per liter (mg/L) as SiO_2
- Oxygen - <0.2 mg/L
- Iron - 75 micrograms per liter (ug/L) as Fe
- Calcium - 0.5 mg/L as Ca
- Magnesium - 0.3 mg/L as Mg

- Sodium - 1.6 mg/L as Na
- Potassium - 0.2 mg/L as K
- Alkalinity, field - 5.0 mg/L as $CaCO_3$
- Sulfate - 1.0 mg/L as SO_4
- Chloride - 1.7 mg/L as Cl
- Fluoride - <0.1 mg/L as F
- Solids, residue at 180°C - 18 mg/L
- Hardness - 3 mg/L as $CaCO_3$
- Specific conductance - 20 micromhos (umhos) @ 25°C
- pH - 5.4 units
- Temperature - 15°C

There were no data for dissolved nitrates, nitrogen (ammonia and organics), total nitrogen, or dissolved hydrogen sulfide.

Minor and trace dissolved constituents:

- Chromium - <1 ug/L as Cr
- Total Organic Carbon - 0.4 ug/L as C
- Arsenic - <1 ug/L as As
- Barium - 10 ug/L as Ba
- Beryllium - <1 ug/L as Be
- Boron - <10 ug/L as B
- Cadmium - <1 ug/L as Cd
- Cobalt - 4 ug/L as Co
- Copper - 9 ug/L as Cu
- Lead - 3 ug/L as Pb
- Manganese - 7 ug/L as Mn
- Molybdenum - <1 ug/L as Mo
- Nickel - 3 ug/L as Ni
- Silver - <1 ug/L as Ag
- Strontium - 2 ug/L as Sr
- Zinc - 94 ug/L as Zn
- Antimony - <1 ug/L as Sb
- Lithium - <4 ug/L as Li

There were no data on dissolved organic compounds in any nearby Patapsco wells. The closest wells with such data are over 10 miles west of the Base in the industrial area of Baltimore. These wells generally contain <1 ug/L of all the organic compounds of concern. When one of these wells does show a noticeable concentration of some compound, it appears to be isolated and does not occur in other wells in the industrial area. These isolated concentrations indicate that there are no organic compounds of concern that contribute to the normal background concentrations found near the Base.

Another source of background data comes from a control sample of soil taken on the Base property. This control sample was taken on or before 13 December 1986 along with four other soil samples. The control sample was taken at a depth of approximately 1-2 feet from the surface in a grassy area between buildings 1040 and 1050. The purpose for taking these samples was to investigate the suspicion of jet fuel contamination at the old POL storage and operating facility. These samples were sent to the USAF Occupational and Environmental Health Laboratory (OEHL) at Brooks Air Force Base, Texas, where a bioassay was performed on them from 7 - 9 January 1987. This bioassay consisted of aquatic toxicity tests which utilize minnows as target organisms. The tests were run for 72 hours with the surviving minnow population being recorded at 24 hour intervals. In addition to the aquatic toxicity tests, OEHL tested the samples for the EP Toxicity test, the Corrositivity test, and the Ignitability test. The control sample was found to be non-toxic to aquatic organisms, and it passed the other tests mentioned above. The control sample should exhibit the background level of soil and ground-water constituents. The following is a partial list of the control sample results.

- Arsenic - <0.01 mg/L
- Barium - <1.0 mg/L
- Cadmium - <0.01 mg/L
- Chromium - <0.05 mg/L
- Lead - 0.19 mg/L

- Mercury - <0.001 mg/L
- Selenium - <0.01 mg/L
- Silver - <0.01 mg/L
- pH - 6.0

There are two wells on Base. One is located behind the K.O. Building (Building 5045), the other is near the munitions facility (Building 5100).

These wells have been sampled and analyzed several times. The results have indicated levels of chlorobenzene that were present at or slightly above the detection limit of 0.2 ug/L. These wells are no longer utilized for drinking water but are used for process water for other activities at these locations despite the fact that the levels of chlorobenzene have always been below the acceptable limits for drinking water. The discontinuation of its use as drinking water was a precautionary step taken by the Base Bioenvironmental Engineering Technician.

Field soil resistivity measurements were taken in the area of the new POL facility on 3 August 1982. This survey was performed to provide soil resistance values to be used for designing corrosion control, grounding, or cathodic protection systems for the planned new POL facility. The test results seemed to be fairly consistent with a range of between 7,000 and 13,000 ohms per centimeter (Ohm/cm). Most of the test results trended towards the high end of this range.

Soil profiles at depth were determined for the initial Base construction activities which occurred in 1956-57. The areas covered by this survey included the older section of the Base, apron, and the extension of the main runway. The soils were classified using the Unified Soil Classification System (USCS). The soil profile data may be found on the Base records of the Master Soil Plan and Profile sheets 20 and 21 out of 29, dated 12 March 1956.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with past and present Base employees resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and wastes are generated. Table 2 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal methods for these wastes. If an operation is not listed in Table 2, then that operation has been determined on a best-estimate basis to produce negligible quantities of wastes ultimately requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with 20 installation personnel who had an average of 25 years tenure at the Base and subsequent site inspections resulted in the identification of 15 potentially contaminated waste disposal/spill sites. It was determined that sites 1-12 are potentially contaminated with materials resulting from ANG operations. No evidence of contamination from ANG operations was found for sites 13-15. If contaminants are found to be present at a site, there would be a potential for migration. Sites 1-12 were scored using HARM (Appendix C) and recommended for further evaluation. Figure 6 illustrates the locations of the potential sites. Site 15 is located off of Base property at the east end of the outfall channel. Copies of the completed Hazardous Assessment Rating Forms are found in Appendix D. Also included in Appendix D is a summary and explanation of the factor rating criteria used to score the sites. Table 3 summarizes the Hazard Assessment Score (HAS) for each of the scored sites. Sites 13-15 were not given HARM scores.

As mentioned, there is a potential for contaminant migration at each of the HARM scored sites. The migration pathway of primary concern is the groundwater route, and the most likely potential human receptors are owners of

Table 2. Hazardous Waste Disposal Summary: Maryland Air National Guard, Martin State Airport, Baltimore, Maryland

SHOP NAME	LOCATION (Bldg No.)	WASTE MATERIAL	CURRENT WASTE QUANTITY* Gal./Yr	METHODS OF TREATMENT, STORAGE, AND/OR DISPOSAL 1957	1980	1988
Aircraft Maintenance	1070 2050 1105	Deicer Aircraft Cleaning Compound	990 19	STRM SEWER		
Aerospace Ground Equipment Maintenance	1060 1130	Hydraulic Oil PD-680 Battery Acid Aircraft Cleaner	1275 385 32 2	CONTR CONTR/FTA NEUTR/SAN SEWER CONTR	DRMO DRMO	DRMO DRMO
Vehicle Maintenance (Motor Pool)	2110	Engine Oil Battery Acid PD 680 Aircraft Cleaning Compound	1050 16 110 55	CONTR/FTA NEUTR/SAN SEWER CONTR SAN SEWER/NEURT	DRMO	DRMO
Fuels Management (1) Liquid Fuels	3000	JP-4	1800	FTA/CONTR	DRMO	DRMO
Non Destructive Inspection (NDI) (1) Oil Analysis Lab	2050	1,1,1 - Trichloroethane	79	CONTR	DRMO	DRMO

KEY: STRM SEW - Drained to Storm Sewer
SAN SEWER - Drained to Sanitary Sewer
NEUTR - Neutralized and Drained to Storm Sewer
FTA - Fire Training Activities
DRMO - Disposed of by Defense Reutilization and Marketing Office
CONTR - Disposed of by Contractor

* This quantity may or may not reflect past practices.

Table 2. (Cont.) Hazardous Waste Disposal Summary: Maryland Air National Guard, Martin State Airport, Baltimore, Maryland

SHOP NAME	LOCATION (Bldg No.)	WASTE MATERIAL	CURRENT WASTE QUANTITY* Gal./Yr	METHODS OF TREATMENT, STORAGE, AND/OR DISPOSAL 1957	1980	1988
Corrosion Control	1130	Solvents/PD-680	55			
		Thinner	110			
		Paint Stripper	275	CONTR/FTA		DRMO
		Varsol	75			
		Cleaning Compound	220	STRM SEWER		
Paint Shops	1130	Solvents/Thinners	385	CONTR/FTA		DRMO
Photo Lab	1070	Fixer	12	SAN SEWER		
Propulsion Shop	3010	7808 Oil	155			
		Hydraulic Oil	575			
		Engine Oil	630	CONTR/FTA		DRMO
		Cleaning Compounds (Gas Path)	115	STRM SEWER		
		Aircraft Cleaning Compound	55	STRM SEWER		

KEY: STRM SEW - Drained to Storm Sewer
SAN SEWER - Drained to Sanitary Sewer
NEUTR - Neutralized and Drained to Storm Sewer
FTA - Fire Training Activities
DRMO - Disposed of by Defense Reutilization and Marketing Office
CONTR - Disposed of by Contractor

* This quantity may or may not reflect past practices.

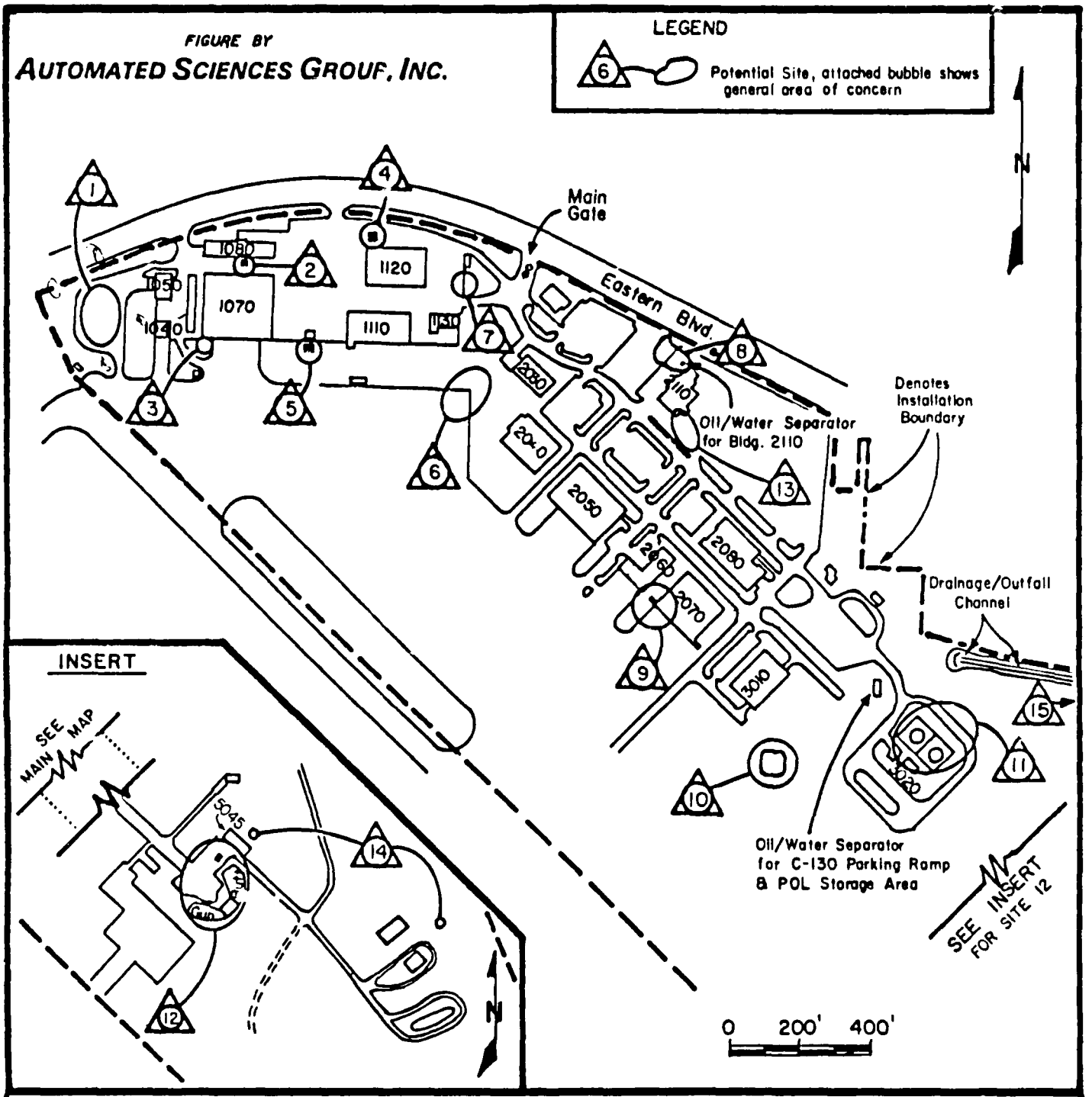


Figure 6. Locations of Potential Sites at Maryland Air National Guard Base , Martin State Airport.

Table 3. Site Hazard Assessment Scores (as derived from HARM): Maryland Air National Guard, Martin State Airport, Baltimore, Maryland

Site Priority	Site No.	Site Description	Receptor	Waste Character-istics	Pathway	Waste Mgmt. Practices	Overall Score
1	2	No.2 Heating Oil Storage Tank (1080)	55	72	100	1.0	76
2	4	No.2 Heating Oil Storage Tank (1120)	55	72	100	1.0	76
3	5	No.2 Heating Oil Storage Tank (1110)	55	72	100	1.0	76
4	11	Aboveground POL Storage Tanks	57	90	80	0.95	72
5	1	Old POL Underground Storage Area	55	54	100	1.0	70
6	7	Removed Undergrond MOGAS Storage Tank	55	54	100	1.0	70
7	10	Old Fire Training Area (FTA)	57	90	60	1.0	69
8	9	Newer Fire Training Area (FTA)	57	72	60	1.0	63
9	3	Hazardous Waste Collection Area (1060)	55	60	61	1.0	59
10	6	Aircraft Wash Area	55	60	60	1.0	58
11	8	Motor Pool Wash Rack	57	27	65	1.0	50
12	12	Gun Butt	55	10	49	0.95	36

residential wells near the Base. The nearest of these wells is approximately 0.5 - miles north by northwest of the Base. There are other wells about the same distance east from the eastern Base boundary. The geologic map for the Middle River Quadrangle, Maryland (1977), indicates that, in general, the coastal deposits in the area of the MD ANG dip gently toward the southeast. The surficial or water-table aquifer can be assumed to flow from areas of topographic rise toward open water.

Site No. 1: Old Underground POL Storage Area (HAS-70)

This site was evaluated by Hazardous Materials Technical Center (HMTC) in their Phase I Records Search, dated February 1986, of the Base. They did not rate this site under the HARM rating methodology.

Interviews with Base fuel specialists personnel revealed that JP-4 fuel storage at the MD ANG was provided by four 25,000-gallon underground storage tanks (UST) which were located to the west of buildings 1080, 1040, and 1050. These steel tanks were installed in 1958 and had no internal protective coating and/or cathodic protection to retard corrosion despite the fact that these tanks were in contact with the water table.

In 1982, a leak was discovered in one of the four 25,000-gallon tanks. Routine leak checks of the fuel tanks indicated water content elevated from normal levels in one of the tanks. Suspecting a leak, Base personnel drained the tank and discovered a leak after an internal examination of the tank. Fuel storage personnel immediately repaired the hole and continued operations. According to the fuels managers, early detection and quick repair actions resulted in no fuel loss as indicated by fuel inventory records. These USTs were removed in December 1986.

At the time of the removal of these four tanks, noticeable odors were present in the excavation. Soil samples were collected for analyses by the USAF Occupational and Environmental Health Laboratory (OEHL). These test results may be found in Appendix E. These results indicated that a significant toxic component was present in all the samples.

These soils were also analyzed using the EP Toxicity test, the Corrositivity test, and the Ignitability test. All results were negative with one exception: one sample showed a lead content of 0.23 mg/l (milligrams per liter). The allowable lead contamination level is 0.2 mg/l. According to Sax's "Dangerous Properties of Industrial Materials" JP-4 is composed of 65% gasoline and 35% light petroleum distillate.

One of the interviewees indicated that a fuel spill of up to 600 gallons of JP-4 fuel occurred during the 1970s. A fuel tank overfilled during transfer operations. Normal fuel spill-control operations during this time frame dictated that fuel spills be diluted. Runoff from this spill-control action flowed into the storm drainage ditch which runs along Eastern Boulevard.

Due to the potential threats to local surface and ground water by possible contaminant releases at the old POL fuel storage area, a HAS was applied. A relatively shallow water table was the contributing factor to the ground-water susceptibility. A private water well located approximately 0.5 miles north by northwest of the site is a potential receptor for ground-water contamination. Local surface water and recreational coastal inlets could also potentially be affected if contamination is present at this site. A storm drainage ditch runs along Eastern Boulevard and drains into Frog Mortar Creek.

Site No. 2: Leaking Underground Storage Tank (HAS-76)

Since early 1985, the ANG Bases have been required to maintain an inventory of existing underground storage tanks and to maintain a record of all containers which exceed 10 gallons. The MD ANG Base submitted their underground storage tank survey to the National Guard Bureau in July 1985. This survey indicated that there were 32 USTs on the Base property. One of these USTs is a 2,000-gal tank located near Building 1080. Subsequently, four of these USTs (Site No. 1) were removed in December 1986.

Leak rate tests were conducted on 15 and 30 October 1987 on this underground storage tank containing No. 2 heating oil. These tests were conducted under

approximately 2 to 3 pounds of hydraulic pressure. Results of these tests indicated that this tank was leaking at a rate of from 0.42 to 0.44 gallons per hour. Precise determinations of the total amount of contaminants released were not possible because the interviewees were not certain when this tank began leaking. Based on the leak test results, approximately 3,000 to 3,800 gallons of fuel oil per year may have been leaking from this tank for an undetermined period of time.

This tank was installed in 1966 and was removed from service in November 1987. The tank is constructed of steel with no internal protective coating and/or cathodic protection to retard corrosion. Depth to the water table is approximately 5 feet below the top of the tank.

Due to the potential threats to the ground-water pathways by these potential contaminants, a HAS was applied to this site.

Site No. 3: Hazardous Waste Collection Area, (HAS-59)

This site was a drum storage area located on the west side of Building 1060. This earthen area was the major collection point for liquid waste materials for many years. Various types of drummed waste liquids such as fuel and lubricating oils, paint thinners, and cleaning solvents were stored here. These drums were stored directly on the ground and the number is unknown.

According to interviewees, oil staining is present which indicates that there were numerous small waste spills when the drums were filled. Also, the possibility exists that these drums developed leaks because they were in contact with the ground for long periods of time. A HAS was applied to this site for these reasons.

Site No. 4: Leaking Underground Storage Tank (HAS-76)

Since early 1985, the ANG Bases have been required to maintain an inventory of existing underground storage tanks and to maintain a record of all

containers which exceed 10 gallons. The MD ANG Base submitted their underground storage tank survey to the National Guard Bureau in July 1985. This survey indicated that there were 32 USTs on the Base property. One of these USTs is a 1,500-gal tank located near Building 1120. Subsequently, four of these USTs (Site No. 1) were removed in December 1986.

Leak rate tests were conducted on 15 and 30 October 1987 on this underground storage tank containing No. 2 heating oil. These tests were conducted under approximately 2 to 3 pounds of hydraulic pressure. Results of these tests indicated that this tank was leaking at a rate of from 0.12 to 0.50 gallons per hour. Precise determinations of the total amount of contaminants released were not possible because the interviewees were not certain when this tank began leaking. Based on the leak test results, approximately 1,000 to 4,400 gallons of fuel oil per year may have been leaking from this tank for an undetermined period of time.

This tank was installed in 1967 and was removed from service in November 1987. The tank is constructed of steel with no internal protective coating and/or cathodic protection to retard corrosion. Depth to the water table is approximately 3 feet below the top of the tank.

Due to the potential threats to the ground-water pathways by these potential contaminants, a HAS was applied to this site.

Site No. 5: Leaking Underground Storage Tank (HAS-76)

Since early 1985, the ANG Bases have been required to maintain an inventory of existing underground storage tanks and to maintain a record of all containers which exceed 10 gallons. The MD ANG Base submitted their underground storage tank survey to the National Guard Bureau in July 1985. This survey indicated that there were 32 USTs on the Base property. One of these USTs is a 8,000-gal tank located near Building 1100. Subsequently, four of these USTs (Site No. 1) were removed in December 1986.

Leak rate tests were conducted on 15 and 30 October 1987 on this underground storage tank containing No. 2 heating oil. These tests were conducted under approximately 2 to 3 pounds of hydraulic pressure. Results of these tests indicated that this tank was leaking at a rate of from 0.24 to 0.26 gallons per hour. Precise determinations of the total amount of contaminants released were not possible because the interviewees were not certain when this tank began leaking. Based on the leak test results, approximately 2,100 to 2,300 gallons of fuel oil per year may have been leaking from this tank for an undetermined period of time.

This tank was installed in 1958. The tank is constructed of steel with no internal protective coating and/or cathodic protection to retard corrosion. Depth to the water table is approximately 5 feet below the top of the tank.

Due to the potential threats to the ground-water pathways by these potential contaminants, a HAS was applied to this site.

Site No. 6: Old Aircraft Wash Rack (HAS-58)

This site is located on the aircraft parking apron northwest of Building 2040 where for many years, aircraft maintenance personnel washed aircraft. A variety of materials were used as cleaning agents. Primarily, industrial grade detergents and varsol were used; however, 115/145 octane aviation gas was also occasionally used. Runoff from these washing operations flowed into a storm drain to the north of the parking apron. This drain empties into the storm drain which runs along Eastern Boulevard.

Contamination of the soil between the apron and the storm drain is a possibility. A HAS was applied to this site because of the potential contamination which may still be present.

Site No. 7: Removed Underground Mogas Tank (HAS-70)

The MD ANG uses an 89 octane leaded gasoline called Mogas for many of their motor vehicles. In February 1987, excavation activities were initiated in

an area south of Building 1140 and east of the area of the old MOGAS tank which had been removed in late 1986. Based upon odors emanating from the excavation area, the MD ANG collected ground-water samples for analyses. Analytical results of the samples taken near the Mogas UST indicated the presence of volatile halocarbons and aromatics (Appendix E). The Maryland Department of Natural Resources was informed of the sample results.

The area around Building 1140 drains north towards the open ditch that flows along Eastern Avenue and eventually enters Frog Mortar Creek. Preliminary sampling done in February 1987, indicates that further sampling is necessary to determine present levels of volatile halocarbons and aromatics. This site was assigned a HAS utilizing the HARM methodology.

Site No. 8: Motor Vehicle Wash Area 2110 (HAS-50)

Since the construction of Building 2110 in 1979 through 1980, the Maryland ANG has been using an area outside building 2110 for motor vehicle washing. The wash area is located on the northwest side of the building on a concrete pad. Wash water waste flows into a sand trap with an approximate 30-gallon capacity and then into an oil/water separator.

Motor vehicles are cleaned at this wash area without the use of chemicals. Steam cleaning with the help of Ivory soap is reported to be the primary method for cleaning. During washing, some grease, engine oil, and road film are removed from the vehicles and washed into the trap-oil/water separator system.

The outlet pipe from the trap flows into the oil/water separator. The oil fraction flows into a holding tank while the oil-free water fraction flows into the sewer or Publicly Owned Treating Works (POTW). Any overflow from the trap enters an open drainage ditch that flows along Eastern Avenue and eventually enters Frog Mortar Creek.

There were visible oily spots in the grassy area adjacent to the wash area which suggests that this wash area may not be cleaned regularly. According

to those interviewed at the MD ANG, the trap may have had its flow obstructed at one time. Runoff from the grassy area may also have flowed into the previously mentioned ditch along Eastern Avenue. A HAS was applied to this site because of the possibility for local ground and surface water contamination.

Site No. 9: Newer Fire Training Area (FTA) (HAS-63)

This site was evaluated by HMTC in their Phase I Records Search, dated February 1986, of the Base. No HARM rating was applied to this site.

The MD ANG has conducted their fire-fighting exercises at a site located near the western-most corner of existing Building 2070. This site was used within the 1975 to 1979 time period and was not used after October of 1979. Fire Training activities have occurred off base since 1979. The FTA or "fire pit" near Building 2070 was approximately 50 to 75 feet in diameter and semi-circular in shape. The pit was an unlined, open earthen/graveled area, slightly bermed, with a general depth of 6 to 10 inches to contain the flammable materials during training.

County and local volunteer fire departments often joined the MD ANG for fire training. Training was done generally on a quarterly basis. A factor in determining when training was conducted was the rate at which waste liquids accumulated at the FTA. These wastes were generally stored in 55-gallon drums at the FTA until a training session began.

During the years this FTA was in use, an average of three 55-gallon drums of JP-4 was released for each fire training event. Interviewees reported that spent solvents, waste oils, "slop wastes", and other flammables were also burned in the fire pit.

On a basis of one fire training day every three months, using three drums of flammable liquids per exercise, three times a day, it is estimated that approximately 1,980 gallons per year of waste were released. Assuming that

up to 70%* of the flammables released at the FTA were destroyed, approximately 590 gallons per year remained to either evaporate or seep into the ground. A potential total of approximately 2,970 gallons of waste may have been released into the ground during the five year period this FTA was in use.

Due to the potential threats to the local surface and ground-water pathways by these potential contaminants, a HAS was applied to this site.

Site No. 10: Old Fire Training Area (FTA) (HAS-69)

This site was evaluated by HMTC in their Phase I Records Search, dated February 1986, of the Base. They did not rate this site using the HARM methodology.

The MD ANG moved to the Martin State Airport location in 1957. A fire fighting training area was established approximately 100 feet south of where Building 3010 now exists. This FTA was used on a quarterly basis during the 1957 to 1974 time period.

The fire pit was approximately 50 to 75 feet in diameter and semi-circular in shape. The pit was an unlined, open earthen/graveled area, slightly bermed, with a general depth of 6 to 10 inches to contain the flammable materials during training.

A factor in determining when training was conducted was the rate at which waste liquids accumulated at the FTA. These wastes were generally stored in 55 gallon drums at the FTA until a training session began. Fire training was done on an average of four times a year.

During the years when this FTA was in use, an average of three 55-gallon drums of JP-4 were released for each fire training event. Interviewees reported that spent solvents, waste oils, "slop wastes" and other flammables were also burned in the fire pit.

* The 70% value is an often used average when specific climatic data is not available.

On a basis of one fire training exercise every three months, using three drums of flammable liquids per exercise, 3 times per day, it is estimated that approximately 1980 gallons per year of waste may have been released at this FTA. Assuming that up to 70% of the flammables released at the FTA were destroyed,* approximately 590 gallons per year may have remained to either evaporate or seep into the ground. A potential total of approximately 10,100 gallons of flammable liquids may have been released during the 17 years this FTA was in use.

Due to the potential threats to the local surface and ground water by contaminants released at this FTA, a HAS was applied to this site.

Site No. 11: Aboveground POL Storage Area (HAS-72)

The new JP-4 Fuel Storage Area (POL) is located in the southern portion of the MD ANG Base. The area includes two 210,000-gallon, aboveground JP-4 (jet fuel) storage tanks. Each tank area is enclosed within a structured containment area. The two containment areas share a common wall and are composed of concrete slabs and walls with expansion joints. The floor slabs rest on approximately four inches of crushed stone. Each area has a sump or catch basin for collection of water. The catch basins for both areas are approximately 1.5 ft deep. Both are valved to flow into exterior catch basins which eventually discharge into an oil/water separator. The oil/water separator is approximately 100 feet east of the outfall channel (ditch).

During the early morning hours of 31 July 1987, an unauthorized fuel transfer operation caused a fuel spill at the JP-4 Fuel Storage Area. The fuel transfer occurred as a result of an undetermined cause. JP-4 fuel was transferred from Tank No. 2 to the adjacent Tank No. 1, which overflowed into its own containment area. The total amount of fuel spilled was estimated at 36,970 gallons. It was estimated that the POL area was unattended for about 14 hours during which time the spill occurred.

* See "*" on bottom of page IV-13

Clean America, Inc. was brought in to aid in the recovery efforts. Vacuum trucks were used in an effort to recover the spilled fuel. Approximately 28,420 gallons of material was recovered. This volume included approximately 5,830 gallons of foam/water which was introduced into the dike to reduce vapor loss and to maintain the fuel vapor below the lower explosive limit. An additional 1,000 gallons of water were used to wash down the dike. Of the 5830 gallons of foam/water used, approximately 30% fell short of the dike according to collaboration of visual observers. This left 4,080 gallons of foam/water plus the 1,000 gallons of water to be recovered by Clean America. A balance of 13,630 gallons of JP-4 jet fuel was unaccounted for. Some of the 13,630 gallons may have been lost to evaporation. Using a computer model developed by Dr. Robert Coutant of Batelle Laboratory, Columbus, Ohio, which considers climatic conditions, it was estimated that approximately 2,600 gallons evaporated over a 16-hour period. Therefore, depending upon the validity of the assumptions and the inventory data, losses could have amounted to approximately 11,000 gallons although the exact quantity lost is not known.

Three 4-ft-deep borings were excavated within a 10-ft border along three sides of the area to determine if fuel had escaped from within the area. Initial monitoring by ANG indicated the presence of an explosive vapor mixture in two of the borings and an odor of JP-4 fuel in the last boring.

Approximately three weeks after the spill, a small sheen was observed on the drainage ditch bank 200 feet downstream from the storm drain outfall which is 300 feet northeast of the POL area. During daily visual checks, the sheen was observed growing in size up to several feet in length and width. The sheen normally dissipated with rainfall and/or high tides. After any rain fall, the sheen reappeared within a day or two, always in the same spot. Samples were taken with the results for oils and grease ranging between <0.3 to 0.8 - mg/1. An insufficient amount of oils and grease existed in these samples to match them with the JP-4 used at this Base. It should be noted that the above samples were collected using a composite sampler over a 24-hour period.

Because of these factors plus the potential threats to the local surface and ground water by contaminants released at this site, a HAS was applied.

Site No. 12: Gun Butt (HAS-36)

The Gun Butt is a structure which was constructed by the previous tenants of the Base as a safety backstop when test firing weapons. It consists of a curved concrete wall with a large pile of sand inside. The Gun Butt is partially covered by a wooden roof that has deteriorated over the years and has allowed rainfall to easily enter. Close inspection of this site was not possible due to inclement weather.

It is known that 50-caliber and 20-mm weapons were test fired into this Gun Butt by the previous tenant. This area has not been used in many years, but at least one interviewee remembered that the MD ANG used the Gun Butt a few times to test fire 50-caliber weapons. It was also mentioned that the sand pile was replaced with fresh sand/soil an undetermined number of years ago.

Without soil samples to analyze, it is difficult to determine how much lead is in the sand pile; therefore, the level of contamination, if any, present in the nearby soil/ground water can only be assumed to be small for the purpose of HARM scoring. A HAS rating was assigned to this site.

Site No. 13: Vehicle Maintenance (No Rating)

Vehicle maintenance activities in Building 2110 involve the storage and distribution of MOGAS and diesel fuel. Storage capacity consists of one 5,000-gallon diesel storage tank, one 5,000-gallon leaded MOGAS tank, and one 5,000-gallon unleaded MOGAS tank. The motor pool also uses and disposes of hazardous wastes as indicated in Table 2. There was no evidence indicating that any significant spill or disposal problems have ever been associated with these shops. Therefore, no HARM rating is necessary.

Site No. 14: Nonpotable Wells (No Rating)

Trace quantities of chlorobenzene were detected in analytical results of groundwater sampled by ANGB personnel from two on-base wells. The two wells

are located on Air National Guard leased land and are posted "non-potable" and thus are not to be used as drinking water. The wells do service two ANGB buildings, but not as drinking water.

Approximately half of the analysis results for the water samples collected by ANGB personnel indicated concentrations of chlorobenzene at or above the detection limit of 0.2 ug/l. Chlorobenzene concentrations for the remaining samples were below the detection limit. The State of Maryland health personnel have also conducted their own water sample analyses for these wells and have detected no contamination. The wells are therefore not considered a health hazard.

No direct source for the possible contamination has been determined. No information has been found that would indicate the Base used any hazardous materials in the past that could have produced detectable chlorobenzene levels. Based on this information, the site did not receive a HARM rating.

Site No. 15: National Pollutant Discharge Elimination System (NPDES) Areas (No Rating)

The State of Maryland's Aviation Administration has a NPDES permit for waste stream discharges at the Martin State Airport. The Maryland Aviation Administration indicated that there are no problem areas at Maryland ANGB. Therefore, no HARM rating of such areas is necessary.

C. Critical Habitats /Endangered or Threatened Species

Communications with the Maryland Department of Natural Resources indicate that there are no endangered or threatened species of flora or fauna in the vicinity of the Base. There are no areas designated as critical habitats or wilderness areas in the vicinity of the Base. Inland coastal waterways border the Base on three sides. There are no major wetlands within a one mile radius of the Base. However, there is an area on the one mile fringe which could be a minor tidal wetlands area. This area has not officially been designated as a wetland area by any state or federal agencies. This area is considered a habitat protection for several species of sensitive forest interior birds and is protected by the Baltimore County Chesapeake

Bay Critical Area Local Protection Program. The major impact to their habitat is considered to be noise disruptions due to all-terrain vehicles. This would not qualify the Base as a threatening factor. Also, since only the edge of this area is within a mile of the Base boundary and since the Base is "downstream" from this site, no wetlands are considered to be within a one mile radius of the Base.

V. CONCLUSIONS

- Information obtained through interviews with 20 Base personnel, review of Base records, and field observations has resulted in the identification of twelve potentially contaminated disposal/spill sites on the Base. There is a potential for contaminant migration at all of the sites.

- All of the sites have been scored using the Air Force HARM assessment methodology.

- As of the date of this report, 28 USTs exist on the MD ANGB property. Present data indicate that there have been releases from three of these USTs (Sites 2, 4, 5). No releases from the remainder of the USTs have been reported.

- No direct or indirect evidence of ground-water contamination was discovered at the Base; however, the overall ground-water and geologic environment makes underlying aquifers susceptible to contamination from surface sources. Geologic characteristics at the Base contributing to this susceptibility include the presence of moderately permeable soil and a shallow ground-water table. Presently, there are two water wells on Base. They are not used as sources of potable water due to the slight chlorobenzene contamination levels found in these wells.

- The two deep wells are installed within two different aquifers. One well is screened and draws its water from the Patuxent aquifer which is a confined aquifer in the area of the Base so it is not considered to be threatened by potential contamination of the shallow ground-water aquifer at the Base. The other Base well is screened in the upper aquifer, the Patapsco, but is screened at a depth of from 124 to 133 feet. The nature of the upper aquifer (the Patapsco) is that is has a structure of interbedded, discontinuous, alternating lenses of material

having differing permeabilities. Table 1, p. III-5, illustrates the alternating lenses of clay and sand. The structure tends to isolate "pockets" of ground water which may or may not be hydrologically connected which helps to explain why there may be two wells only a few yards apart which tap different producing lenses or zones within the aquifer. The Base well that is screened in the Patapsco (upper) aquifer is screened in a lens of permeable material that is almost certainly not connected hydrologically with the water table zone (the water table is generally within 5 to 10 feet of the surface.

- The most likely receptors of potential ground-water contamination other than the two on-Base wells are local residences whose wells are screened closer to the surface of the water table or are far enough downgradient* (assumed) from the Base so as to allow downward migration of possible contaminants. The nearest of these wells is approximately 0.5-miles northwest of the Base. There are other such wells slightly more than 0.5-miles east of the Base.

- It is possible that the oily sheen seeping into the drainage or outfall channel near Site No. 11 is coming from the JP-4 fuel spill (31 July 1987). No evidence of offbase environmental stress was observed in the immediate vicinity of the boundary of the Base.

*Note: All ground-water flow gradients referenced to this report are assumed from regional flow, topographic and geologic information. Actual site specific gradients beneath the Base are not yet known.

VI. RECOMMENDATIONS

Further IRP investigations are recommended for sites 1-12 at the Base. No further IRP action is recommended for sites 13-15.

GLOSSARY OF TERMS

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct ground water and to yield economically significant quantities of ground water to wells and springs.

CONTAMINANT - As defined by Section 101(f)(33) of SARA shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under the following,

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquified natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRITICAL HABITAT - The native environment of an animal or plant which, due to either the uniqueness of the organism or the sensitivity of the environment, is susceptible to adverse reactions in response to environmental changes such as may be induced by chemical contaminants.

DISCHARGE - The release of any waste stream, or any constituent thereof, to the environment which is not recovered.

DOWNGRADIENT - A direction that is topographically or hydraulically down slope; the direction in which ground water flows.

FALL LINE - An imaginary line or narrow zone connecting the waterfalls on several adjacent near-parallel rivers, marking the points where these rivers make a sudden descent from an upland to a lowland, specifically the Fall Line marking the boundary between the ancient, resistant crystalline rocks of the Piedmont Plateau and the younger, softer sediments of the Atlantic Coastal plain in the eastern U.S.

FOLIATED - A small scale structural term for a rock which exhibits a planar orientation of its platy minerals usually due to metamorphism.

FORMATION - The fundamental formal unit of classification according to lithology and stratification.

GABBRO - A dark colored igneous rock formed at great depth.

GNEISS - A rock formed by regional metamorphism often having alternating bands of granular and platy minerals.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

HAS - Hazard Assessment Score - The score developed by utilizing the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, physical, chemical, or infectious characteristics may

a. cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or
b. pose a substantial threat or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

IGNEOUS - Rock material of molten origin.

ILLITE - A general name for a group of three-layer, micalike clay minerals intermediate in composition and structure between mica and the kaolin minerals. It contains less potassium and more water than true micas, and more potassium than kaolinite and montmorillonite.

KAOLINITE - A common clay mineral of the kaolin group: $Al_2Si_2O_5(OH)_4$. It consists of sheets of silicon joined by an oxygen to sheets of aluminum. It is a high-alumina clay mineral that does not appreciably expand under varying water content and does not exchange iron or magnesium.

LIGNITIC MATERIAL - Sedimentary deposits containing some portion of lignite, a brownish-black lower quality coal.

LITHOLOGY - The study of the characteristics that separate one geologic deposit from another such as: minerals/material present, structure of deposits, orientation of deposits, gradation of deposits.

LOWER CRETACEOUS - Of or relating to the period of geologic time that occurred after the Jurassic Period, generally thought to be about 130 million years ago.

MIGRATION (Contaminant) - The movement of contaminants through pathways (e.g., ground water, surface water, soil, and air).

PALEOZOIC - Pertaining to an era of geologic time generally assumed to be from 570 to 225 million years ago. This period of time ranges from the end of the Precambrian era to the begining of the Mesozoic era.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

PRECAMBRIAN - Pertaining to all geologic time before the begining of the Paleozoic era, generally assumed to be roughly equivalent to 90% of geologic time.

SCHIST - A strongly foliated metamorphic rock.

STRATIFICATION - Structure produced by deposition of sediments in layers or beds.

STRATUM - A section of a formation that consists throughout of approximately the same kind of rock material. Also a layer (of sediment) that was spread out horizontally with older layers below and younger layers above.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, lakes, and drainage ditches.

UPGRADIENT - A direction that is topographically or hydraulically up slope.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water.

WETLANDS - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - Areas designated under Federal or State laws as wilderness areas to be managed for their aesthetic or natural value.

BIBLIOGRAPHY

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2. Report of Investigations No. 43, Hydrogeology, Digital Solute-Transport Simulation, and Geochemistry of the Lower Cretaceous Aquifer System near Baltimore, Maryland, F.H. Chapelle, Dept. of Natural Resources, Maryland Geological Survey, Baltimore, Maryland, 120 pp., 1985.

3. Bulletin No. 4, Geology and Ground-Water Resources of the Baltimore Areas, R.R. Bennett and R.R. Meyer, State of Maryland Board of Natural Resources, Depart. of Geology, Mines, and Water Resources, Baltimore Maryland, 573 pp., 1952.

4. Basic Data Report No. 1: Records of Wells and Springs in Baltimore County, Maryland, C.P. Laughlin, Maryland Geological Survey, U.S. Dept of the Interior Geological Survey in cooperation with the Baltimore County Dept. of Public works, Baltimore, Maryland, 406 pp., 1966.

5. J. Reinhardt, Geologic Map of the Middle River Quadrangle, Maryland, State of Maryland Dept. of Natural Resources, Maryland Geological Survey, Baltimore, Maryland, 1977.

6. United States Geological Survey Map of the Middle River Quadrangle, (7 1/2 minute topographic series), U.S. Dept. of the Interior.

7. Federal Register 47 31224-31235, 16 July 1982.

8. Installation Restoration Program, Phase I, Records Search, Maryland Air National Guard Base, Martin State Airport, Baltimore, Maryland, Hazardous Materials Technical Center, February 1986.

9. N.I. Sax, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Company Inc.,3124 pp., 1984.

APPENDIX A

RESUMES OF SEARCH TEAM MEMBERS

AUTOMATED SCIENCES GROUP, INC.

RICHARD J. BURTNETT - PROJECT MANAGER QA ENGINEER

PROFESSIONAL CAPABILITIES

Over twenty years' experience in program/project management, including research and development, test planning, training and management, quality assurance/quality control, integrated logistic support, major system acquisition, and development and implementation of programs. Experience with site surveys and records searches for Installation Restoration Program (IRP) for Air National Guard bases.

EDUCATION

B.S., Education, University of North Dakota, 1957
B.S., Aerospace Safety Engineering, University of So. California, 1969
R&D Management Courses, U.S. Army

PROFESSIONAL EXPERIENCE

1986-Present Automated Sciences Group, Inc.
Project Manager/QA Engineer. Technical and program management for Quality Assurance program development and implementation and diversified waste management activities in support of the National Hazardous Waste Remedial Action Program, the Oak Ridge National Laboratory, and the USAF Installation Restoration Program.

1983-1986 Presearch Inc. and Burroughs Corporation
Project Manager/Senior QA Engineer. Supervised six engineers in development and execution of quality assurance program for Gas Centrifuge Enrichment Plant (GCEP) machine design and development, subassembly manufacturing, and machine assembly, performance, and testing. Planned, executed, and followed up activities for DOE quality assurance audits to determine adequacy of and adherence to established procedures. Responsible for development, update, and revision of DOE Quality Documentation in accordance with NQA-1 and MIL-STD-9858A. Planned nonconformance tracking system for the gas centrifuge machines.

1979-1983 Goodyear Atomic Corporation, Piketon, Ohio
QA Supervisor/Engineer in Recycle and Assembly Division of Union Carbide Nuclear Division, Oak Ridge. Developed operational methods/ procedures for start-up and operation of the Recycle and Assembly Facility of Gas Centrifuge Enrichment Plant (GCEP). Developed and implemented programs for quality control, subassembly and machine testing, assembly operations, and nonconformance analysis. Conducted audits for Union Carbide. Assigned to Operating Contractors Project Office; represented DOE by interfacing with architect engineering firms, construction contractors, and operating contractors concerning

quality assurance matters (design reviews, non-conformance programs, quality assurance audits, and other procurement, construction, installation, and acceptance activities). Developed the organization, job descriptions, staffing levels, and program for the GCEP QA/QC Division.

1974-1979 Michelin Tire Co., Inc.

Manufacturing Manager. Directed preparation of raw materials and production of semi-finished rubber products for radial tires in automated facility with computerized electro-mechanical operations of heavy manufacturing equipment.

Training Manager. Developed and implemented training programs for startup and operation of $250 million automated rubber processing plant. Responsible for professional development of personnel. Responsible for disposal of toxic wastes in accordance with EPA standards.

1973-1974 Vectra Corporation (Standard Oil of California)

Managed spinning, extrusion, and draw twisting departments. Responsible for equipment maintenance, production, and quality control

Prior U.S. Army (20 years)

Managed research and development and participated in procurement and deployment of specialized equipment/systems for U.S. Army and government agencies. Performed testing and evaluation of Army aircraft and aircraft systems.

Command assignments in infantry and fixed/rotary wing organizations.

AUTOMATED SCIENCES GROUP, INC.

T. WARD DILWORTH - ENGINEER

PROFESSIONAL CAPABILITIES

Combined background in Geology and Civil Engineering with emphasis on the geotechnical and environmental difficulties encountered in soil, rock, ground water, and similar hydrologic situations. Experience in preparation of proposals and technical reports and laboratory and field testing of soils and concrete. Help conduct site surveys and records searches for Installation Restoration Program (IRP) for various National Guard bases. Efforts include risk assessment, site prioritization, and remedial action recommendations.

EDUCATION

B.A., Geology, University of Tennessee, 1984
B.S., Civil Engineering, University of Tennessee, 1987

PROFESSIONAL EXPERIENCE

1987 - Present Automated Sciences Group, Inc.
Engineer. Involved in Martin Marietta's site characterization investigations for the low-level waste disposal demonstration project. Duties encompass part of the groundwater characterization for the project and include monitoring groundwater levels on three sites, recording well details as they are finished, and transfer of collected data.

Also involved in development of groundwater computer modeling program. Assisted in survey of certain buildings at ORGDP to obtain information used in placing those buildings in safe storage. Engaged in studies involving underground waste storage tanks.

1986 - 1987 Law Engineering
Engineering Aide, Laboratory and Field Technician. Assisted senior engineering staff in preparation of technical reports and proposals. Checked field reports, prepared engineering drawings, and provided input on geologic considerations included in reports and proposals. Conducted laboratory and field tests on soil (in situ density, proctor test, freeze/thaw and wet/dry cycles on soil-cement samples, water content, and collecting bag samples) and concrete (compression testing of cylinders, making concrete cylinders, making grout cubes, slump testing, air content, density/unit weight). Assisted drilling crew in auger drilling operations and laying out borehole locations.

MEMBERSHIP

American Society of Civil Engineers

CITIZENSHIP

U. S.

CLEARANCE

None

AUTOMATED SCIENCES GROUP, INC.

DAVID R. STYERS, P.E. - HEALTH PHYSICIST

PROFESSIONAL CAPABILITIES

Twelve years' experience in program management, including test planning, system design, training and management, research and development, and quality assurance/quality control. Expertise in radiation health physics, including field surveys, safety reviews, hazard assessments, compliance reviews, and gamma spectroscopy (radiological chemical analyses). Conduct site surveys and records searches for Installation Restoration Program (IRP) for various Air National Guard bases. Efforts include risk assessment, site prioritization, and remedial action recommendations.

EDUCATION

M.S., Health Physics, Georgia Institute of Technology, Atlanta, 1985
Certified Professional Engineer in Civil Engineering
B.S., Education (Major, Chemistry, Minor, Physics), Slippery Rock College, Slippery Rock, PA, 1964

PROFESSIONAL EXPERIENCE

1987-Present Automated Sciences Group, Inc.
Health Physicist. Manage Tumulus Chemical and Nuclear Waste Disposal Task for ASG, including monitoring activities at Demonstration Site, SWSA-6. Prepare task implementation plans, maintain master schedule, and interface with clients at Oak Ridge National Laboratory. Active participation as a team member in Hazardous Waste Environmental Audits, Waste Minimization, and USAF Installation Restoration Program Projects.

1985-1987 Oak Ridge Associated Universities
Health Physics Team Leader. Directed on-site radiation survey teams throughout the United States; provided radiation safety assistance. Conducted complex radiological assays of samples; analyzed and interpreted data; prepared comprehensive reports of results. Reviewed safety procedures and engineering plans for decontamination of nuclear facilities, including environmental impact documents. Conducted hazard assessments of radionuclides. Inspected operations and facilities for compliance with regulations.

1978-1985 Pennsylvania Department of Environmental Resources
Chemist. Performed qualitative and quantitative radioassay analyses by gamma spectroscopy techniques. Prepared and disposed of radioactive standards and samples in compliance with NRC regulations. Established quality control charts for radiation analyzers. Participated in quality assurance program of EPA's Environmental Surveillance Monitoring Laboratory; achieved 98% accuracy.

1974-1978 Pennsylvania Department of Transportation
Chemist. Supervised air monitoring section of Chemical Laboratory. Evaluated and selected test site locations for air monitoring projects;

trained staff in proper use of equipment. Scheduled laboratory and field testing. Designed mobile air monitoring vans. Prepared reports on air monitoring testing and research.

1968-1974 Pennsylvania Department of Transportation
Chemist. Supervised and performed qualitative and quantitative chemical monitoring activities.

1965-1968 Fairview Township Schools
Teacher. College preparatory Chemistry and Physics.

MEMBERSHIPS

American Nuclear Society
Health Physics Society

AUTOMATED SCIENCES GROUP, INC.

M.C. (MICK) WIEST, JR. - ENVIRONMENTAL SCIENTIST

PROFESSIONAL CAPABILITIES

Nine years experience in environmental science including hazardous waste management, compliance with Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) (CERCLA), compliance with National Pollutant Discharge Elimination System (NPDES) and Surface Mining Control and Reclamation Act (SMCRA). Pollution control/resource recovery experience in the petrochemicals industry.

EDUCATION

B.S., Environmental Management, University of Houston, TX, 1979

Dale Carnegie Course, Houston, 1979
EPA Personnel Protection and Safety Course, Nashville, 1985
Exxon Three-Year Training Program in Chemistry of Hydrocarbons and Petrochemicals, Baytown, TX, 1976

PROFESSIONAL EXPERIENCE

1987-Present Automated Sciences Group, Inc.
Environmental Scientist. Task Leader for As Low As Reasonably Achievable (ALARA) studies on occupational exposure to low-level radioactive solid waste. This work involves studies at the Oak Ridge National Laboratory and the Oak Ridge Gaseous Diffusion Plant to reduce annual radiation exposure rates.

Performed environmental assessment and building characterizations of contaminated areas inside Oak Ridge Gaseous Diffusion Plant under contract DOE.

1986-1987 U.S. Department of Interior, Office of Surface Mining and Reclamation, Norris, Tennessee
Reclamation Specialist. Inspected mine operations, including coal washing and blending plants. Enforced mining laws and regulations to ensure that environmental standards were met. Conducted soil surveys, plant survival studies, and water testing. Ensured minimization of erosion and acid drainage and proper disposal of toxic mine waste. Investigated complaints related to mining.

1985-1986 Tennessee Department of Health & Environment, Division of Superfund, Knoxville
Environmental Specialist. Investigated known and suspected hazardous waste sites. Developed sampling plans for abandoned waste sites and conducted water and soil sampling using EPA-approved procedures. Responsible for compliance with Superfund (CERCLA) regulations. Investigated complaints concerning hazardous waste.

APPENDIX B

OUTSIDE AGENCY CONTACT LIST

CONTACT LIST FOR LOCAL, STATE, AND NATIONAL AGENCIES

Baltimore County Zoning Office
Baltimore County Courthouse
Towson, MD
(301) 494-3391
- Flood Insurance Rate Map (produced by the National Flood Insurance Program)
- Zoning Maps

Baltimore County Health Department
Office of Water and Sewer Services
Baltimore County Courthouse
Towson, MD
Health Department (301) 494-3740 Water/Sewer (301) 494-2762
Ground Water Section (301) 494-3768
- Water Well Data

State Department of Transportation
Office of Highway Planning (Map Dept/Div)
(301) 321-3518
- Road Maps

Soil Conservation Service
Van Buren Lane
Cockeysville, MD
(301) 666-1188
- Soil Survey of Baltimore County

National Archives
Washington, DC
Main Office (202) 523-3340
Cartographic & Architectural Branch (703) 756-6705
- Historical Information

Maryland State EPA Office
Annapolis, MD
(301) 266-9180
- Well Information

Maryland Geological Survey
Baltimore, MD
Publications (301) 554-5505
- Geological/Hydrogeological Information

National Climatic Data Center
Federal Building
Asheville, NC
(704) 259-0682
- Climate/Meteorlogical Information

APPENDIX C

USAF HAZARD ASSESSMENT RATING METHODOLOGY

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is as follows:

> To develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF), using information gathered during the Records Search phase of its Installation Restoration Program (IRP) has sought to establish a system of priorities for taking actions at identified sites.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites suspected of contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (i.e., hazardous wastes are present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like other hazardous waste site ranking models, the U.S. Air Force site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by specific sites: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site and the distance between the site and the Base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the ground-water use of the uppermost aquifer, and population served by the ground water supply within three miles of the site. The uses of the surrounding area are determined by the zoning within a one mile radius. Determination of whether or not critical environments exist within a one mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The

maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptor subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and ground-water migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned; and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no contaminant are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factory to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 ft (excludes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 mile	1 to 3 mile	3,001 ft to 1 mile	0 to 3,000 ft	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 3,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered species; threatened species; presence of recharge area; major wetlands	10

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Scale Levels

Rating Factors	0	1	2	3	Multiplier
F. Water quality / use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available, commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)
- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

and

S = Suspected confidence level
- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability, and radioactivity and determine the hazard rating

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS - Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
	L	S	M
50	L	C	L
	M	S	H
	S	C	M
	S	S	H
	M	S	M
40	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard rating can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, groundwater, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net Precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($<10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-6} cm/sec)	0% to 15% clay ($<10^{-2}$ to 10^{-4} cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor
The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/Water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete, the factor ratings under items I-A through I, III-B-1, or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX D

SITE HAZARDOUS ASSESSMENT RATING FORMS AND FACTOR READING

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No.1

Location Old POL Storage Area

Date of Operation or Occurrence

Owner/Operator MD ANG

Comments/Description

Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	0	4	0	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 0.9 = 54

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		[illegible]		24
			Subtotals	108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding		1		3

Subscore (100 x factor score/3)

3 Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
			Subtotals	114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	54
Pathways	100
Total 209 divided by 3 =	70
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

70 x 1.0 = 70

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 2
Location No. 2 Heating Oil Storage Tank - Building 1080
Date of Operation or Occurrence
Owner/Operator MD ANG
Comments/Description
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	0	4	0	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water		8	24
Net precipitation		6	18
Surface erosion		8	24
Surface permeability		6	18
Rainfall intensity		8	24
	Subtotals		108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding — 1 — 3

Subscore (100 x factor score/3)

3. Groundwater migration

Depth to groundwater		8	24
Net precipitation		6	18
Soil permeability		8	24
Subsurface flows		8	24
Direct access to groundwater		8	24
	Subtotals		114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors			55
Waste Characteristics			72
Pathways			100
Total	227	divided by 3 =	76
		Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

76 x 1.0 = 76

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 3
Location Hazardous Waste Collection Area, West of Building 1060
Date of Operation or Occurrence
Owner/Operator MD ANG
Comments/Description
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	0	4	0	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characterist' s Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61

2. Flooding	0	1	3	0
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
		Subtotals	60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	60
Pathways	61
Total 176 divided by 3 =	59
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

59 x 1.0 = 59

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 4
Location No. 2 Heating Oil Storage Tank - Building 1120
Date of Operation or Occurrence
Owner/Operator MD ANG
Comments/Description
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	0	4	0	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
			Subtotals	108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding — 1 — 3

Subscore (100 x factor score/3)

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
			Subtotals	114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors			55
Waste Characteristics			72
Pathways			100
Total	227	divided by 3 =	76
	Gross Total Score		

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

76 x 1.0 = 76

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 5
Location No. 2 Heating Oil Storage Tank - Building 1110
Date of Operation or Occurrence
Owner/Operator
Comments/Description MD ANG
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	0	4	0	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
			Subtotals	108

Subscore (100 x factor score subtotal/maximum score subtotal) _____

2. Flooding 1 3

Subscore (100 x factor score/3) _____

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
			Subtotals	114

Subscore (100 x factor score subtotal/maximum score subtotal) _____

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	72
Pathways	100
Total 227 divided by 3 =	76
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

76 x 1.0 = 76

HAZARDOUS ASSESSMENT RATING FORM

ame of Site MD ANG BASE Site No. 6
ocation Old Aircraft Wash Rack - Building 2040
ate of Operation or Occurrence
wner/Operator MD ANG
omments/Description
ite Rated By Automated Sciences Group, Inc.

. RECEPTORS

ating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
. Population within 1,000 ft of site	0	4	0	12
. Distance	3	10	30	30
. Land use/zoning within 1 mile radius	3	3	9	9
. Distance to installation boundary	3	6	18	18
. Critical environments within 1 mile radius of site	0	10	0	30
. Water quality of nearest surface water body	2	6	12	18
. Groundwater use of uppermost aquifer	2	9	18	27
. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

I. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54

2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
		Subtotals	68	114
Subscore (100 x factor score subtotal/maximum score subtotal)				60

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 60

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	60
Pathways	60
Total 175 divided by 3 =	58
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score 58 x 1.0 = 58

HAZARDOUS ASSESSMENT RATING FORM

ıme of Site MD ANG BASE Site No. 7
ɔcation Removed Underground MOGAS Tank, North of Building 1140
ıte of Operation or Occurrence
ıner/Operator MD ANG
ɔmments/Description
ite Rated By Automated Sciences Group, Inc.

. RECEPTORS

ating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
. Population within 1,000 ft of site	0	4	0	12
. Distance	3	10	30	30
. Land use/zoning within 1 mile radius	3	3	9	9
. Distance to installation boundary	3	6	18	18
. Critical environments within 1 mile radius of site	0	10	0	30
. Water quality of nearest surface water body	2	6	12	18
. Groundwater use of uppermost aquifer	2	9	18	27
. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

I. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

60 x 0.9 = 54

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 100

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
			Subtotals	108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding		1		3

Subscore (100 x factor score/3)

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
			Subtotals	114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	54
Pathways	100

Total 209 divided by 3 = 70
Gross Total Score

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

70 x 1.0 = 70

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 8
Location Motor Vehicle Wash Area, Northeast of Building 2110
Date of Operation or Occurrence
Owner/Operator MD ANG
Comments/Description
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	1	4	4	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical enironments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			103	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 30

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

30 x 0.9 = 27

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

27 x 1.0 = 27

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	1	24
Subtotals			70	108
Subscore (100 x factor score subtotal/maximum score subtotal)				65

2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 65

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	57
Waste Characteristics	27
Pathways	65
Total 149 divided by 3 =	50
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

50 x 1.0 = 50

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 9 - Newer FTA
Location Western Corner of Building 2070
Date of Operation or Occurrence 1975-79
Owner/Operator MD ANG
Comments/Description Generally used 4 times or less/year, 3 exercises per day
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	1	4	4	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	103	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54

2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
		Subtotals	68	114
Subscore (100 x factor score subtotal/maximum score subtotal)				60

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 60

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		57
Waste Characteristics		72
Pathways		60
Total	189 divided by 3 =	63
	Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

63 x 1.0 = 63

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 10 - Old FTA
Location South of Building 3010
Date of Operation or Occurrence 1957-74
Owner/Operator MD ANG
Comments/Description Generally used 4 times or less per year, 3 exercises per day
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	1	4	4	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	103	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

100 x 0.9 = 90

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

90 x 1.0 = 90

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore _____

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
		Subtotals	68	114
Subscore (100 x factor score subtotal/maximum score subtotal)				60

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 60

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	57
Waste Characteristics	90
Pathways	60
Total 207 divided by 3 =	69
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

69 x 1.0 = 69

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 11
Location New POL Storage Area
Date of Operation or Occurrence 31 July 1987
Owner/Operator MD ANG
Comments/Description 31 July 1987 Spill
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	1	4	4	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	103	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

100 x 0.9 = 90

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

90 x 1.0 = 90

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54

2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
		Subtotals	68	114
Subscore (100 x factor score subtotal/maximum score subtotal)				60

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	57
Waste Characteristics	90
Pathways	80
Total 227 divided by 3 = Gross Total Score	76

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

76 x 0.95 = 72

HAZARDOUS ASSESSMENT RATING FORM

Name of Site MD ANG BASE Site No. 12
Location Gun Butt
Date of Operation or Occurrence
Owner/Operator MD ANG
Comments/Description
Site Rated By Automated Sciences Group, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft of site	0	4	0	12
B. Distance	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	2	6	12	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	99	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 55

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 20

B. Apply persistence factor

Factor Subscore A x Persistence Factor = Subscore B

20 x 1.0 = 20

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

20 x 0.5 = 10

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ____

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface Water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
		Subtotals	52	108
Subscore (100 x factor score subtotal/maximum score subtotal)				48

2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	16	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to groundwater	0	8	0	24
		Subtotals	56	114
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	55
Waste Characteristics	10
Pathways	49
Total 114 divided by 3 =	38
Gross Total Score	

B. Apply factor for waste contaminant from waste management practices
Gross Total Score x Waste Management Practices Factor = Final Score

38 x 0.95 = 36

Maryland Air National Guard
Martin State Airport
Baltimore, Maryland
USAF Hazard Assessment Rating Methodology
Rating Factor Criteria

The following is a summary and explanation of the rating factor criteria used to score the Base sites under HARM. The majority of the factors in the receptors and pathway categories are the same for each of the rated sites and are therefore stated only once. In those instances where a rating factor varies according to a specific site, the factor is addressed separately for each of the respective sites.

I. RECEPTORS

A. Population Within 1,000 Feet Of Site. Factor Rating 0 for all sites except Sites 8-11. Excluding the Base population, there are not offsite population within 1,000 feet of each rated site. For Sites 8-11, there are estimated to be 1-26 people within 1,000 feet of these sites.

B. Distance To Nearest Well. Factor Rating 3 for all sites. According to well records for Baltimore County, there is a well , either private or on site, within 3,000 feet of each site.

C. Land Use/Zoning (Within One Mile Radius). Factor Rating 3. Although a majority of the land use is commercial/industrial, there are several parcels of land designated as residential.

D. Distance To Installation Boundary. Factor Rating 3. All the rated sites are within 1,000 feet of the base boundaries.

E. Critical Environments (Within One Mile Radius Of Site). Factor Rating 0. No critical environments exist within a one mile radius of any of the sites.

F. Water Quality/Use Designation of Nearest Surface Water Body. Factor Rating 2. The waters of Frog Mortar Creek and other Middle River tributaries are mainly utilized for recreation (e.g. boating, crabbing), but some shellfish propagation and harvesting are known.

G. Ground-water Use of Uppermost Aquifer. Factor Rating 2. The uppermost aquifer is most likely used for drinking water through nearby domestic wells.

H. Population Served By Surface Water Supplies Within 3 Miles Downstream of The Site. Factor Rating 0. Surface waters within 3 miles of the base are not used as drinking water sources.

I. Population Served By Aquifer Supplies Within 3 Miles Of The Site. Factor Rating 2. Although municipal waters supply most of the drinking water in the Middle River area, the existence of more than 50 domestic wells is evidence enough to indicate a population of at least 51 and probably less than 1,000 being served by ground water.

II. WASTE CHARACTERISTICS

Site No.1:

- A-1: Hazardous Waste Quantity - Factor Rating S. The released quantity of JP-4 for this site was estimated to be less than 20 drums.

- A-2: Confidence Level - Factor Rating C. This is based on the knowledge of the known type of materials used at this site.

- A-3: Hazard Rating - Factor Rating H. The hazard rating at this site is based on JP-4 toxicity. JP-4 has a Sax toxicity of 3, which corresponds to a HARM hazard rating of 3.

B. Persistence Multiplier - Factor Rating 0.9. JP-4 falls within the category of substituted and other ring compounds.

Site No. 2:

- A-1: Hazardous Waste Quantity - Factor Rating L. Because of leak rates for this UST, it was determined that as little as 3,600 and as much as 3,800 gallons per year of fuel oil may have leaked into the ground.

- A-2: Confidence Level - Factor Rating C. The leak rates were determined from actual leak test results.

- A-3: Hazardous Rating - Factor Rating H. The substance involved is No. 2 fuel oil which has a Sax's Level of 3 in toxicity corresponding to a HARM rating of 3.

B. Persistence Multiplier - Factor Rating 0.9. No. 2 fuel oil falls within the category of substituted and other ring compounds.

Site No. 3:

- A-1: Hazardous Waste Quantity - Factor Rating S. The quantity estimated to have entered the ground at this site is much less than the 20 drum limit for the small quantity category.

- A-2: Confidence Level - Factor Rating S. This is based on a knowledge of the types and quantities of waste stored at this site.

- A-3: Hazard Rating - Factor Rating H. The flash point of some solvents stored at this site is below $80^{o}F$.

B. Persistence Multiplier - Factor Rating 1.0. The substances stored at this site may have included 1,1,1 Trichloroethane and/or Trichloroethylene.

Site No. 4:

- A-1: Hazardous Waste Quantity - Factor Rating M. Because of leak rates for this UST, it was determined that as little as 1,000 and as much as 4,400 gallons per year of fuel oil may have leaked into the ground.

- A-2: Confidence Level - Factor Rating C. The leak rates were determined from actual leak test results.

- A-3: Hazardous Rating - Factor Rating H. The substance involved is No. 2 fuel oil which has a Sax's Level of 3 in toxicity corresponding to a HARM rating of 3.

B. Persistence Multiplier - Factor Rating 0.9. No. 2 fuel oil falls within the category of substituted and other ring compounds.

Site No. 5:

- A-1: Hazardous Waste Quantity - Factor Rating M. Because of leak rates for this UST, it was determined that as little as 2,100 and as much as 2,300 gallons per year of fuel oil may have leaked into the ground.

- A-2: Confidence Level - Factor Rating C. The leak rates were determined from actual leak test results.

- A-3: Hazardous Rating - Factor Rating H. The substance involved is No. 2 fuel oil which has a Sax's Level of 3 in toxicity corresponding to a HARM rating of 3.

B. Persistence Multiplier - Factor Rating 0.9. No. 2 fuel oil falls within the category of substituted and other ring compounds.

Site No. 6:

- o A-1: Hazardous Waste Quality - Factor Rating S. The quantity estimated to have entered the ground at this site is less than the 20 drum limit for the small quantity category.

- o A-2: Confidence Level - Factor Rating C. This is based on a knowledge of the types of materials used at this site.

- o A-3: Hazard Rating - Factor Rating H. The flash point of some solvents stored at this site is below 80°F.

B. Persistence Multiplier - Factor Rating 1.0. The substances used at this site may have included 1,1,1 Trichloroethylene along with 115-145 octane aviation gasoline.

Site No. 7:

- o A-1: Hazardous Waste Quantity - Factor Rating S. Although the quantity could not be accurately approximated, information concerning fuel losses from this tank tend to indicate a small volume of fuel was lost.

- o A-2: Confidence Level - Factor Rating C. This is based on the knowledge of the type of materials used at this site.

- o A-3: Hazard Rating - Factor Rating H. The leaded gasoline stored in this tank has a Sax's level of 3 in toxicity which corresponds to a HARM rating of 3.

B. Persistence Multiplier - Factor Rating 0.9. Leaded gasoline stored in this tank falls within the category of substituted and other ring compounds.

Site No. 8:

- A-1: Hazardous Waste Quantity - Factor Rating S. The quantity of contaminants present at this site is not accurately known but should be well below the 20 drum upper limit for the small quantity category.

- A-2: Confidence Level - Factor Rating C. This is based on the known types of waste generated at this site.

- A-3: Hazardous Rating - Factor Rating L. Motor oil and grease are the suspected contaminants. These substances have a low hazard rating.

B. Persistence Multiplier - Factor Rating 0.9. Motor oils fall into the category of substituted and other ring compounds.

Site No. 9:

- A-1: Hazardous Waste Quantity - Factor Rating M. The estimated quantity of waste materials that may have entered the ground at this site was 2,970 gallons.

- A-2: Confidence Level - Factor Rating C. Interviewees confirmed the amounts of JP-4 used at this site.

- A-3: Hazard Rating - Factor Rating H. See Site 1, Section A-3.

B. Persistence Multiplier - Factor Rating 0.9. See Site 1, Section B.

Site No. 10:

- A-1: Hazardous Waste Quantity - Factor Rating L. The estimated quantity of waste materials that may have entered the ground was 10,100 gallons.

- o A-2: Confidence Level - Factor Rating H. See Site 9, Section A-3.

- o A-3: Hazard Rating - Factor Rating H. See Site 1, Section A-3.

B. Persistence Multiplier - Factor Rating 0.9. See Site 1, Section B.

Site No. 11:

- o A-1: Hazardous Waste Quantity - Factor Rating L. The quantity of JP-4 fuel that was assumed to be missing was over 10,000 gallons.

- o A-2: Confidence Level - Factor Rating C. The quantities were reported by interviewees and Base records.

- o A-3: Hazard Rating - Factor Rating H. See Site 1, Section A-3.

B. Persistence Multiplier - Factor Rating 0.9. JP-4 falls within the category of substituted and other ring compounds.

For All HARM Rated Sites (except Site No. 12):

C. Physical State Multiplier - Factor Rating 1.0. The materials released at each site were in a liquid state.

Site No. 12:

- o A-1: Hazardous Waste Quantity - Factor Rating S. The suspected contaminant is lead from the ammunition slugs that were fired into the sand piles. It is not expected that the quantity of lead fragments could exceed 5 tons.

- o A-2: Confidence Level - Factor Rating S. The lack of confidence is due to the unknown quantity and conflicting interviewee verification..

- A-3: Hazard Rating - Factor Rating L. Lead is relatively inert and does not represent a high or moderate environmental hazard in a neutral or very slightly acidic environment.

B. Persistence Multiplier - Factor Rating 1.0. Lead falls into the category of heavy metals.

C. Physical State Multiplier - Factor Rating 0.5. The material was in solid form.

III. PATHWAYS CATEGORY

A. Evidence of Contamination.

Site No.1: Factor Rating 100 - Direct Evidence. Analyses of soil samples revealed a significant toxic component in these samples.

Site Nos. 2, 4, 5: Factor Rating 100 - Direct Evidence. Fuel tanks were tested and found to be leaking at known rates.

Site No. 7: Factor Rating 100 - Direct Evidence. Analyses of ground-water samples indicated the presence of volatile halocarbons and aromatics.

Site Nos. 3, 6, 8-10, 12: Factor Rating 0 - No Evidence. There is no direct or indirect evidence that contaminants are migrating from these sites.

Site No. 11: Factor Rating 80 - Indirect Evidence. Visual evidence of contaminants seeping from containment basin and "oil sheen" on banks of ditch indirectly indicate migration of contaminants. Samples of this oily substance could not be collected in large enough quantities to accurately match it to JP-4.

B-1 Potential for Surface Water Contamination

- Distances to Nearest Surface Water (includes Drainage Ditches and Storm Sewers): Factor Rating 3. Each of the identified sites on the base are within 500 feet of surface water except for Site No. 12 which has a Factor Rating of 2.

- Net Precipitation: Factor Rating 2. Net precipitation at this base is calculated to be 7.5 inches per year.

- o Soil Erosion:

  Site Nos. 1-5, 7, and 12: Factor Rating 1. There were no visible signs of significant erosion at these sites.

  For Site Nos. 6, and 8-11: Factor Rating 0. The two old FTA's (Site Nos. 9 & 10) have been partially graded so the surface of contaminated material, if it exists, would be covered by graded fill. Site Nos. 6, 8, and 11 showed no signs whatsoever of erosion.

- o Surface Permeability: Factor Rating 1. Surface soils at the base tend to be silty sand to clayey sand on the surface with moderate permeabilities. The one exception was Site No. 8 which is asphalted on the surface and received a Factor Rating of 3.

- o Rainfall Intensity Based On 1-Year, 24-Hour Rainfall: Factor Rating 2. The 1-year, 24-hour rainfall value is 2.7 inches.

B-2 Potential for Flooding: Factor Rating 0. According to the Flood Insurance Rate Map (FIRM) for the National Flood Insurance Program, the Base does not lie within a 100 year floodplain.

B-3 Potential for Ground-water Contaminations.

- o Depth to ground water: Factor Rating 3. Base records and past excavations on the Base indicate a shallow water table of less than 10 feet in most places under the Base.

- o Net Precipitation: Factor Rating 2. See B-1.

- o Soil Permeability: Factor Rating 2. The soils beneath the surface tend to have a higher clay content than the soil on the surface but interbedded lenses of gravels and silty sand give a similar overall permeability.

- Subsurface Flows:

  Site Nos. 1, 2, 4, 5 and 7: Factor Rating 2. All these sites are below the natural ground surface and therefore are usually in contact with water table, especially in wet seasons.

  Site Nos. 9-11: Factor Rating 1. These sites are on or near the surface and therefore are in contact with the water table less frequently that the sites listed above.

  Site Nos. 3, 6, 8, and 12: Factor Rating 0. These sites have a very low probability of coming in contact with the water table.

- Direct Access To Groundwater: Factor Rating 0. With the exception of Site No. 12, there is a low risk that contaminants at these sites have direct access to ground water. Site No. 12 has a Factor Rating of Zero since there is no evidence that the lead slugs have direct access to ground water.

IV. WASTE MANAGEMENT PRACTICES CATEGORY

Waste Management Factor Multiplier:

Site Nos. 11 and 12: Factor Multiplier 0.95. These sites have limited containment.

All other sites: Factor Multiplier 1.0. There are no forms of containment at these HARM scored sites.

APPENDIX E

TEST RESULTS
MARYLAND AIR NATIONAL GUARD BASE
MARTIN STATE AIRPORT
BALTIMORE, MARYLAND

SITE 1

Old POL Underground Storage Tanks

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

REPLY TO ATTN OF: EC

20 MAR 1987

SUBJECT: Consultative Letter, 87-029EQ0339CAD, Aquatic Toxicity Test, Warfield ANGB MS

TO: 175 TAC Clinic/SGPB

1. Introduction: We've completed aquatic toxicity tests on water extractions made from your soil samples. These were the samples you collected from your ~~Fire Pit Training area~~ and submitted to us on 13 December 86 (GS860172 though GS860176). Our tests indicated the extractions made from all of your samples, except for your control (GS860172), were acutely toxic to aquatic organisms.

2. Background:

a. Our aquatic toxicity tests were performed to determine whether toxic materials could be solubilized from the soils in your Fire Pit Training area. The results of this test will aid in determining whether the soils in the pit will need to be treated as hazardous wastes.

b. We performed our aquatic toxicity tests following the procedures in: (1) sixteenth edition of Standard Methods for the Examination of Water and Wastewater; (2) Methods for Measuring the Acute Toxicity of Effluent to Aquatic Organisms, EPA-600/4-85/013; and (3) Quality Assurance Manual for Performing Acute Toxicity Tests, FDER Biological Section, 1983. We used Pimephales promelas (fathead minnow) as the target organism and ran the test for 72 hours.

3. Project Personnel:

Maj Thomas R. Doane
SSgt Christina M. Koenig
SrA Harold D. Casey

4. Results:

a. We received your samples on 24 Dec 86. Our bioassay was performed from 7 to 9 Jan 87. The results (Atchs 1-5) discussed here were reported to you, by telephone on 13 Jan 87.

b. At time of testing, we mixed 500 mg from each of your soil samples with 1000 ml of our laboratory water. This mixture was agitated for approximately 8 hours then settled for over 12 hours. We ran duplicate toxicity tests with 250 ml of the supernatent for each sample (see Atch 6). There were ten fathead minnows added to each test container.

c. The water extractions of all of your soil samples, except for your control (GS860172), were toxic to our test organisms.

5. Conclusions and Recommendation:

a. Your soils might not be classified as hazardous wastes according to current regulations. We submitted samples to our Analytical Services Division (USAFOEHL/SA) for the EP Toxicity test, the Corrosivity test and the Ignitability test (Atch 7). All of your samples passed all of the tests with the exception of GS860176 which had 0.23 mg/l of lead. (The allowable level of contamination is 0.2 mg/l.) However, the aquatic extraction and toxicity test we performed is currently required by the State of California. We chose to use this test since California often leads the nation in environmental protection legislation and this procedure is a realistic approximation of what could enter the ground or surface waters. There was obviously a significant toxic component to all of your samples.

b. If you have any concerns about leaching of this soil site into ground or surface water, you should attempt to identify the toxic component. Due to the use of the area as ~~a fire training pit~~, the material is likely to be organic in nature; probably some partially combusted material used to start a fire. As part of the various IRP studies conducted by USAFOEHL/TS, we have seen residuals of many potentially toxic chemicals such as benzenes, naphthalenes, phthalates, pyrenes and anthracenes.

c. If you would like to attempt to identify the toxic component of these samples, we suggest you submit the following samples:

(1) A 100 gram sample for EPA series 625 analysis. (Mark this sample for Mr Martin's attention.)

(2) A 100 gram sample for EPA series 8020 analysis.

(3) A 100 gram sample for oils and grease analysis. Mark the paperwork that you want identification of components if high levels of oils and greases are found.

(4) Send all samples to USAFOEHL/SA with required paperwork.

(5) Please annotate on all paperwork that a copy of the results are to be sent to USAFOEHL/ECQ, Attn: Major Doane.

6. If you have any questions or need further assistance, please contact Maj Thomas R. Doane at AUTOVON 240-3667 or commercial (512) 536-3667.

Darryl T. Markland

DARRYL T. MARKLAND, Col, USAF, BSC
Chief, Consultant Services Division

7 Atch
1-5 Results
6. Bioassay Info Sheet
7. Chemical Analysis

cc: HQ ANGSC/SG
HQ AFSC/SGPB
OL AD, USAFOEHL
USAF Rgn Med Cen
Wiesbaden/SGB

TEST NUMBER: D 0441 007 1 BASE SAMPLE NUMBER: GS860172 SPECIAL PROJECT NUMBER: 8701001 CL / TR NUMBER: 87- EQ0441AD

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF CLINIC	SGPB	WARFIELD ANG, 175TH TAC CLINIC	MD	21220

REQUESTOR: MSGT SMITH AUTOVON NUMBER: 235 1ST EXTENSION: 9428 2ND EXTENSION:

TRACKING INFORMATION

DATE OF RECEIPT: 24-DEC-86 PROJECT MANAGER: MAJ DOANE PROJECT TECHNICIAN: SSGT KOENIG, AIC CASEY
REMARKS: 500MG OF SAMPLE MIXED WITH RECONSTITUTED LAB WATER,SHOOK FOR6 HRS,SETTLE FOR 15 HRS. < 24 HR OLD DAPHNIA USED IN ASSAY

ORGANISM: DAPHNIA MAGNA LC50: DURATION: 48 HOURS

ANALYTICAL INFORMATION

D.O.	PH	TEMP(C)	TEMP(F)	ALKALINITY	HARDNESS	CL		OTHER DATA
7.4	7.5	23.0	73.4	104.0	162.0	0.00	CONTROL SAMPLE	

SAMPLE START DATA

START DATE: 07-JAN-87 START TIME: 0800

	1	2	3	4	5	6	7
STARTING NUMBER:	10	10	10	10			
DILUTION PERCENT:	100	100	0	0			

INTERVAL: 24 HOURS

SURVIVING NUMBER:	10	10	10	10
SURVIVAL PERCENT:	100	100	100	100
DO				
PH:				
OTHER:				

INTERVAL: 48 HOURS

SURVIVING NUMBER:	10	10	10	10
SURVIVAL PERCENT:	100	100	100	100
DO:	8.0	8.0	8.0	8.0
PH:	8.5	8.5	8.4	8.4
OTHER:	23 C	23 C	23 C	23 C

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCLNT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

USAFOEHL BIOASSAY RECORD SHEET

TEST NUMBER: D 0441 007 2   BASE SAMPLE NUMBER: GS860173   SPECIAL PROJECT NUMBER: 8701001   CL / TR NUMBER: 87- EQ0441AAD

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF CLINIC	SGPB	WARFIELD ANG, 175TH TAC CLINIC	MD	21220

REQUESTOR: MSGT SMITH   AUTOVON NUMBER: 235   1ST EXTENSION: 9428   2ND EXTENSION:

TRACKING INFORMATION

DATE OF RECEIPT: 24-DEC-86   PROJECT MANAGER: MAJ DOANE   PROJECT TECHNICIAN: SSGT KOENIG, AIC CASEY
REMARKS: 500MG OF SAMPLE MIXED WITH RECON LAB WATER, SHOOK FOR 6 HRS, SETTLE FOR 15 HRS. < 24 HR OLD DAPHNIA USED IN ASSAY

ORGANISM: DAPHNIA MAGNA   LC50:   DURATION: 48 HOURS

ANALYTICAL INFORMATION

D.O.	PH	TEMP(C)	TEMP(F)	ALKALINITY	HARDNESS	CL	OTHER DATA
7.4	7.5	23.0	73.4	104.0	162.0	0.00	SAMPLE TAKEN FROM DEACTIVATED POL TANK FARM, 10" DEPTH

SAMPLE START DATA

START DATE: 07-JAN-87   START TIME: 0800

	1	2	3	4	5	6	7
STARTING NUMBER:	10	10	10	10			
DILUTION PERCENT:	100	100	0	0			

INTERVAL: 24 HOURS

	1	2	3	4	5	6	7
SURVIVING NUMBER:	0	0	10	10			
SURVIVAL PERCENT:	0	0	100	100			
DO							
PH:							
OTHER:							

INTERVAL: 48 HOURS

	1	2	3	4	5	6	7
SURVIVING NUMBER:	0	0	10	10			
SURVIVAL PERCENT:	0	0	100	100			
DO:	8.4	8.4	8.0	8.0			
PH:	8.4	8.4	8.4	8.4			
OTHER:	23 C	23 C	23 C	23 C			

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

USAF/OEHL BIOASSAY RECORD SHEET

TEST NUMBER: D 0441 007 3   BASE SAMPLE NUMBER: GS860174   SPECIAL PROJECT NUMBER: 8701001   CL / TR NUMBER: 87- EQ0441AD

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF CLINIC	SGPB	WARFIELD ANG, 175TH TAC CLINIC	MD	21220

REQUESTOR: MSGT SMITH   AUTOVON NUMBER: 235   1ST EXTENSION: 9428   2ND EXTENSION:

TRACKING INFORMATION

DATE OF RECEIPT: 24-DEC-86   PROJECT MANAGER: MAJ DOANE   PROJECT TECHNICIAN: SSGT KOENIG, AIC CASEY
REMARKS: 500MG OF SAMPLE MIXED WITH RECONSTITUTED LAB WATER,SHOOK FOR6 HRS,SETTLE FOR 15 HRS. < 24 HR OLD DAPHNIA USED IN ASSAY

ORGANISM: DAPHNIA MAGNA   LC50:   DURATION: 48 HOURS

ANALYTICAL INFORMATION

D.O.	PH	TEMP(C)	TEMP(F)	ALKALINITY	HARDNESS	CL	OTHER DATA
7.4	7.5	23.0	73.4	104.0	162.0	0.00	SAMPLE TAKEN FROM DEACTIVATED POL TANK FARM, 10" DEPTH

SAMPLE START DATA

START DATE: 07-JAN-87   START TIME: 0800

	1	2	3	4	5	6	7
STARTING NUMBER:	10	10	10	10			
DILUTION PERCENT:	100	100	0	0			

INTERVAL: 24 HOURS

	1	2	3	4
SURVIVING NUMBER:	10	10	10	10
SURVIVAL PERCENT:	100	100	100	100
DO				
PH:				
OTHER:				

INTERVAL: 48 HOURS

	1	2	3	4
SURVIVING NUMBER:	0	1	10	10
SURVIVAL PERCENT:	0	10	100	100
DO:	8.6	8.6	8.0	8.0
PH:	8.3	8.3	8.4	8.4
OTHER:	23 C	23 C	23 C	23 C

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

USAFOEHL BIOASSAY RECORD SHEET

TEST NUMBER: D 0441 007 4 BASE SAMPLE NUMBER: GS860175 SPECIAL PROJECT NUMBER: 87 1001 CL / TR NUMBER: 87- EQ0441AD

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF CLINIC	SGPB	WARFIELD ANG, 175TH TAC CLINIC	MD	21220

REQUESTOR: MSGT SMITH AUTOVON NUMBER: 235 1ST EXTENSION: 9428 2ND EXTENSION:

TRACKING INFORMATION

DATE OF RECEIPT: 24-DEC-86 PROJECT MANAGER: MAJ DOANE PROJECT TECHNICIAN: SSGT KOENIG, AIC CASEY
REMARKS: 500MG OF SAMPLE MIXED WITH RECONSTITUTED LAB WATER,SHOOK FOR6 HRS,SETTLE FOR 15 HRS. < 24 HR OLD DAPHNIA USED IN ASSAY

ORGANISM: DAPHNIA MAGNA LC50: DURATION: 48 HOURS

ANALYTICAL INFORMATION

D.O.	PH	TEMP(C)	TEMP(F)	ALKALINITY	HARDNESS	CL	OTHER DATA
7.4	7.5	23.0	73.4	104.0	162.0	0.00	SAMPLE TAKEN FROM DEACTIVATED POL TANK FARM, 10" DEPTH

SAMPLE START DATA

START DATE: 07-JAN-87 START TIME: 0800

	1	2	3	4	5	6	7
STARTING NUMBER:	10	10	10	10			
DILUTION PERCENT:	100	100	0	0			

INTERVAL: 24 HOURS

SURVIVING NUMBER:	10	9	10	10
SURVIVAL PERCENT:	100	90	100	100
DO				
PH:				
OTHER:				

INTERVAL: 48 HOURS

SURVIVING NUMBER:	0	1	10	10
SURVIVAL PERCENT:	0	10	100	100
DO:	7.8	7.8	8.0	8.0
PH:	8.3	8.3	8.4	8.4
OTHER:	23 C	23 C	23 C	23 C

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

USAFOEHL BIOASSAY RECORD SHEET

TEST NUMBER: D 0441 007 5 BASE SAMPLE NUMBER: GS860176 SPECIAL PROJECT NUMBER: 8701001 CL / TR NUMBER: 87- EQ0441AD

REQUESTING AGENCY INFORMATION

UNIT	OFC SYM	INSTALLATION	ST	ZIP
USAF CLINIC	SGPB	WARFIELD ANG, 175TH TAC CLINIC	MD	21220

REQUESTOR: MSGT SMITH AUTOVON NUMBER: 235 1ST EXTENSION: 9428 2ND EXTENSION:

TRACKING INFORMATION

DATE OF RECEIPT: 24-DEC-86 PROJECT MANAGER: MAJ DOANE PROJECT TECHNICIAN: SSGT KOENIG, AIC CASEY
REMARKS: 500MG OF SAMPLE MIXED WITH RECONSTITUTED LAB WATER,SHOOK FOR6 HRS,SETTLE FOR 15 HRS. < 24 HR OLD DAPHNIA USED IN ASSAY

ORGANISM: DAPHNIA MAGNA LC50: DURATION: 48 HOURS

ANALYTICAL INFORMATION

D.O.	PH	TEMP(C)	TEMP(F)	ALKALINITY	HARDNESS	CL	OTHER DATA
7.4	7.5	23.0	73.4	104.0	162.0	0.00	SAMPLE TAKEN FROM DEACTIVATED POL TANK FARM, 10" DEPTH

SAMPLE START DATA

START DATE: 07-JAN-87 START TIME: 0800

	1	2	3	4	5	6	7
STARTING NUMBER:	10	10	10	10			
DILUTION PERCENT:	100	100	0	0			

INTERVAL: 24 HOURS

SURVIVING NUMBER:	8	9	10	10
SURVIVAL PERCENT:	80	90	100	100
DO				
PH:				
OTHER:				

INTERVAL: 48 HOURS

SURVIVING NUMBER:	1	0	10	10
SURVIVAL PERCENT:	10	0	100	100
DO:	8.0	8.0	8.0	8.0
PH:	8.4	8.4	8.4	8.4
OTHER:	23 C	23 C	23 C	23 C

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

INTERVAL: HOURS

SURVIVING NUMBER:
SURVIVAL PERCENT:
DO:
PH:
OTHER:

15 October 1986

USAFOEHL
AQUATIC BIOASSAY INFORMATION SHEET

RATIONALE:

The use of living organisms to detect the presence of toxic materials in the environment goes back to the use of parakeets in coal mines to indicate to the miners that the air was not fit to breathe. We use aquatic organisms at USAFOEHL for the same conceptual purpose: to detect the presence of toxic materials in the environment. We use juvenile water fleas (Daphnia magna) and fathead minnows (Pimephales promelas) for two main purposes. First, we use them to test for toxicity of USAF base effluents; particularly for NPDES permit compliance. Second, these aquatic organisms serve as reliable indicators for screening suspected contaminated water samples before more expensive chemical analysis are attempted to support fish kill investigations. We also use the larvae of a mosquito (Wyeomyia smithii) as well as a species of aquatic bacteria (Photobacterium phosphoreum) for testing the toxicity of selected water samples. We do this because all too often when water samples are collected in support of a fish kill investigation they are taken a considerable time after the event. Therefore, the water submitted to us may not be representative of the situation at the the time of the event and may not be toxic at all. This biological screening protocol saves us the considerable time and money required to perform a battery of tests in an attempt to isolate a nonexistent toxic component.

PROCEDURES:

We perform our aquatic toxicity tests following the procedures in: (1) Standard Methods for the Examination of Water and Wastewater (16th Edition); (2) Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-85/013; and (3) Quality Assurance Manual for Performing Acute Toxicity Tests, FDER Biological Section, 1983.

To perform our standard 48 hour acute toxicity test we use 250 ml of sample for the Daphnia or 2000 ml for the fish. All tests are run in glass beakers. We use juvenile fish, less than 3 months old, which are approximately one inch in length and 1 gram in weight which were originally obtained from the National Fish Hatchery in Uvalde TX. We use juvenile Daphnia, less than 24 hours old. We always run at least one duplicate of each test and two simultaneous controls, which are set up exactly the same as the test, but use our standard laboratory dilution water. (We use dechlorinated Brooks AFB tap water which comes from the Edwards underground aquifer and is of very high quality as our dilution water.) The controls are used to confirm the reliability of our test procedure. In the instances where we are required to determine the amount of a suspected toxicant that would kill half the organisms (LC50), additional dilutions of the sample are required. We routinely use 50% and 25% of the sample mixed with our laboratory water plus an undiluted 100% sample. The organisms are observed every 24 hours to determine deaths,

Atch 6

the number of which is proportional to the level of toxicity. We use death as the end point of our tests, or in the case of the Daphnia, the cessation of all movement, even on stimulation. Our tests are run in environmental chambers at a constant 22 degrees centigrade (+/- one degree).

USAFOEHL BIOASSAY RECORD SHEET:

The attached record sheet reports the results of our toxicity test as well as basic analytical information. Each page represents one sample with all dilution percentages used. Your "BASE SAMPLE NUMBER" and our "TEST NUMBER" are indicated on the first line as our "SPECIAL PROJECT NUMBER" and our "CONSULTATIVE LETTER (CL) OR TECHNICAL REPORT (TR) NUMBER" where relevant. Your organization and our project personnel are identified in the next section along with the sample receipt date. Our target organism is identified next with the LC50 if one was calculated and the "DURATION:" of the test in "HOURS". We next have listed results of the analyses we performed on the raw sample, such as "D.O." (dissolved oxygen), "PH", "TEMPERATURE" (centigrade and fahrenheit), "ALKALINITY" (as mg/l CaCO3), "HARDNESS" (as mg/l CaCO3), "CL" (chlorine) and any relevant "OTHER DATA". We also note the time and date we actually start the test. The numbers "1" through "7" signify the number of replicates. (There will always be at least one duplicate of each sample dilution tested.) The "STARTING NUMBER" refers to the number of organisms used in each test, usually 10. The "DILUTION PERCENT" refers to the concentration of your sample used in each replicate. Undiluted sample is identified as 100% dilution and 0% dilution represents the laboratory control samples which will be the same for each page. (If run on the same day, the two controls will serve for all samples run that day.) "SURVIVAL NUMBER" is the number of organisms still alive at that "TIME INTERVAL". "SURVIVAL PERCENT" will read 100 when no toxicity is measured. The lower the percent survival the more toxic the sample. Observations are annotated at each 24 hour hour mark. There may be an occasion to run a test through 96 hours depending on the circumstance, otherwise these areas will be left blank. We also report the DO, pH and any other relevant parameters at each time interval.

Please call Major Tom Doane at AUTOVON 240-3667 (Commercial 512/536-3667) if you have questions about our procedures or your results.

LABORATORY ANALYSIS REPORT AND RECORD (Confidential) 30 Jan 01

FROM: USAF OEHL/SA
Brooks AFB TX 78235-5000

SAMPLE RECEIVED: GS870001 thru GS870005 sludge samples

DATE RECEIVED: 9 Jan 87

SAMPLE FROM: TAC Nat

LAB CONTROL NO: 001171 thru 001175

TESTED: Hazardous Waste — Analyses by: Infrared Spectrograph: X-ray fluorescence: PH measurement: Gas Chromatograph: closed cup flash pt. Testor: Other

OEHL No.	Base No.	Ignitable	Corrosivity and/or Reactivity	RESULTS OF ANALYSIS
001171	870001	no	None (pH 6.0)	
001172	870002	no	None (pH 6.0)	
001173	870003	no	None (pH 6.0)	
001174	870004	no	None (pH 6.0)	
001175	870005	no	None (pH 6.0)	

REQUESTING AGENCY (Mailing Address)

OEHL/ECQ
attn: Kay Doane
Brooks AFB

J. D. HILLSBERRY, GS-12
Chief, Industrial Products and Compressed Gas Analysis Section

AFSC Form 3511, DEC 85

Atch 7

LABORATORY ANALYSIS REPORT AND RECORD | DATE 23 Jan 87

SAMPLE IDENTITY: OEHL- ECQ | FROM: USAFOEHL/SA BROOKS AFB TX 78235-5501

DATE RECEIVED: 9 Jan 87 | OEHL #

E.P. TOXICITY METALS ANALYSIS (UNITS = Mg \ L)

BASE #	GS860176 GS87001	173 GS87002	174 GS87003	175 GS87004	GS860176 GS87005
OEHL #	1171	1172	1173	1174	1175
Arsenic 1002	<0.01	0.03	<0.02	0.01	0.06
Barium 1007	<1.00	<1.00	<1.00	<1.00	<1.00
Cadmium 1027	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium 1034	<0.05	<0.05	<0.05	<0.05	0.07
Lead 1051	0.19	0.11	0.13	0.13	0.23
Mercury 71900	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium 1147	<0.01	<0.01	<0.01	<0.01	<0.01
Silver 1077	<0.01	<0.01	<0.01	<0.01	0.01

G. D. HILLSBERRY, GS-12
Chief, Industrial Products and Compressed Gas Analysis Section

MICHAEL J. WARTLAND, TSgt, USAF
NCOIC Occupational Chemistry Branch

Requesting Agency:
OEHL/ECQ
Brooks A.F.B. TX 78235

Edward A. Hrna
EDWARD A. HRNA
Physical Science Technician
Metals Analysis Section

SITE 7

Underground MOGAS Tank Excavation
North of Building 1140

JOINT MESSAGEFORM						SECURITY CLASSIFICATION: UNCLASSIFIED				
PAGE	DTG RELEASER TIME			PRECEDENCE		CLASS	SPECAT	CMS		DMS MSG IDENT
	DATE TIME	MONTH	YR	ACT	INFO					
1 OF 1	20 1200Z	MAR	87	RR	RR	UUUU				
HOUR: NO	MESSAGE HANDLING INSTRUCTIONS									

FROM 175 TFG MARTIN STATE AIRPORT BALTIMORE MD //DEE//

TO AIR NATIONAL GUARD SPT CTR ANDREWS AFB MD//DEV//

UNCLASSIFIED

SUBJECT: POTENTIAL GROUNDWATER CONTAMINATION

1. BE ADVISED THAT SOIL SAMPLES TAKEN NEAR AN UNDERGROUND MOGAS FUEL TANK INDICATE THE PRESENCE OF VOLATILE HALOCARBONS AND AROMATICS. SAMPLING WAS INITIATED BASED UPON ODORS EMANATING FROM AN ADJACENT EXCAVATION.

2. THE MARYLAND DEPARTMENT OF NATURAL RESOURCES HAS BEEN INFORMED OF SAMPLE RESULTS. THE MAGNITUDE AND EXTENT OF THE PROBLEM, IF ANY, IS UNKNOWN. WE WILL ADVISE YOU OF FURTHER DEVELOPMENTS AS THEY OCCUR.

6 5 4 3 2 1 0

DISTR

135 TAC/CC

175 TFG/CC/SGPB

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE	SPECIAL INSTRUCTIONS
SCOTT A. KEARBY, CAPT, MDANG ASSISTANT BASE ENGINEER	
RELEASER: TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE: SCOTT A. KEARBY, DEE X222	
SIGNATURE:	SECURITY CLASSIFICATION: UUUU
	DATE TIME GROUP: 20 1200Z MAR 87

DD FORM 173/1 PREVIOUS EDITION IS OBSOLETE GPO : 1983 O - 425-905

LABORATORY ANALYSIS REPORT AND RECORD (General) 20Feb1987

TO: :

FROM: USAFOEHL/SA
BROOKS AFB TX 78235-5501

SAMPLE IDENTITY: WATER

DATE RECEIVED: 13 Feb 87

SAMPLE FROM: 135 AGE Underground TANK

LAB CONTROL NO:

TEST FOR: VOLATILE HALOCARBONS

METHODOLOGY: EPA 601

BASE No.	IGN870EX6				DET LIMIT
OEHL No.	9207				
Bromodichloromethane	ND				0.1
Bromoform					0.2
Bromomethane					1.0
Carbon Tetrachloride					0.1
Chlorobenzene					0.2
Chloroethane					0.5
2-Chloroethylvinyl ether					0.1
Chloroform					0.1
Chloromethane					0.1
Dibromochloromethane					0.1
1,2-Dichlorobenzene					0.2
1,3-Dichlorobenzene					0.2
1,4-Dichlorobenzene					0.2
Dichlorofluoromethane					0.1
1,1-Dichloroethane					0.2
1,2-Dichloroethane	38				0.2
1,1-Dichloroethene	ND				0.1
trans1,2-Dichloroethene	592				0.1
1,2-Dichloropropane	ND				0.1
cis1,3-Dichloropropene					0.2
trans1,3-Dichloropropene					0.2
Methylene Chloride	13				0.2
1,1,2,2-Tetrachloroethane	ND				0.1
Tetrachloroethylene	8.3				0.1
1,1,1-Trichloroethane	1173				0.1
1,1,2-Trichloroethane	ND				0.1
Trichloroethylene					0.1
Trichlorofluoromethane					0.1
Vinyl Chloride					0.2
1,2-Dibromoethane					

Results in micrograms per liter.

DATE ANALYZED: 19Feb1987

ND = None Detected. Less than the detection Limit.
TRACE = Present, but quantity less than quantitative limit.

REQUESTING AGENCY (Mailing Address)

175 TAC Clinic/SGPB
2701 Eastern Blvd
Balto MD 21220-
2899

BCHarrison

AFSC Form 3511, DEC 85 REPLACES AND FORM 841, SEP 82, WHICH IS OBSOLETE

Warfield ANG

USXPUCHE/SA
BROOKS AFB TX 78235-5501

SAMPLE IDENTITY

DATE RECEIVED
13 Feb 87

SAMPLE FROM
135 AGE Under Grnd TANK

LAB CONTROL NO

VIA/FOR
VOLATILE AROMATICS

METHODOLOGY: EPA 602

DEHL No.		9201	DETECTION LIMIT	
BASE No.		GA87C005	ND	TR
Benzene	34030	2700	1.0	2.0
Chlorobenzene	34301	1320	1.0	2.0
1,2-Dichlorobenzene	34536	ND	2.0	3.0
1,3-Dichlorobenzene	34566	ND	2.0	3.0
1,4-Dichlorobenzene	34571	200	2.0	3.0
Ethylbenzene	34371	460	1.0	2.0
Toluene	34010	3280	1.0	2.0

Results in micrograms per liter.

ND = None Detected. Less than the detection Limit
TRACE = Present, but quantity less than quantitative limit.

DATE ANALYZED: 24 Feb 87

REQUESTING AGENCY (Mailing Address)

175 TAC Clinic/SGPB
2701 Eastern Blvd
Baltimore, Md.
21220-2899

BC Harrison

SMS

AF SC Form 3511, DEC 86

Non-Potable Wells
Buildings 5045 and 5100

Brooks AFB TX 78235-5000

IDENTITY | DATE RECEIVED

FROM | LAB CONTROL NR

FOR
Volatile Aromatics

Methodology: EPA 602

Bldg 5100

					Detection Limit	
OEHL NO:	45421					
BASE NO:	GP840023				ND	TR
Benzene	ND				1.0	2.0
Chlorobenzene	ND				1.0	2.0
1,2-Dichlorobenzene	ND				2.0	3.0
1,3-Dichlorobenzene	ND				2.0	3.0
1,4-Dichlorobenzene	ND				2.0	3.0
Ethylbenzene	ND				1.0	2.0
Toluene	ND				1.0	2.0

Results in micrograms per liter.

ND - None detected Less than the detection limit
Trace - Present but less than the quantitative limit

Eric Banks 1LT USAF
CHEMIST

23 NOV

MD, USAF

REQUESTING AGENCY (Mailing Address)
175 TAC CLINIC/SGPB
WARFIELD ANGB
BALTIMORE MD 21220-2899

~~21220-2799~~

ABORATORY ANALYSIS REPORT AND RECORD (General)

16 OCT 1984

FROM: USAF OEHL/SA
BROOKS AFB TX 78235

NTITY

DATE RECEIVED
30 AUG 84

FROM

LAB CONTROL NR
48420, 22, 23

FOR
latile Halocarbons

:hodology: EPA Method 601 Blk 5ml Blk 5ml Blk 5ml

:IL NO:	48420	48422	48423			DET.
SE NO:	GP840024	GP840026	GP840027			LIMIT
omodichloromethane	ND	ND	ND			0.1
omoform						0.2
omomethane						1.0
rbon Tetrachloride						0.1
lorobenzene						0.2
loroethane						0.5
Chloroethylvinyl ether						0.1
loroform						0.1
loromethane						0.1
bromochloromethane						0.1
2-Dichlorobenzene						0.2
3-Dichlorobenzene						0.2
4-Dichlorobenzene						0.2
chlorodifluoromethane						0.1
1-Dichloroethane						0.2
2-Dichloroethane						0.2
1-Dichloroethene						0.1
ans-1,2-Dichloroethene						0.1
,2-Dichloropropane						0.1
s-1,3-Dichloropropene						0.2
ans-1,3-Dichloropropene	↓					0.2
ethylene Chloride	0.8					0.2
,1,2,2-Tetrachloroethane	ND					0.1
trachloroethylene	0.6					0.1
,1,1-Trichloroethane	ND					0.1
,1,2-Trichloroethane						0.1
richloroethylene						0.1
richlorofluoromethane						0.1
inyl Chloride	↓	↓	↓			0.2

esults in Micrograms per Liter

Edwin A. Pacer 23 OCT 1984
Maj, USAF

QUESTING AGENCY (Mailing Address)
175 TAC Clinic/SGPB
Warfield ANGB
Baltimore, MD
21220-2899

ND-NONE DETECTED, LESS THAN THE DETECTION LIMIT.

TRACE-PRESENT BUT LESS THAN THE QUANTITATIVE LIMIT.

A.L Willis
Technician

LABORATORY ANALYSIS REPORT AND RECORD (General)

ENTITY	FROM USAF OEHL/SA Brooks AFB TX 78235-5000
FROM	DATE RECEIVED
FOR	LAB CONTROL NR

Volatile Aromatics

Methodology: EPA 602

OEHL NO:	67842	67844			Detection Limit	
BASE NO:	GP840047	GP840049			ND	TR
Benzene	ND	1.2			1.0	2.0
Chlorobenzene	10.5	1.5			1.0	2.0
1,2-Dichlorobenzene	ND	ND			2.0	3.0
1,3-Dichlorobenzene	ND	ND			2.0	3.0
1,4-Dichlorobenzene	ND	ND			2.0	3.0
Ethylbenzene	1.5	ND			1.0	2.0
Toluene	ND	ND			1.0	2.0

Bldg 5100 Bldg 5045

Results in micrograms per liter.

ND - None detected Less than the detection limit
Trace - Present but less than the quantitative limit

DATE ANALYZED: 1-3-85

Edward J. Brown

21 JAN 1985

REQUESTING AGENCY (Mailing Address)

175 TAC CLINIC/SGAB
WARFIELD ANGB
BALTIMORE, MD 21220-2899

Analysis Completed by Contract Lab.

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: 21 JAN 85

TO:

FROM: USAF OEHL/SA
BROOKS AFB TX 78235-5000

SAMPLE IDENTITY: WATER

DATE RECEIVED: 27 NOV 84

SAMPLE FROM: WARFIELD ANGB, MD

LAB CONTROL NR:

TEST FOR: Volatile Halocarbons

Methodology: EPA Method 601 Bid 5040 Bid 5045

OEHL NO:	67841	67843				DET.
BASE NO:	GP140046	GP140048				LIMIT
Bromodichloromethane	ND	ND				0.1
Bromoform	ND	ND				0.2
Bromomethane						1.0
Carbon Tetrachloride	ND	ND				0.1
Chlorobenzene	ND	ND				0.2
Chloroethane						0.5
2-Chloroethylvinyl ether						0.1
Chloroform	ND	ND				0.1
Chloromethane						0.1
Dibromochloromethane	ND	ND				0.1
1,2-Dichlorobenzene						0.2
1,3-Dichlorobenzene						0.2
1,4-Dichlorobenzene						0.2
Dichlorodifluoromethane						0.1
1,1-Dichloroethane	ND	ND				0.2
1,2-Dichloroethane	ND	ND				0.2
1,1-Dichloroethene	ND	ND				0.1
trans-1,2-Dichloroethene	ND	ND				0.1
1,2-Dichloropropane						0.1
cis-1,3-Dichloropropene	ND	ND				0.2
trans-1,3-Dichloropropene						0.2
Methylene Chloride	ND	ND				0.2
1,1,2,2-Tetrachloroethane						0.1
Tetrachloroethylene						0.1
1,1,1-Trichloroethane						0.1
1,1,2-Trichloroethane						0.1
Trichloroethylene	ND	ND				0.1
Trichlorofluoromethane						0.1
Vinyl Chloride						0.2

Results in Micrograms per Liter

Edward J. Brown

DATE ANALYZED: 1-3-85

21 JAN 1985

Analysis Completed by Contract Lab.

REQUESTING AGENCY (Mailing Address)

175 TAC Clinic/SGPB
Warfield ANGB,
Baltimore, MD 21220-2899

ND-NONE DETECTED, LESS THAN THE DETECTION LIMIT.

TRACE-PRESENT BUT LESS THAN THE QUANTITATIVE LIMIT.

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: 8 May 85

TO: Warfield ANGB

FROM: USAF OEHL/SA
Brooks AFB TX 78235-5000

SAMPLE IDENTITY: Water

DATE RECEIVED: 19 Apr 85

SAMPLE FROM: Warfield ANGB

LAB CONTROL NO:

TEST FOR: Volatile Aromatics

Methodology: EPA 602

	Blank 5/00				Detection Limit	
OEHL NO:	27461					
BASE NO:	GP850015				ND	TR
Benzene	ND				1.0	2.0
Chlorobenzene	1.3				1.0	2.0
1,2-Dichlorobenzene	ND				2.0	3.0
1,3-Dichlorobenzene					2.0	3.0
1,4-Dichlorobenzene					2.0	3.0
Ethylbenzene					1.0	2.0
Toluene	ND				1.0	2.0

Results in micrograms per liter.

ND-None Detected. Less than the detection limit.
TRACE-Present but less than the quantitative limit.

DATE ANALYZED: 8 MAR 85

NOTE: Analysis completed by contract laboratory.

REQUESTING AGENCY (Mailing Address)
175 TAC Clinic/SGPB
Warfield ANGB
Balto, MD
21220-2899

Edward J. Brown 10 MAY 1985

ENVIRONMENTAL SAMPLING DATA

(Use this space for mechanical imprint)

SAMPLING SITE IDENTIFIER (AFR 19-7): 0441 FA 006

BASE WHERE SAMPLE COLLECTED: Warfield ANGB

SAMPLING SITE DESCRIPTION: Bldg 5100 Well

DATE COLLECTION BEGAN (YYMMDD): 870710

TIME COLLECTION BEGAN (24 hour clock): 1020

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE _____ HOURS

MAIL REPORTS TO (circle if changed): ORIGINAL 0441 — 175 TAC Clinic/SGPB, 2701 Eastern Blvd Balto. Md 21220-2899

COPY 1

COPY 2

SAMPLE COLLECTED BY (Name, Grade, AFSC): C.A. Smith, MSgt 90770

SIGNATURE: [signature]

AUTOVON: 235-9428

REASON FOR SUBMISSION: R — A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify)

BASE SAMPLE NUMBER: GN 87 0082 — OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		Hardness	00900	Residue, Settleable	50086	GROUP T	
Ammonia	00610	Iron	01045	Residue, Volatile	00505	Bromoform	32104
Chemical Oxygen Demand	00340	Lead	01051	Silica	00955	Bromodichloromethane	32101
Kjeldahl Nitrogen	00625	Magnesium	00927	Specific Conductance	00095	Carbon Tetrachloride	32102
Nitrate	00620	Manganese	01055	Sulfate	00945	Chloroform	32106
Nitrite	00615	Mercury	71900	Sulfite	00740	Chloromethane	34418
Oil & Grease	00560	Nickel	01067	Surfactants -MBAS	38260	Dibromochloromethane	32105
Organic Carbon	00680	Potassium	00937	Turbidity	00076	Methylene Chloride	34423
Orthophosphate	00671	Selenium	01147			Tetrachloroethylene	34475
Phosphorus, Total	00665	Silver	01077			1,1,1-Trichloroethane	34506
		Sodium	00929	GROUP H		Trichloroethylene	39180
GROUP D		Thallium	01059	BHC Isomers	39340	Trihalomethanes	82080
Cyanide, Total	00720	Zinc	01092	Chlordane	39350	PCBs	39516
Cyanide, Free	00722			DDT Isomers	39370		
				Dieldrin	39380	X VOA	
GROUP E		GROUP G		Endrin	39390		
Phenols	32730	Acidity, Total	70508	Heptachlor	39410		
		Alkalinity, Total	00410	Heptachlor Epoxide	39420		
GROUP F		Alkalinity, Bicarbonate	00425	Lindane	39782		
Antimony	01097	Bromide	71870	Methoxychlor	39480		
Arsenic	01002	Carbon Dioxide	00405	Toxaphene	39400		
Barium	01007	Chloride	00940	2,4-D	39730	ON SITE ANALYSES	
Beryllium	01012	Color	00080	2,4,5-TP-Silvex	39760	Parameter	Value
Boron	01022	Fluoride	00951	2,4,5-T	39740	Flow 50050	mgd
Cadmium	01027	Iodide	71865			Chlorine, Total 50060	mg/l
Calcium	00916	Odor	00086			Dissolved Oxygen 00300	mg/l
Chromium, Total	01034	Residue, Total	00500			pH 00400	units
Chromium VI	01032	Residue, Filterable (TDS)	70300	GROUP J		Temperature 00010	°C
Copper	01042	Residue, Nonfilterable	00530	Sulfides	00745		

COMMENTS

AF FORM JAN 81 2752

LABORATORY ANALYSIS REPORT AND RECORD FORM

16 FEB 1988

USAFOEHL/SA
BROOKS AFB TX 78235-5501

SAMPLE MEDIUM: WATER

DATE RECEIVED: 26 Oct 1987

SAMPLE TYPE:

VOLATILE AROMATICS

METHODOLOGY: EPA 602

OEHL No.		70844	DETECTION LIMIT	
BASE No.		GN870282	ND	TR
Benzene	34030	ND	1.0	2.0
Chlorobenzene	34301		1.0	2.0
1,2-Dichlorobenzene	34536		2.0	3.0
1,3-Dichlorobenzene	34566		2.0	3.0
1,4-Dichlorobenzene	34571		2.0	3.0
Ethylbenzene	34371		1.0	2.0
Toluene	34010		1.0	2.0

Results in micrograms per liter.

ND = None Detected. Less than the detection Limit
TRACE = Present, but quantity less than quantitative limit.

DATE ANALYZED: 26 Oct 1987

REQUESTING AGENCY (Mailing Address)

175th TAC CLINIC/SGPB
2701 Eastern Blvd
Baltimore, Md
Attn 21220-2899

RAC

ENVIRONMENTAL SAMPLING DATA

(Use this space for mechanical imprint)

SAMPLING SITE IDENTIFIER (AFR 19-7): 0441 FA 006

BASE WHERE SAMPLE COLLECTED: Warfield ANGB

SAMPLING SITE DESCRIPTION: Bldg 5100 Well

DATE COLLECTION BEGAN (YYMMDD): 870121

TIME COLLECTION BEGAN (24 hour clock): 1020

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE _____ HOURS

MAIL REPORTS TO (circle if changed)
- ORIGINAL: 0441 175 TAC Clinic/SGPB, 2701 Eastern Blvd Baltimore Md 21220-2899
- COPY 1:
- COPY 2:

SAMPLE COLLECTED BY (Name, Grade, AFSC): C. A. Smith, MSgt, 90770

SIGNATURE:

AUTOVON: 235-9428

REASON FOR SUBMISSION: R

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify)

BASE SAMPLE NUMBER: GN87 0083

ANALYSES REQUESTED (check appropriate blocks)

GROUP A		GROUP D		GROUP E		GROUP F	
Ammonia	00610	Cyanide, Total	00720	Phenols	32730	Antimony	01097
Chemical Oxygen Demand	00340	Cyanide, Free	00722			Arsenic	01002
Kjeldahl Nitrogen	00625					Barium	01007
Nitrate	00620					Beryllium	01012
Nitrite	00615					Boron	01022
Oil & Grease	00560					Cadmium	01027
Organic Carbon	00680					Calcium	00916
Orthophosphate	00671					Chromium, Total	01034
Phosphorus, Total	00665					Chromium VI	01032
						Copper	01042

		GROUP G	
Hardness	00900	Acidity, Total	70508
Iron	01045	Alkalinity, Total	00410
Lead	01051	Alkalinity, Bicarbonate	00425
Magnesium	00927	Bromide	71870
Manganese	01055	Carbon Dioxide	00405
Mercury	71900	Chloride	00940
Nickel	01067	Color	00080
Potassium	00937	Fluoride	00951
Selenium	01147	Iodide	71865
Silver	01077	Odor	00086
Sodium	00929	Residue, Total	00500
Thallium	01059	Residue, Filterable (TDS)	70300
Zinc	01092	Residue, Nonfilterable	00530

		GROUP H	
Residue, Settleable	50086	BHC Isomers	39340
Residue, Volatile	00505	Chlordane	39350
Silica	00955	DDT Isomers	39370
Specific Conductance	00095	Dieldrin	39380
Sulfate	00945	Endrin	39390
Sulfite	00740	Heptachlor	39410
Surfactants -MBAS	38260	Heptachlor Epoxide	39420
Turbidity	00070	Lindane	39782
		Methoxychlor	39480
		Toxaphene	39400
		2,4-D	39730
		2,4,5-TP-Silvex	39760
		2,4,5-T	39740
		GROUP J	
		Sulfides	00745

GROUP T	
Bromoform	32104
Bromodichloromethane	32101
Carbon Tetrachloride	32102
Chloroform	32106
Chloromethane	34418
Dibromochloromethane	32105
Methylene Chloride	34423
Tetrachloroethylene	34475
1,1,1-Trichloroethane	34506
Trichloroethylene	39180
Trihalomethanes	82080
PCBs	39516
X VOH	

ON SITE ANALYSES

Parameter		Value
Flow	50050	mgd
Chlorine, Total	50060	mg/l
Dissolved Oxygen	00300	mg/l
pH	00400	units
Temperature	00010	°C

COMMENTS

AF FORM JAN 81 2752

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: 27 OCT 1987

FROM: USAFOEHL/SA
BROOKS AFB TX 78235-5501

P.C. IDENTITY: WATER

DATE RECEIVED: 26OCT1987

P.C. DESC:

LAB CONTROL NO.:

TYPE: VOLATILE HALOCARBONS

METHODOLOGY: EPA 601

EHL No.		70845				
ASE No.		VGN870083				
Bromodichloromethane	32101	ND				
Bromoform	32104					
Bromomethane	34413					
Carbon Tetrachloride	32102					
Chlorobenzene	34301					
Chloroethane	34311					
2-Chloroethylvinyl ether	34576					
Chloroform	32106	0.3				
Chloromethane	34418	ND				
Dibromochloromethane	32105					
1,2-Dichlorobenzene	34536					
1,3-Dichlorobenzene	34566					
1,4-Dichlorobenzene	34571					
Dichlorofluoromethane	34668					
1,1-Dichloroethane	34496					
1,2-Dichloroethane	34531					
1,1-Dichloroethene	34501					
trans1,2-Dichloroethene	34546					
1,2-Dichloropropane	34541					
cis1,3-Dichloropropene	34704					
trans1,3-Dichloropropene	34699					
Methylene Chloride	34423					
1,1,2,2-Tetrachloroethane	34516					
Tetrachloroethylene	34475					
1,1,1-Trichloroethane	34506					
1,1,2-Trichloroethane	34511					
Trichloroethylene	39180					
Trichlorofluoromethane	34488					
Vinyl Chloride	39175					
1,2-DIBROMOETHANE						

Results in micrograms per liter.

ND = None Detected. Less than the detection Limit. <.1
TRACE = Present, but quantity less than quantitative limit. <.2

REQUESTING AGENCY (Mailing Address)

175th TAC CLINIC/SGPB
2701 Eastern Blvd
Baltimore, Md
ZIP 21220-2899

DATE ANALYZED: 26OCT1987

B C Harrison

RD

SITE 11

Aboveground POL Storage Tanks
31 July 1987 Spill

WHITE - OIL SPILL CONTROL DIVISION PINK - WRA ENFORCEMENT YELLOW - PERSON OR AGENCY REPORTING SPILL

REPORT OF SPILL

No. 46399 (1 5)

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401

TELEPHONE:
DAY (301) 269-3551
NIGHT OR HOLIDAYS
(301) 269-3181

PURSUANT TO THE PROVISIONS OF STATE LAW AND REGULATION (COMAR 08 05 04 07) THE PERSON RESPONSIBLE FOR AN OIL SPILL SHALL PREPARE A COMPLETE WRITTEN REPORT OF THE OCCURRENCE AND PROMPTLY SUBMIT IT TO THE ADMINISTRATION. THE WRITTEN REPORT MAY NOT BE USED IN ANY CRIMINAL CASE EXCEPT AS A PROSECUTION FOR PERJURY OR FOR GIVING FALSE STATEMENT. THE ADMINISTRATION RESERVES THE RIGHT TO OBTAIN ANY FURTHER INFORMATION AS NEEDED.

ANSWER ALL QUESTIONS AND GIVE APPROPRIATE DETAILS. RETURN TO THE ADMINISTRATION WITHIN 10 DAYS OF THE COMPLETION OF CLEANUP. PLEASE PRINT FIRMLY. USE A BALL POINT PEN. THIS REPORT MAY ALSO BE USED FOR MATERIALS OTHER THAN OIL.

A Date of Spill Mo (6) 0 7 Day (11) 3 1 Yr 19 8 7 — Time of Spill (12-15) 0 6 2 0 (Use 24 Hour Clock)

B Location of Spill (Circle only one box)

- [1] Contained on land
- [2] Entered surface waters. If #2 checked, name body of water (17-28) _____
- [3] Is below ground surface — SEE ATCH
- [4] Entered storm drain
- [5] Entered sanitary sewer (16)

County (29-30) BALTIMORE

Location (name of Rd etc.) MARTIN STATE AIRPORT
2701 EASTERN BLVD
BALTIMORE, MD 21220 (31-55)

C Total amount of Vehicle, Vessel, Tank (If unknown amount, put U in box.)

- [ ] (2 1 0 0 0 0) gallons (56 57 63)
- [ ] Amount Spilled (3 6 9 1 0) gallons (64 65 71)
- [ ] Amount Recovered (2 8 4 2 0) gallons (72 73 79)

D Type of Substance Spilled (Circle one or more)

- [G] Gasoline
- [K] Kerosene
- [J] Jet Fuel
- [1] No. 1 Oil
- [6] No. 6 Oil
- [W] Waste Oil
- [H] Hazardous Material (must identify)
- [O] Other (must identify) (8-10) _____ (11-35)
- [D] Diesel Oil
- [2] No. 2 Oil
- [4] No. 4 Oil
- [B] Bunker
- [C] Crude
- [A] Asphalt

E Source of Spill (Circle one box)

- [C] Car
- [T] Truck
- [N] Tank Truck
- [R] Train
- [L] Oil Terminal
- [V] Service Station
- [H] Ship
- [B] Barge (36)
- [W] Other Watercraft
- [A] Aviation
- [I] Industry other than Oil Company
- [S] School
- [P] Apartment Bldgs
- [U] Unknown
- [F] Home Fuel Tank
- [D] Drums (Specify)
- [O] Other (Specify) TANK FARM (37-48)

Vehicle Tag No. _____

Cause of Spill (Circle one box)

- [A] Accident
- [G] Grounding
- [B] Bilge Pumping
- [S] Sinking
- [M] Mystery Slick
- [T] Tank Leak
- [R] Transfer Accident
- [P] Pipe Leak
- [O] Other (specify) SEE ATCH (48-57)

Attributing Cause (Circle one box)

- [V] Vandalism
- [M] Mechanical Failure
- [P] Personnel Error
- [O] Other (specify) SEE ATCH (58-68)

F Materials Used By You to Clean Up Spills (Circle one or more)

Material	Quantity
[S] Sorbent	___ ___ ___ bags
[B] Sorbent Booms	___ ___ ___ each
[C] Corrwed	___ ___ ___ rolls
[L] Oil Snare	___ ___ ___ boxes
[O] Other (specify) VACUUM TRUCKS (6-21)	

Total product removed by sorbent material (___ ___ ___ ___ ___ ___ ___) gallons (22-28)

If vacuum trucks or pumps were used to remove product in liquid form, give total product removed in liquid form (___ 2 8 4 2 0) (29-35)

G Where were clean-up materials disposed? (Circle one or more and give name)

- [L] Landfill _____
- [R] Oil Recovery Company _____ (36-71)
- [O] Other CLEAN AMERICA INC.

H Cost of Spill (Circle one or more boxes and give amount)

[C]	Cleanup	$ 3 3 5 0 0 (est.)
[P]	Loss of Product	2 6 1 0 0
[E]	Loss of Equipment	7 1 1 0
[O]	Other	
[T]	Total (6-45)	$ 6 2 0 5 8

I What will be done to prevent a recurrence of spill? (Circle one or more boxes)

- [P] Personnel Training
- [R] Repair Mechanical Failure
- [I] Increase Security
- [V] Revise Operations Procedure
- [O] Other (Explain) _____ (46-47) (48-98)

J Effects of Spill (List only the effects caused by the spilled material)

- [F] Fatality
- [I] Injury
- [W] Waterfowl
- [F] Finfish
- [S] Shellfish
- [O] Other Wildlife (60-64)
- [P] Private Well Contaminated
- [M] Municipal Drinking Water Contaminated
- [I] Industrial Water Intake Contaminated
- [F] Fire
- [X] Property Damage
- [O] Other (Explain) SEE ATCH (65-79)

Please Explain Effects _____

K Spill was cleaned up by (Circle one or more and give name)

- [S] State Agency _____
- [C] County or City Agency _____
- [L] Petroleum Industry _____
- [V] Private Industry _____
- [N] Oil Spill Cleanup Contractor CLEAN AMERKA INC
- [O] Other _____ (6-41)

L Person(s) Responsible for Spill (Circle one and give name and address)

- [G] Government
- [Z] Private Citizen
- [V] Private Industry
- [P] Petroleum Industry
- [T] Transportation Industry
- [C] Chemical Industry
- [O] Other (42)

Name _____
Address _____

If Company give name and address
Name MARYLAND AIR NATIONAL GUARD (43-62)
Address 2701 EASTERN BLVD
BALTIMORE, MD 21220

Oil Operations Permit No. (63-70) B3 OT 0699

M Person(s) Making Report
Name (6-17) ROBERT D. CARDWELL JR. COL
Address 2701 EASTERN BLVD
BALTIMORE, MD 21220

Signature _____

Attachment to Report of Spill # 46399

B. Location of Spill:

Although the majority of the spilled fuel was contained by the dike, an unknown amount of fuel (potentially 9550 gal) did penetrate the side of the catch basin and entered the subbase beneath the containment slab.

E. Cause of Spill:

Truck loading pump #1 was running for an unknown period sometime between 1700 on 30 July 87 until it was discovered at approximately 0620 on 31 July 87. The valves were configured in a manner to permit JP4 to recirculate from tank to tank. The running pump transferred fuel, emptying tank #2 and filling tank #1 until it overfilled and collected in the diked area.

E. Attributing Cause:

The exact cause is still under investigation. Two possibilities exist; either the pump was left running by the last operator or the pump was started after duty hours by an unknown person. Contributing factors include:

- Leaving valves to and from the storage tanks open.
- Leaving the recirculation valve partially open.
- Keeping the pump control and power circuits active/energized after duty hours.

H. Cost of Spill:

The $2,370.00 listed as "Other" is for Aqueous Film Forming Foam (AFFF) used by the MDANG Fire Department to mitigate safety hazards during the clean up.

J. Effects of Spill:

The extent of the effects of the JP4 that entered the ground beneath the containment slab is unknown. Preliminary sampling is being accomplished by the MDANG BioEnvironmental technician and analysis will be done through the USAF Occupational & Environmental Health Laboratory, Brooks AFB, Texas.