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U.S. AIR FORCE
INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH

AIR NATIONAL GUARD, CAMP EDWARDS (ARNG),
U.S. AIR FORCE AND VETERAN'S ADMINISTRATION
FACILITIES AT MASSACHUSETTS MILITARY
RESERVATION, MASSACHUSETTS.

APPENDICES: TASK 6

DECEMBER 11, 1986

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Oak Ridge, Tennessee 37831
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Martin Marietta Energy Systems, Inc.
for the
U.S. DEPARTMENT OF ENERGY

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MASSACHUSETTS MILITARY RESERVATION, MASSACHUSETTS

FINAL REPORT: TASK 6

DECEMBER 11, 1986

Prepared by the
[OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TENNESSEE 37831

Operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
UNDER CONTRACT NO. DE-AC05-84OR21400

Submitted by
E.C. JORDAN CO.
261 COMMERCIAL STREET
PORTLAND, MAINE

APPENDIX A
GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

ADC	Aerospace Defense Command
AEHA	Army Environmental Hygiene Agency
AEW&C	Airborne Early Warning and Control Wing
AFB	Air Force Base
AFESC	Air Force Engineering and Service Center
AFS	Air Force Station
AFTDS	AVGAS Fuel Valve Testing Dump Site
AGE	Aerospace Ground Equipment Shop
AICUZ	Air Installation Compatible Use Zone
AIM-4	Air-to-air missiles
aliphatic	Hydrocarbon compounds with carbon bonds that are not arranged in a resonating ring structure
ANG	Air National Guard
ANG/CE	Air National Guard/Civil Engineering
anisotropic	Having physical properties such as transmissivity that vary in different directions
Aquafarm	Underground fuel storage and transfer facility that uses water to displace fuel for delivery
aquifer	A geologic formation, group of formations, or part of a formation capable of yielding water to a well or spring
ARNG	Army National Guard
aromatic	Hydrocarbon compounds in which carbon atoms are bonded in a resonating ring structure
ASCC	Air Station Cape Cod
avionics	Airborne electronics
AVCO	AVCO, Inc. A corporation based in Greenwich, Connecticut, that engages in defense contracting.

AVGAS	Aviation gasoline
bottom ash	Ash from the furnace of a coal-fired furnace
BOMARC	Boeing Michigan Aeronautical Research Center
bowser	tank trailer
BTN	Battalion
BTX	Benzene, toluene, and xylenes (aromatic fuel hydrocarbons)
CAM Shop	Consolidated Aircraft Maintenance Shop
cantonment	builtup area of a military (Army) installation
cation	positively charged ion
CaCO_3	Calcium carbonate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFTA	Current fire training area
CGRADSTA	Coast Guard Radar Station
cosmolene	petroleum jelly preservative
cy	cubic yards
DCA	1,1-dichloroethane
decision tree	Logic diagram
DEQE	Department of Environmental Quality Engineering
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DFAE	Directorate of Facilities and Engineering
2,4-DNT	2,4-dinitrotoluene
DOD	Department of Defense
downgradient	in the direction of decreasing hydraulic static head; the direction in which ground-water flows

DPDO	Defense Property Disposal Office
DRMO	Defense Reutilization and Marketing Office
effluent	Discharge of liquid waste
EOD	Explosive Ordnance Demolition
EPA	U.S. Environmental Protection Agency
epilimnion	upper, wind-mixed waters of a lake
eutrophic	referring to a lake or pond in which high nutrient levels and relatively large populations of algae or aquatic plants occur
Evapotranspiration	referring to the portion of precipitation returning to the atmosphere by direct evaporation or transpiration by vegetation
°F	degrees Fahrenheit
FFTA	former fire-training area
FFTA/NDI	former fire-training area/former NDI laboratory
FIS	fighter-interceptor squadron
FIW	fighter-interceptor wing
fluvial	sediments deposited through river floodplain deposition
fly ash	ash from a furnace that is carried in the exhaust and is collected from the emission for disposal
ft	feet
gal/yr	gallons per year
graded	referring to the size range of grains or particles in a sediment
granodiorite	an igneous magnesium-iron-containing mineral consisting of quartz, oligoclase, and orthoclase
gunk	petroleum distillate degreaser (usually jellied)

halogenated	compounds containing halogen atoms (fluorine, chlorine, bromine, iodine)
HARM	Hazard Assessment Rating Methodology
hypergolic	referring to a rocket fuel and oxidizer combination that when mixed will react or ignite without an external ignition source
hypolimnion	the zone of a lake below the depth of wind-mixing
infiltration	the flow of a liquid onto a substance through small pores
IRP	Installation Restoration Program
Jordan	E.C. Jordan Co.
JP-4	jet aircraft fuel
KC-97/135	two types of USAF refueler aircraft
kettleholes	depression left during glacial recession by melting buried blocks of ice
Laurentide Ice Sheet	the section of ice that covered the southern New England area during the Wisconsin Glaciation
lenses	a body of a sediment type thick in the center and thinning toward the edges
MCL	maximum contaminant level
MEK	Methyl ethyl ketone
meltwater	water generated from melting continental glacier
mesotrophic	referring to a lake with moderate nutrient levels and productivity
metalimnion	the region of a lake where water temperature changes rapidly as a function of depth
mg/L	milligram(s) per liter
mgN/L	milligram(s) of nitrogen per liter
mgP/L	milligram(s) of phosphorus per liter

MIBK	methyl isobutyl ketone
mm	millimeter
MMR	Massachusetts Military Reservation
MNHP	Massachusetts Natural Heritage Program
MOGAS	motor gasoline
MOU	memorandum of understanding
moraine	a mound or hill made up of glacial drift
mph	miles per hour
MSL	mean sea level
6MWS	Missile Warning Squadron
NAAF	Naval Auxiliary Air Facility
ND	not detected
NDI	nondestructive Inspection Lab
NGB	National Guard Bureau
Ni-Cad	Nickel-cadmium
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
nonhalogenated	molecules not containing halogen atoms
NORAD	North American Defense Command
nosedocks	hangars that accommodate the forward section only of large aircraft
NOS	not otherwise specified
OEHL	Occupational and Environmental Health Laboratory
oligotrophic	a lake that contains low concentrations of nutrients, small standing crops of algae or vegetations, and has high water clarity
OMS	Organizational Maintenance Shops

ORNL	Oak Ridge National Laboratory
Otis AFB	former name of Massachusetts Military Reservation
PAHs	polycyclic aromatic hydrocarbons
PAVE-PAWS	Precision Acquisition Vehicle Entry - Phased Array Warning System
PCB	Polychlorinated biphenyl - liquid used as a dielectric in electrical equipment; suspected human carcinogen; bioaccumulates in the food chain and causes toxicity to higher trophic levels
PCE	Tetrachloroethylene (perchloroethylene)
pci	a measure of radioactivity (10^{-12} Curies)
PD-680	Petroleum distillate solvent
permeability	the capacity of a porous rock, soil, or sediment to transmit fluid without damage to the structure of the medium
PFSA	Petrol Fuel Storage Area
PFTS	Permanent Field Training Site
pH	negative logarithm of the hydrogen ion concentration; an expression of acidity or alkalinity
PMEL	Precision Measurement Equipment Lab
ppb	parts per billion
ppm	parts per million
POL	petroleum, oils, and lubricants
POWs	prisoners of war
QAPP	Quality Assurance Program Plan
radon	an inert gaseous element; chemical symbol Ra
RADSTA	Radar Station
RAP	Remedial Action Program

RCRA	Resource Conservation and Recovery Act
RFNA	red fuming nitric acid
RFPS	Railyard Fuel Pumping Station
RMCL	recommended maximum concentration level
SAC	Strategic Air Command
saturation	referring to complete filling of the interstices of a rock or sediment
SS-25	solvent consisting of 50% petroleum distillate, 35% PCE and 15% methylene chloride
STP	Sewage Treatment Plant
TEAC	Technical Environmental Affairs Committee
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TOX	total organic halogens
TSCA	Toxic Substances Control Act
UDMH	unsymmetrical dimethyl hydrazine
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
unconsolidated	not cemented, referring to sediment overburden such as sand, silt, or clay rather than rock
upgradient	at a higher elevation
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USMC	U.S. Marine Corps
USN	U.S. Navy
UTES	Unit Training Equipment Shop

VA	Veterans Administration
vadose zone	referring to the unsaturated zone of the land subsurface between the land surface and the water table
VOC	volatile organic compounds
Wisconsin Glaciation	a period of glacial activity that ended approximately 12,000 years ago in southern New England
WPA	Works Progress Administration
YANKEE	World War I 26th Infantry Division

APPENDIX B
TEAM MEMBER BIOGRAPHICAL DATA

MICHAEL A. KEIRN, SENIOR SCIENTIST

Education

Purdue University - B.S. in Biological Sciences, 1965

University of Florida - M.S. in Environmental Engineering
Sciences, 1968

University of Florida - Ph.D. in Environmental Engineering
Sciences, 1977

Professional Experience

Dr. Keirn's areas of expertise include environmental chemistry, aquatic microbiology, bioassay/aquatic toxicology, and microbial ecology. He brings more than ten years of experience in environmental risk and impact analysis and the management of hazardous waste investigations to the Jordan Company. His project management activities have focused on multidisciplinary environmental surveys of uncontrolled hazardous waste sites, assessment of public health risk and environmental impacts, and development of remedial alternatives.

Dr. Keirn has managed four remedial investigation/feasibility study projects and has conducted assessments at numerous suspected hazardous waste sites. He is experienced in the management of all three field investigative phases of the Department of Defense Installation Restoration Program (IRP) for hazardous waste disposal sites including: Initial Assessments (Records Searches); Environmental Contamination Surveys; and Development of Alternatives (Contaminant Control Measures). For four years, he served in a technical review capacity as Project Quality Assurance Supervisor for the Phase I assessments of 104 installations for USATHAMA. He has also served as Assessment Team Leader and as Chemist and Ecologist for Phase I assessments for all three military branches, including the IAS of Allegheny Ballistics Laboratory, West Virginia for the U.S. Navy.

Dr. Keirn has managed Phase II contamination surveys of four installations for USATHAMA: Alabama Army Ammunition Plant; West Virginia Ordnance Works; Vint Hill Farms Station, Virginia; and Gateway Army Ammunition Plant, Missouri. These surveys have included the installation of more than 100 monitoring wells; groundwater, surface water, sewer, soil, sediment, air, building, and tissue sampling and analysis; and geohydrological assessments of contaminant migration. Dr. Keirn also directed overall Technical Support Services involving contamination surveys at ten U.S. Army installations. He has also managed or directed IRP Phase IV evaluations at several DOD installations to identify and rank candidate remedial measures to control hazardous contaminant migration, and develop concept designs and cost estimates for the recommended alternative.

In addition to CERCLA-related aspects, Dr. Keirn has also managed and directed environmental impact and public health assessments of toxic materials releases. These include solvents, explosives and propellants, white phosphorous, mercury, PCBs, dredge spoil, and paper mill effluents. He directed the assessment of the level, concentration and migration of PCBs present in the soil, groundwater and sediments after a spill at an active transformer storage yard in Arkansas.

MICHAEL A. KEIRN (Continued)

Dr. Keirn was responsible for assessing the water quality impact due to maintenance dredging at sites in Florida and Mississippi. The project included a study of chemical water quality impact and biological impact assessment. For the U.S. Navy, he developed water quality impact assessment studies, including the impact of dredging and spoiling, for the siting of a naval base installation in Georgia. The environmental impact assessment of the proposed site was especially critical due to its location adjacent to a barrier island system and protected seashore.

Dr. Keirn developed an environmental assessment of mercury discharges from a peat harvesting operation in an environmentally critical area in North Carolina. Due to the potential for runoff of mercury from the dredging of peat, Dr. Keirn developed and implemented an in situ mercury bioaccumulation study of shellfish and fish in the river. He conducted bioassays on fish and monitored rate of uptake in clams and bluegill to determine the potential risks to the environment and public health. Dr. Keirn has performed assessments of the bacterial pathogens developing in paper mill wastes and was Technical Director of a comprehensive assessment of acute and chronic toxicity of paper mill effluent to aquatic species. This program evaluated the biological response of four freshwater fish species, three aquatic invertebrates, and an algal species to paper mill effluent.

Dr. Keirn has managed or performed numerous public health evaluations involving environmental exposure to industrial solvents, military explosives, and their transformation products. In addition, he has been involved in water quality criteria setting for nitrocellulose, nitroglycerin, RDX, HMX, and white phosphorus.

Dr. Keirn has provided expert witness testimony in sanitary microbiology and public health and serves as a member of the Standard Methods Committee on Periphyton. In addition, he has authored more than fifteen publications in the areas of public health microbiology, aquatic toxicology, aquatic ecology and environmental impact of hazardous wastes, and is co-author of a U.S. Fish and Wildlife Service manual on the impact of channelization on streams.

MICHAEL MURPHY, BIOLOGIST

Education

University of Bridgeport - B.A. in Biology, 1978

Certifications

Habitat Evaluation Procedures (HEP) Certificate, 1984

Associations

Maine Association of Planners

New England Association of Environmental Biologists

Professional Experience

Mr. Murphy is experienced in field research, data gathering, and data assessment of the effects on terrestrial and aquatic life resulting from improper hazardous waste disposal, hydroelectric projects, and land development.

Representative projects include:

- o Environmental assessment of the drainage area surrounding a Fortune 500 electronics manufacturer. This assessment was undertaken to determine the effects of TCE and other industrial wastes on aquatic life.
- o Literature search for available data on the North Hollywood Dump Superfund site was conducted to assist in determining the effects of the dumpsite, containing pesticides, on local fisheries.
- o Preparation of FERC license application for the 14-MW Winslow Hydro Project (Maine) for Scott Paper Co.
- o Preparation of FERC license application for the 50-MW Basin Mills Project for Bangor Hydro-Electric Co.
- o Environmental assessment for Getty Mining Co. of the potential effects on fish and wildlife populations due to construction of a deep-shaft mining operation in northern Maine.
- o Environmental assessment for Signal Clean Fuels, Inc. on the effects of a peat harvesting operation in northern Maine on area fish and wildlife.
- o Assisted in a wetlands identification project for a Maine land developer to determine the wetland area according to the state of Maine regulations.
- o Participated in a project at a major Connecticut water company to determine eels and plankton in drinking water intake pipes through the use of low-frequency sound. Designed, installed, operated equipment, organized data and submitted progress reports. Prior to this field work, laboratory

MICHAEL MURPHY (Continued)

testing was performed on eels and plankton in controlled environments and results were published.

Mr. Murphy has also been involved in a national-scale research and data management program for the development of treatment technologies to monitor and control polychlorinated biphenyls (PCBs) in pulp and paper industry effluents. Responsibilities included gathering data and inputs from industry, state, and governmental agencies; gathering and organizing data according to process and water treatment methods of individual mills, and assisting in the development of costs for treatment of the PCBs.

Publications and Presentations

Technical paper on "Technique Development for Control of Biological Contaminants in a Public Water Supply," J. Poluhowich, M. Murphy, et al. University of Bridgeport Press (1978).

THEODORE W. TAYLOR, GEOLOGIST

Education

Lehigh University - M.S. in Geology, 1983
Colby College - B.A. in Geology, 1981

Affiliations

American Geophysical Union
Mineralogical Society of America
Sigma Xi, The Scientific Research Society

Professional Experience

Mr. Taylor has been involved in numerous contaminated site assessment studies. He has been responsible for the data collection, analysis, and interpretation of hydrologic conditions in order to assess the boundaries and environmental impact of soil and rock contamination and the mode of contaminant transport. Mr. Taylor has conducted projects as part of plant site closure programs and has designed and implemented groundwater monitoring investigations. He has also been the site hydrogeologist for assessment studies at operating plant facilities for large industrial corporations. Mr. Taylor is experienced in monitoring well installation and development, permeability tests, pump tests, groundwater sampling, geophysical surveys, and in-field geologic investigations. He is proficient in the operation of computer-automated X-ray fluorescent and diffraction equipment for quantitative and qualitative geochemical analyses.

With the Lawrence Livermore National Laboratory (U.S. Dept. of Energy), Livermore, California, Mr. Taylor was a field geologist investigating the mineralogical and structural characteristics of an igneous stock being used as a test site for the burial of nuclear waste.

With the AMAX Mount Tolman Project, Mr. Taylor was an assistant to the geologic staff that was exploring and evaluating the Mount Tolman porphyry molybdenum deposit near Grand Coulee, Washington. He participated in field investigations, map compilation, and core logging.

Publications

"Petrological and Geochemical Study of the O.K. Copper-Molybdenum Deposit, Beaver County, Utah," Utah Geological and Mineral Survey, Special Studies, No. 67 (1985).

"A Petrological and Geochemical Study of the O.K. Copper-Molybdenum Deposit, Beaver County, Utah," GSA Abstracts with Programs, Vol. 16, No. 4, p. 257 (1984). (With C.B. Sclar.)

"An Application of Magnetic and Electromagnetic Surveys to the Interpretation of Bedrock Geology, Sidney, Maine, (abst.)," The Maine Geologist, Vol. 7, No. 3 (1980). (With T.D. Leary.)

SUSAN A. WAITE, CHEMICAL ENGINEER

Education

University of Maine - B.S. in Chemical Engineering, 1984

Affiliations

Member AICHE

Professional Experience

Ms. Waite is a chemical engineer with experience in environmental engineering, industrial waste stream (process) design, and construction cost estimating. Her experience includes compilation and review of analytical data; conduct of feasibility studies and public health assessments; preparation of cost analysis of remedial action alternatives; field work on hazardous waste sites, as well as process design for the Pulp and Paper Industry.

Ms. Waite has participated in Remedial Investigation/Feasibility Studies for Superfund projects in Maine, New York, and Michigan. Specifically, her responsibilities have included development of site Applicable Regulations and Appropriate Regulations (ARARs), alternatives development, evaluation and screening, preparation of cost estimates for remedial action alternatives for feasibility studies, as well as preparation of preliminary assessments for hazardous waste sites, and participation in laboratory quality assurance programs.

Ms. Waite has also been responsible for preparation of major components of several Superfund public health assessments and endangerment assessments. These responsibilities include selections of indicator chemicals, development of toxicological profiles, and risk/hazard characterization for contaminants in groundwater, soils, and air.

Ms. Waite was a member of the field investigation team at the Love Canal Superfund site in New York. Her responsibilities included description of soils and bedrock, sampling of soils, monitoring of drilling operations and installation of monitoring wells.

As an Industrial Process Engineer, Ms. Waite has worked for the Pulp & Paper/Industrial Process Department. Her responsibilities have included process design, preparation of process flow, and instrumentation diagrams, preparation of equipment specifications and recommendations, and flow balances.

APPENDIX C
LIST OF INTERVIEWEES

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LIST OF INTERVIEWEES

Interviewees	Years of Service at MMR
1. Base Civil Engineer/ANG, Army (Retired)	43
2. Base Environmental Engineer/ANG	35
3. Chief Flight Line Operations/USAF (Retired)	35
4. Chief Facility Engineer/USCG	5
5. General Foreman Roads and Grounds/USCG	13
6. Supervisor Roads and Grounds/USCG	26
7. Manager Base Service Station/USCG	7
8. Utility Shop Foreman/USCG	27
9. Supervisor Ground Support Maintenance/USCG	1½
10. Medical Technician/USCG	3
11. Lab Technician/USCG	2
12. Shop Supervisor/USCG	13
13. Shop Supervisor/USCG	12
14. Maintenance Supervisor/USCG	16
15. Hazardous Waste Coordinator/USCG	4
16. Chief, Transmitter Station/USCG	3
17. Technician, Transmitter Station/USCG	6
18. Former Chief, Transmitter Station/USCG	3
19. Maintenance Officer/USCG	16
20. Aircraft Maintenance Officer/USCG	15
21. Fuel Storage Manager/ANG	25
22. Director/VA Cemetery	7
23. Environmental Specialist/ARNG	1
24. Foreman/VA Cemetery	6
25. Maintenance Person/VA Cemetery	6
26. WWTP Operator/ANG	20
27. Fuel Maintenance Technician/ANG	8
28. Fuel Maintenance Technician/ANG	6
29. Range Control Observer/ARNG	1
30. Fireman/ANG	31
31. Civil Engineer/ANG	15
32. Landfill Operator/ANG (Retired)	25
33. Maintenance Foreman/ANG	35
34. UTES Shop Foreman/NG	8
35. UTES Shop Leader/NG	10
36. Roads and Ground Supervisor/ANG	32
37. Historian/ARNG	37
38. Supervisor of OMS #6/ARNG	4
39. Supervisor of OMS #22/ARNG	19
40. Supervisor of OMS #22/ARNG (Retired)	17
41. Refueler Maintenance Person/ANG	3

42.	Refueler Maintenance Supervisor/ARNG	6
43.	Construction Inspector/ANG	37
44.	Motor Pool Operator/ANG	4
45.	Former Range Supervisor/ARNG	20
46.	Fire Chief/ANG	12
47.	Maintenance Engineer/ANG (Retired)	30+
48.	Field Maintenance Supervisor/ANG	28
49.	Field Maintenance Worker PFTS/ANG	36
50.	Roads and Ground Supervisors/ANG	20
51.	Engine Maintenance Worker/USAF	4
52.	Coal Plant Operator/ANG	31
53.	Constellation Flight Support Worker/USAF (Retired)	4
54.	Civil Engineer/USAF (Retired)	20
55.	Aircraft Maintenance Worker/USAF	6
56.	Former Aircraft Engine Maintenance Worker/USAF (Retired)	4
57.	Flight Line Maintenance Worker/USAF (Retired)	7
58.	Former Flight Line Maintenance Worker/ANG	30
59.	Former Flight Line Maintenance Worker/ANG	30
60.	Base Bioengineer/ANG	13
61.	Audiovisual Manager/ANG	10
62.	Electrical Shop Foreman/ANG	4
63.	Research Director/USDA	10
64.	Lab Manager/ANG	21
65.	Lab Technician/ANG	8
66.	PMEL Superintendent/ANG	31
67.	Jet Engine Technician/ANG	10
68.	Airborne Radar Tech/ANG	31
69.	Engine Test Tech/ANG	24

LIST OF OUTSIDE CONTACTS

The overall Massachusetts Military Reservation - Installation Restoration Program (MMR-IRP) is coordinated with federal, state, and local regulatory agencies, as well as the IRP management team and all MMR major command units through the Technical Environmental Affairs Committee (TEAC). Concerns and information related to the U.S. Coast Guard (USCG) facilities at MMR have been coordinated through this committee. Members of the TEAC not part of the MMR Command Structure are listed below. In addition to the listed TEAC personnel, on-site contacts for USCG facilities are:

Dr. William Kerfoot
K-V Associates
281 Main Street
Falmouth, MA 02540

Mr. Dennis LeBlanc
U.S. Geological Survey
150 Causway Street
Suite 1309
Boston, MA 02114-1384

LIST OF MEMBERS MMR TEAC

Brigadier General Louis J. Ferrari
Deputy Adjutant General
MA National Guard
905 Commonwealth Avenue
Boston, MA 02215-1399

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J.F. Kennedy Building
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Ms. Jane Alford
Commonwealth of Massachusetts
Executive Office of Environmental
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Room 2000
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Mr. Paul Anderson
Regional Environmental Engineer
MA Dept. of Environmental Quality
Engineering
Southeast Region
Lakeville Hospital
Main Street
Lakeville, MA 02346

Ms. Virginia Valiela
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Town of Falmouth
59 Town Hall Square
Falmouth, MA 02540

Mr. John Gumbleton
Board of Selectmen
Town of Falmouth
59 Town Hall Square
Falmouth, MA 02540

Ms. V. Louise Behrman
Board of Selectmen
Town of Mashpee
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Mashpee, MA 02649

Mr. Thomas E. Fantozzi
Health Agent
Town of Bourne
24 Perry Avenue
Buzzards Bay, MA 02532

LIST OF MEMBERS
MMR TEAC
(continued)

Mr. Edward Kelly
Town Engineer
Town of Sandwich
P.O. Box 660
130 Main Street
Sandwich, MA 02562

Mr. Walter Eno
4 Crow's Nest Drive
Buzzards Bay, MA 02532

Mr. Stetson Hall
Barnstable County Health Department
Superior Court House
Route 6A
Barnstable, MA 02630

APPENDIX D
MASTER LIST OF SHOPS

APPENDIX D
MASTER LIST OF SHOPS

Shop Name	Current Location	Handles Regulated Hazardous Waste	Generates Regulated Hazardous Materials	Typical Treatment Storage and Disposal Methods
<u>102nd Civil Engineering Flight (102 CE FLT)</u>				
Electrical	971	Yes	Yes	Contract disposal
Heat Plant	160	Yes	Yes	Contract disposal
Mechanical/Liquid Fuels	171	Yes	Yes	Contract disposal
Pavement and Grounds	124	Yes	Yes	To DRMO
Power Production	124	Yes	Yes	To DRMO
Sewage Plant	3212	Yes	Yes	Discharged to ground
Plumbing Shop	971	Yes	Yes	Contract disposal
Sheet Metal	971	No	No	
Carpentry Shop	971	Yes	Yes	Contract disposal
<u>Army Aviation Support Facility (AASF)</u>				
Aircraft Maintenance	2816	Yes	Yes	To DRMO
<u>Camp Edwards Army National Guard Training Site</u>				
Ammunition Supply Point	3431	Reactive Waste	Reactive Waste	EOD Range-burn or detonate
Motor Pool	3431	Yes	Yes	To DRMO
Range Control	4020	No	No	
National Guard Medical Treatment Facility	1313	Yes	Yes	To sanitary sewer
<u>Organizational Maintenance Shops (OMS)</u>				
OMS-6	2806	Yes	Yes	To DRMO
OMS-22	S-2	Yes	Yes	To DRMO
<u>Unit Training Equipment Site (UTES)</u>				
Maintenance Shop	4601	Yes	Yes	To DRMO
<u>102nd Resource Management Squadron (102 RMS)</u>				
Fuels Management Branch	171	Yes	Yes	Contract disposal
Vehicle Maintenance	754	Yes	Yes	Contract disposal; oil separator, discharge

APPENDIX D
MASTER LIST OF SHOPS
(continued)

Shop Name	Current Location	Handles Regulated Hazardous Waste	Generates Regulated Hazardous Materials	Typical Treatment, Storage, and Disposal Methods
<u>102nd Combat Support Squadron (102 CSS)</u>				
Photo Lab	158	Yes	Yes	Contract disposal/To sanitary sewer
<u>102nd Consolidated Aircraft Maintenance Squadron (102 CAMS)</u>				
Photo Debrief	167	Yes	Yes	To photo lab/Sanitary sewer
AGE	191/192	Yes	Yes	To DRMO
PMEL	158	Yes	Yes	To sanitary sewer
Corrosion Control	158	Yes	Yes	To DRMO/Contract disposal
Machine Shop	158	Yes	Yes	To DRMO/Contract disposal
NDI Lab	158	Yes	Yes	To DRMO/Contract disposal
Sheet Metal	158	Yes	Yes	To DRMO/Contract disposal
Welding	158	No	No	
Electrical	158	Yes	Yes	To DRMO/Contract disposal
Pneudraulics	158	Yes	Yes	To DRMO/Contract disposal
Tire Shop	156	Yes	Yes	To DRMO/Contract disposal
Engine Run-up Stand	202	Yes	Yes	Contract disposal
Comm/Nav	158	Yes	Yes	Used in process
Fuels	196	Yes	Yes	To DRMO/Contract disposal
Engine Rebuild	156	Yes	Yes	To DRMO/Contract disposal
Periodic Maintenance	158	Yes	Yes	To DRMO/Contract disposal
MA-1 Mock Up	158	Yes	Yes	To DRMO/Contract disposal
MA-1 Flightline	158	Yes	Yes	To DRMO/Contract disposal
Environmental	158	Yes	Yes	To DRMO/Contract disposal
Survival Shop	158	Yes	Yes	To DRMO/Contract disposal
Egress Shop	158	Yes	Yes	To DRMO/Contract disposal
Simulator	158	Yes	Yes	To DRMO/Contract disposal
Missile Maintenance	120	Yes	Yes	Contract disposal

APPENDIX E
WATER QUALITY CRITERIA

4.86.176A
0012.0.0

MASSACHUSETTS SURFACE WATER
QUALITY STANDARDS
CLASS B

Source: Code of Massachusetts Regulations 314 CMR 400

314 CMR 4.03: Minimum Water Quality Criteria and Associated Uses.

Class B - Waters assigned to the class are designated for the uses of protection and propagation of fish, other aquatic life, and wildlife and for primary and secondary contact recreation.

Minimum Criteria Applicable To All Waters:

- A. These minimum criteria are applicable to all surface waters, unless criteria specified for individual classes are more stringent.

<u>PARAMETER</u>	<u>CRITERIA</u>
1. Aesthetics	All waters shall be free from pollutants in concentrations or combinations that: (a) Settle to form objectionable deposits; (b) Float as debris, scum, or other matter to form nuisances; (c) Produce objectionable odor, color, taste, or turbidity; or (d) Result in the dominance of nuisance species.
2. Radioactive Substances	Shall not exceed the recommended limits of the United States Environmental Protection Agency's National Drinking Water Regulations.
3. Tainting Substances	Shall not be in concentrations or combinations that produce undesirable flavors in the edible portions of aquatic organisms.
4. Color, Turbidity, Total Suspended Solids	Shall not be in concentrations or combinations that would exceed the recommended limits on the most sensitive receiving water use.
5. Oil and Grease	The water surface shall be free from floating oils, grease, and petrochemicals, and any concentrations or combinations in the water column or sediments that are aesthetically objectionable or deleterious to the biota are prohibited. For oil and grease of petroleum origin the maximum allowable discharge concentration is 15 mg/L.

6. Nutrients Shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication.
7. Other Constituents Waters shall be free from pollutants in concentrations or combinations that:
 - (a) Exceed the recommended limits on the most sensitive receiving water use;
 - (b) Injure, are toxic to, or produce adverse physiological or behavioral responses in humans or aquatic life; or
 - (c) Exceed site-specific safe exposure levels determined by bioassay using sensitive species.

Specific Criteria For Class B Waters:

<u>PARAMETER</u>	<u>CRITERIA</u>
1. Dissolved Oxygen	Shall be a minimum of 5.0 mg/L in warm water fisheries and a minimum of 6.0 mg/L in cold water fisheries.
2. Temperature	Shall not exceed 83°F (28.3°C) in warm water fisheries or 68°F (20°C) in cold water fisheries, nor shall the rise resulting from artificial origin exceed 4.0°F (2.2°C).
3. pH	Shall be in the range of 6.5 - 8.0 standard units and not more than 0.2 units outside of the naturally occurring range.
4. Fecal Coliform Bacteria	Shall not exceed a log mean for a set of samples of 200 per 100 mL, nor shall more than 10% of the total samples exceed 400 per 100 mL during any monthly sampling period.

Provisions For Control of Eutrophication

The discharge of nutrients, primarily phosphorus or nitrogen, to surface waters will be limited or prohibited by the Division as necessary to prevent excessive eutrophication of such waters. There shall be no new or increased discharges of nutrients into lakes and ponds or tributaries thereto. Existing discharges containing nutrients that encourage eutrophication or growth of weeds or algae shall be treated. Activities that may result in nonpoint discharges of nutrients shall be conducted in accordance with the best management practices reasonably determined by the Division to be necessary to preclude or minimize such discharges of nutrients.

FEDERAL GROUNDWATER QUALITY CRITERIA

PRIMARY DRINKING WATER STANDARDS:

40 Code of Federal Regulations 141.11

INORGANIC CHEMICALS:

	<u>(mg/L)</u>
Arsenic	0.05
Barium	1
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05

ORGANIC CHEMICALS:

	<u>(mg/L)</u>
Chlorinated Hydrocarbon Pesticides	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
Total Trihalomethanes	0.1
Chlorophenoxy Herbicides	
2,4-D	0.1
2,4,5-TP (Silvex)	0.01

SECONDARY DRINKING WATER REGULATIONS

40 Code of Federal Regulations 143.3

<u>Contaminant</u>	<u>Level</u>
Chloride	250 mg/L
Color	15 color units
Copper	1 mg/L
Corrosivity	Noncorrosive
Foaming agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Sulfate	250 mg/L
Total dissolved solids (TDS)	500 mg/L
Zinc	5 mg/L

FEDERAL PROPOSED RECOMMENDED MAXIMUM
CONTAMINANT LEVELS (RMCL) AND MAXIMUM
CONTAMINANT LEVELS

EPA FINAL RMCLs & PROPOSED MCLs
[for Volatile Chemicals, VOCs]

CHEMICAL	RMCL (ug/L)	PROPOSED MCL (ug/L)
Benzene	0	5
Vinyl Chloride	0	1
Carbon Tetrachloride	0	5
1,2-Dichloroethane	0	5
Trichloroethylene	0	5
1,1-Dichloroethylene	7	7
1,1,1-Trichloroethane	200	200
p-Dichlorobenzene	750	750

PROPOSED RMCLs
for SYNTHETIC ORGANIC CHEMICALS (SOCs)

CHEMICAL	PROPOSED RMCL (ug/L)
Acrylamide	0
Alachlor	0
Chlordane	0
Dibromochloropropane (DBCP)	0
Ethylene dibromide (EDB)	0
Epichlorohydrin	0
Heptachlor	0
Heptachlor epoxide	0
Polychlorinated biphenyls (PCBs)	0
1,2-Dichloropropane	6
Lindane	0.2
Monochlorobenzene	60
Styrene	140
Aldicarb/aldicarb sulfoxide & sulfone	9
Carbofuran	36
cis-1,2-Dichloroethylene	70
o & m-Dichlorobenzene	620
2,4-D	70
Ethylbenzene	680
Methoxychlor	340
Pentachlorophenol	220
Toluene	2000
2,4,5-TP	52
trans-1,2-Dichloroethylene	70
Xylene, o, m, & p	440

Source:

USEPA Federal Register, Vol. 50, (219) 46880-47022, Nov. 13, 1985.

APPENDIX F
WATER QUALITY DATA

4.86.164A
0110.0.0

TABLE F-1
OSBORNE POND DATA

SOURCE: Otis ANGB/SGPM 1986

0.20

2. LABORATORY PERFORMING ANALYSIS O EHL			3. LAB SAMPLE NUMBER 67382			4. REQUESTOR SAMPLE NO GN84001B					
SAMPLE COLLECTION INFORMATION						5. DATE RECEIVED BY LAB 3 Dec 84		6. DATE ANALYSIS COMPLETED 13 Dec 84			
7. SITE DESCRIPTION						ON-SITE ANALYTICAL RESULTS					
8. SITE LOCATION NO OSBOEN'S POND		9. FLOW RATE AT SITE Dec 3 1984 GXL/MIN		10. WEATHER 83 PM 784		11. WATER TEMP 00010 °C		12. PH 00400 UNITS		13. DISS O ₂ 00300 MG/L	
14. COLLECTION DATE/PERIOD				15. COLLECTOR'S NAME		16. RESULTS OF OTHER ON-SITE ANALYSES					
17. SAMPLING TECHNIQUE				18. PHONE NUMBER							
19. REASON FOR SAMPLE SUBMISSION: NPOES											
ANALYSES REQUESTED AND RESULTS											
PRESERVATION GROUP A				PRESERVATION GROUP F 352				PRESERVATION GROUP G			
PARAMETER	TOTAL	MG/L		PARAMETER	DISS	TOTAL	MG/L	PARAMETER	TOTAL	MG/L	
Chemical Oxygen Demand	00340			Primary ARSENIC	01000	01007	<10	BORON	01022	1	
Total Organic CARBON as C	00680			BARIUM	01005	01007	268	BORON, Dissolved	01020	1	
				CADMIUM	01025	01027	<10	CHLORIDE	00940		
PRESERVATION GROUP B				CHROMIUM	01030	01034	<50	COLOR	00080	Units	
OIL & GREASE FREON-IR Method	00560			CHROMIUM Hexavalent		01032		FLUORIDE	00951		
				COPPER Secondary	01040	01042	24	Residue Fil-terable (TDS)	00515		
PRESERVATION GROUP C				IRON	0104	01045	154	Residue Non Filtr (SS)	00530		
AMMONIA as N	00610			LEAD	01049	01051	<20	Residue	00500		
NITRATE as N Cd Reduct. Method	00620			MANGANESE	01056	01055	<50	Residue Volatile	00505		
NITRITE as N	00615			MERCURY	71890	71900	<1	Specific Conductance	00095	(umhos)	
TOTAL KJELDAHL NITROGEN as N	00625			NICKEL	01065	01067		SULFATE as SO ₄	00945		
PHOSPHORUS Ortho PO ₄ as P	70507			SELENIUM	01145	01147		SURFACTANTS MBAS as LAS	38260		
PHOSPHORUS as P	00665			SILVER	0107	01077	<10	TURBIDITY	00078	Units	
				ZINC	01090	01092	<50				
PRESERVATION GROUP D				CALCIUM as Ca	00915	00916	mg				
CYANIDE	00720			MAGNESIUM as Mg	00925	00927	mg				
CYANIDE Free, Amenable to Cl ₂	00722			POTASSIUM	00935	00937	mg				
				SODIUM	00930	00929	mg				
PRESERVATION GROUP E								PRESERVATION GROUP J			
PARAMETER	TOTAL	MG/L						PARAMETER			
PHENOLS	32730										
1. ORGANIZATION REQUESTING ANALYSIS Oles ANG B, Inc.								CHEMIST - EHL WH			
								REVIEWED BY			
								APPROVED BY D. J. R. D.			

2. LABORATORY PERFORMING ANALYSIS			3. LAB SAMPLE NUMBER			4. REQUESTOR SAMPLE NO			
O EHL			67384			G.N840028			
SAMPLE COLLECTION INFORMATION						5. DATE RECEIVED BY LAB		6. DATE ANALYSIS COMPLETED	
7. SITE DESCRIPTION						3 Dec. 84		18 Dec. 84	
8. SITE LOCATION NO						9. FLOWRATE AT SITE		10. WEATHER	
OSBORNE ROAD						00058 GAL/MIN		00041	
11. COLLECTION DATE/PERIOD						12. COLLECTORS NAME		13. WATER TEMP	
Dec 3 12 33 PM '84						PH 184		00010 °C	
14. SAMPLING TECHNIQUE						15. PHONE NUMBER		16. PH	
17. REASON FOR SAMPLE SUBMISSION						18. RESULTS OF OTHER ON-SITE ANALYSES		00400 UNITS	
NPOES								00300 MG/L	
ANALYSES REQUESTED AND RESULTS									
PRESERVATION GROUP A			PRESERVATION GROUP F			PRESERVATION GROUP G			
PARAMETER	TOTAL	MG/L	PARAMETER	DISS	TOTAL	µG/L	PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	.	ARSENIC	01000	01002	.	BORON	01022	µg/l
Total Organic CARBON as C	00680	.	BARIUM	01005	01007	.	BORON, Dissolved	01020	µg/l
		.	CADMIUM	01025	01027	.	CHLORIDE	00940	.
PRESERVATION GROUP B			CHROMIUM			01030	01034	COLOR	00080
PARAMETER	TOTAL	MG/L	CHROMIUM Hexavalent			01032	.	FLUORIDE	00951
OIL & GREASE FREON-IR Method	00560	.	COPPER			01040	01042	Residue Filtrable (TDS)	00515
PRESERVATION GROUP C			IRON			01046	01045	Residue Non Filtr (SS)	00530
PARAMETER	TOTAL	MG/L	LEAD			01049	01051	Residue	00500
AMMONIA as N	00610	.	MANGANESE			01056	01055	Residue Volatile	00505
NITRATE as N Cd Reduct. Method	00620	2.1	MERCURY			71890	71900	Specific Conductance	00095
NITRITE as N	00615	.	NICKEL			01065	01067	SULFATE as SO4	00945
TOTAL KJELDAHL NITROGEN as N	00625	.	SELENIUM			01145	01147	SURFACTANTS MBAS as LAS	38260
PHOSPHORUS Ortho PO4 as P	70507	.	SILVER			01075	01077	TURBIDITY	00076
PHOSPHORUS as P	00665	.	ZINC			01090	01092		Units
PRESERVATION GROUP D			CALCIUM as Ca			00915	00916		
PARAMETER	TOTAL	MG/L	MAGNESIUM as Mg			00925	00927		
CYANIDE	00720	.	POTASSIUM			00935	00937		
CYANIDE Free, Amenable to Cl2	00722	.	SODIUM			00930	00929		
PRESERVATION GROUP E						PRESERVATION GROUP J			
PARAMETER	TOTAL	µG/L				PARAMETER			
PHENOLS	32730	.							
1. ORGANIZATION REQUESTING ANALYSIS						CHEMIST			
						V. J. L.			
						REVIEWED BY			
						APPROVED BY			
						D. J. Reid			

TABLE F-2
HISTORICAL ASHUMET POND AND JOHNS POND
WATER QUALITY DATA

SOURCE: Duerring and Rojko (1984)

ASHUMET POND

COMMUNITY: Mashpee/Falmouth

LOCATION: Ashumet Pond is located in the towns of Mashpee and Falmouth, with approximately 3/4 of the pond existing in Mashpee. The pond lies just east of Sandwich Road and 3/4 miles northeast of state Route 151 and less than 1/2 mile south of Otis Air Force Base.

WATERSHED: Cape Cod

DESCRIPTION: The development of the watershed along the perimeter of Ashumet Pond is moderate to heavy consisting of summer cottages and year-round dwellings along all except the northernmost shoreline. The outlying portions of the watershed are mostly forested and undeveloped.

INLETS: One inlet enters the pond from the northeast, originating in a cranberry bog approximately 1/4 mile to the north of the pond.

OUTLETS: None observed

DATE SAMPLED: 13 August 1980

THERMAL CHARACTERISTICS: Stratified

TROPHIC LEVEL: Mesotrophic

PHYTOPLANKTON: Low to moderate counts dominated by coccooid green algae.

AQUATIC MACROPHYTON: The major portions of this deep pond are weed free. Dense patches of macrophytes were observed in the shallower portions of the northwest and western shore area and patches of moderate density were seen in the southern coves. The major species found include Eleocharis sp. (spike rush), Nitella sp. (muskgrass) and Najas sp. (bushy pondweed)

RECREATIONAL USES: Fishing, swimming and boating.

ACCESS: Public boat launching site accessible from Sandwich Road.

ASHUMET POND
KEY TO AQUATIC MACROPHYTES LISTED IN ORDER OF RELATIVE ABUNDANCE

- E - Eleocharis (Spike Rush)
- F7 - Gratiola sp. (Hedge Hyssop)
- h6 - Myriophyllum tenellum (Leafless Milfoil)
- O2 - Lobelia Dortmanna (Water Lobelia)
- C2 - Nitella (Stonewort)
- k2 - Elatine sp. (Waterwort)
- J - Najas sp. (Bushy Pondweed)
- I - Isoetes sp. (Quillwort)
- ☐ - Moss
- S - Sparganium sp. (Bur Reed)
- P5 - Potamogeton epihydrus (Ribbonleaf Pondweed)

TABLE 1
ASHUMET POND
WATER QUALITY DATA (mg/l)
13 August 1980

STATION:	1	1	1	2
<u>PARAMETER</u>	(Surface)	(26 ft)	(53 ft)	(Inlet)
pH (Standard Units)	7.2	7.2	6.7	7.3
Total Alkalinity	0.9	11	7	21
Total Hardness	17	16	19	26
Suspended Solids	0.0	0.5	0.5	13
Total Solids	50	56	74	84
Specific Conductance (umhos/cm)	88	86	98	98
Chloride	12	11	11	9
Ammonia-Nitrogen	0.07	0.24	0.74	0.16
Nitrate-Nitrogen	0.1	0.1	0.0	0.1
Total Kjeldahl-Nitrogen	0.39	0.47	1.00	0.58
Total Phosphorus	0.01	0.01	0.18	0.01
Total Iron	0.02	0.01	1.20	2.00
Total Manganese	0.06	0.33	2.20	2.00

ASHUMET POND, Mashpee/Falmouth / Cape Cod Drainage Area

Figure 2

AQUATIC MACROPHYTE SURVEY

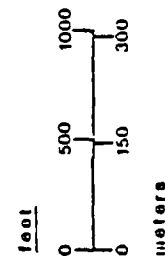
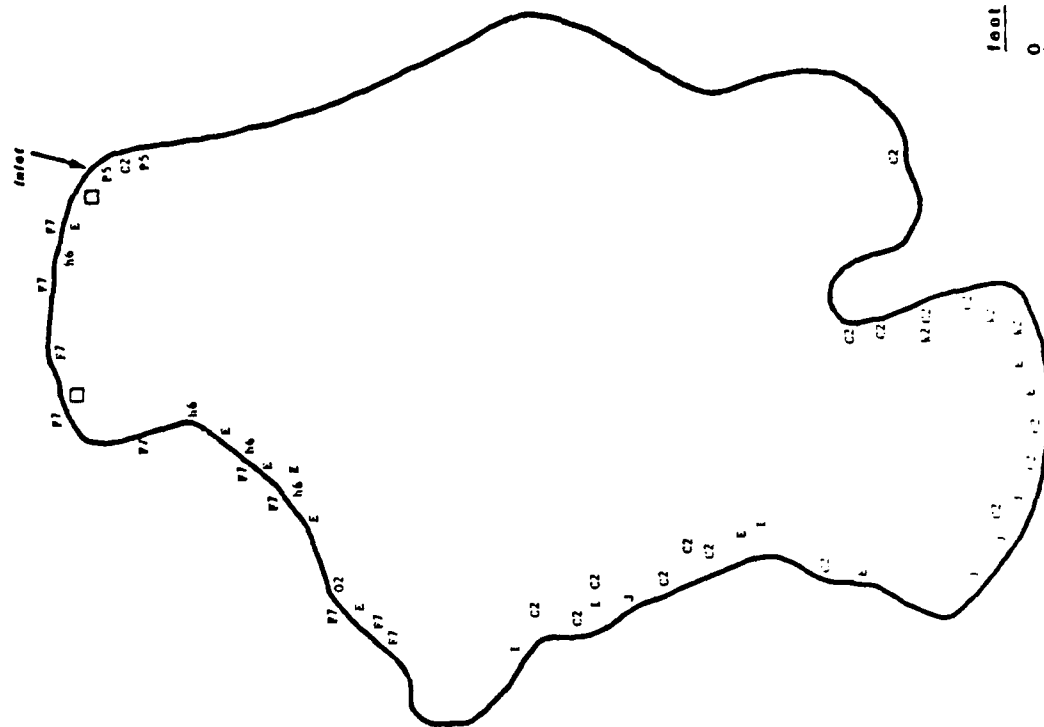
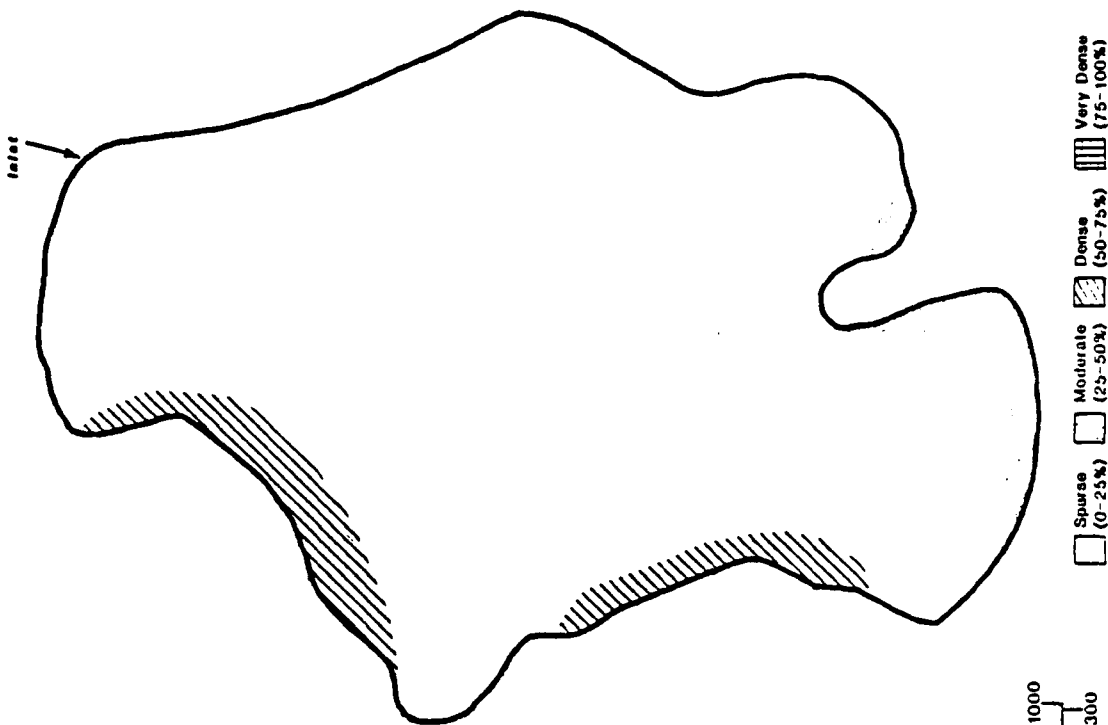


Figure 3

AQUATIC MACROPHYTE DENSITY



BATHYMETRY AND SAMPLE STATIONS

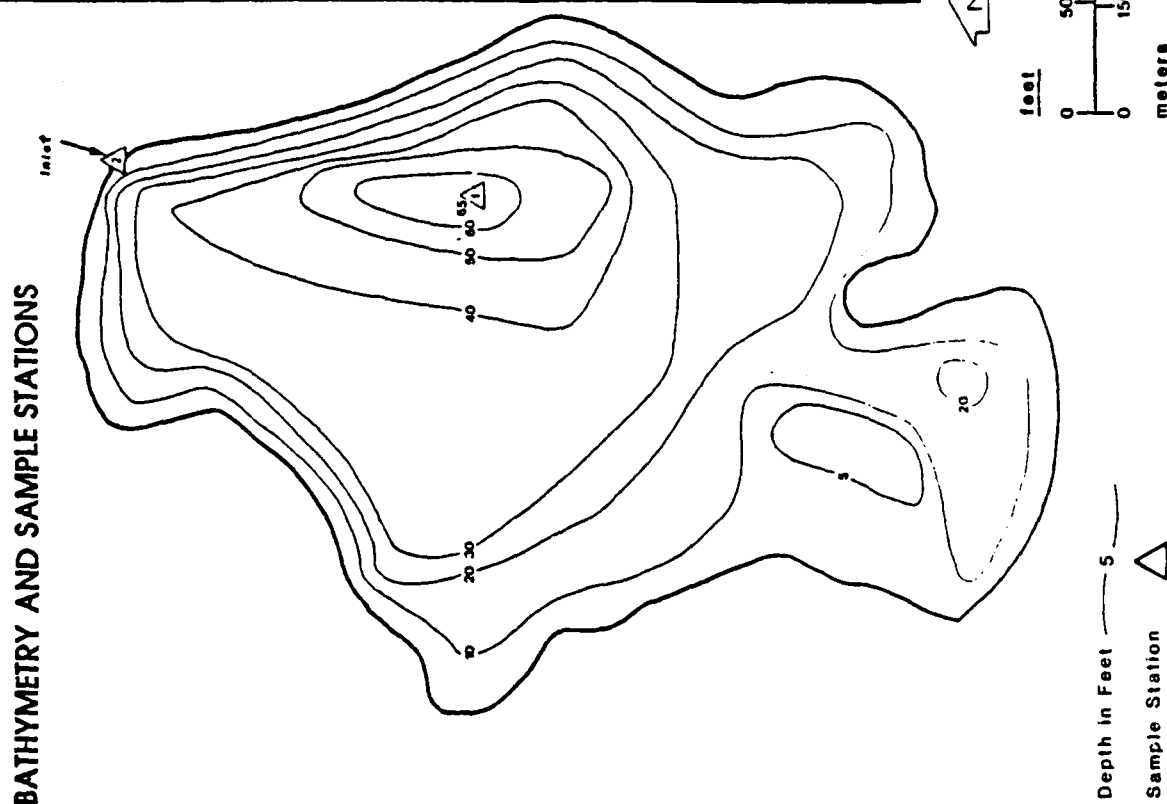
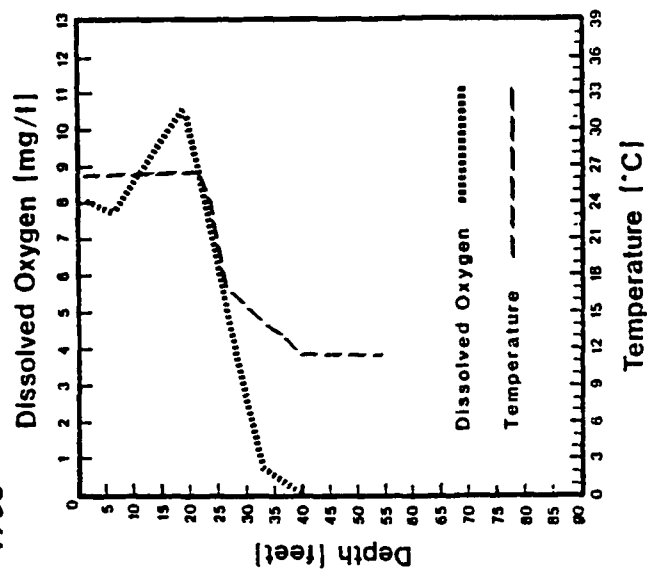


Figure 5
DISSOLVED OXYGEN & TEMPERATURE PROFILES
13 August 1980



STATION 1			
DEPTH	0.0.	TEMP.	TEMP.
(ft.) (m)	(mg/l)	(°C)	(°C)
1.6 0.5	8.0	26.0	15.0
3.3 1.0	--	26.0	13.5
6.6 2.0	7.8	26.0	12.0
9.8 3.0	--	26.0	11.5
13.1 4.0	--	26.0	11.5
16.4 5.0	--	26.0	11.5
19.7 6.0	10.6	26.0	11.5
23.0 7.0	--	24.0	11.5
26.2 8.0	5.4	17.0	11.5

Secchi Disk Transparency 3 ft. (2.4 m)

TABLE 2
ASHUMET POND
MORPHOMETRIC DATA

Maximum Length	1,356 m	(4,450 ft)
Maximum Effective Length	1,356 m	(4,450 ft)
Maximum Width	991 m	(3,250 ft)
Maximum Effective Width	991 m	(3,250 ft)
Maximum Depth	20 m	(65 ft)
Mean Depth	7 m	(23 ft)
Mean Width	605 m	(1,987 ft)
Area	82 ha	(203 acres)
Volume	5,915,866 m ³	(4,796 acre-ft)
Shoreline	3,901 m	(12,800 ft)
Development of Shoreline	1.2	
Development of Volume	1.0	
Mean to Maximum Depth Ratio	0.35	

TABLE 3
ASHUMET POND
STATION 1 (composite)
PHYTOPLANKTON ENUMERATION
13 August 1980

<u>ORGANISM</u>		<u>Cells/ml</u>
Bacillariophyceae (Diatoms)		
<u>Synedra</u> sp.	<u>112</u>	
Subtotal		112
Chlorophyceae (Greens)		
<u>Coelastrum</u> sp.	28	
<u>Sphaerocystis</u> sp.	364	
<u>Staurastrum</u> sp.	<u>28</u>	
Subtotal		420
Cryptophyceae (Cryptomonads)		
<u>Cryptomonas</u> sp.	<u>56</u>	
Subtotal		56
Cyanophyceae (Blue-Greens)		
<u>Anacystis</u> sp.	<u>224</u>	
Subtotal		<u>224</u>
Total		812

JOHNS POND

COMMUNITY: Mashpee

LOCATION: Located approximately 1000 feet east of Ashumet Pond and 1/2 mile south of Otis Air Force Base in the western section of Mashpee.

WATERSHED: Cape Cod

DESCRIPTION: Residential development is found predominantly along the southern and eastern shore of the pond and in the northern section of the watershed associated with Otis Air Force Base. Almost half of the entire watershed is forested.

INLETS: One inlet originating from Moody Pond flows into the northern end of the pond.

OUTLETS: Two outlets exist: one flows out of the southern tip of the pond as the Childs River and the other exits from the north-eastern tip as the Quashnet River.

DATE SAMPLED: 17 August 1978 and 13 August 1980. These surveys occurred during a Diagnostic//Feasibility study of Johns Pond from 1978-1980. Complete report of this study is contained under a separate cover.

THERMAL CHARACTERISTICS: Stratified

TROPHIC LEVEL: Mesotrophic

PHYTOPLANKTON: Very low total counts observed on both 1978 and 1980 survey dates with no particular species dominating.

AQUATIC MACROPHYTON: Macrophyte density and diversity increased over the two year span from sparse to moderate with Eriocaulon sp. (Pipewort) the dominant species in 1980.

RECREATION USES: Swimming, boating and fishing.

ACCESS: Two public access points for boating and fishing exist. One on the eastern shore and the other on the northwest shore reached via Hoophole Road.

JOHNS POND

KEY TO AQUATIC MACROPHYTES LISTED IN ORDER OF RELATIVE ABUNDANCE

13 August 1980

- e1 - Eriocaulon sp. (Pipewort)
F7 - Gratiola sp. (Hedge Hyssop)
O2 - Lobelia Dortmanna (Water Lobelia)

△ - Macroscopic Algae

C1 - Chara sp. (Muskgrass)

j1 - Iris sp. (Iris)

P - Potamogeton sp. (Pondweed)

E - Eleocharis sp. (Spike Rush)

k2 - Elatine sp. (Waterwort)

j2 - Juncus sp. (Rush)

U - Utricularia sp. (Bladderwort)

h6 - Myriophyllum tenellum (Leafless Milfoil)

J - *Najas* sp. (Bush Pondweed)

K1 - Callitriche sp. (Water Starwort)

H1 - Vallisneria americana (Wild Celery)

Q2 - Polygonum sp. (Smartweed)

W2 - Pontederia cordata (Pickerelweed)

A3 - Sagittaria sp. (Arrowhead)

V1 - Decodon verticillatus (Swamp Loose-
strife)

q - Phragmites maximus (Reed Grass)

h5 - Myriophyllum humile (Water Milfoil)

Z2 - Eupatorium sp. (Joe-pye Weed)

25 - Solidago sp. (Goldenrod)

B - *Scirpus* sp. (Bulrush)

H2 - Elodea sp. (Waterweed)

n1 - Brasenia Schreberi (Water Shield)

V3 - Ludwigia sp. (False Loosestrife)

E2 - Eleocharis Smallii (Spike Rush)

AQUATIC MACROPHYTE SURVEY

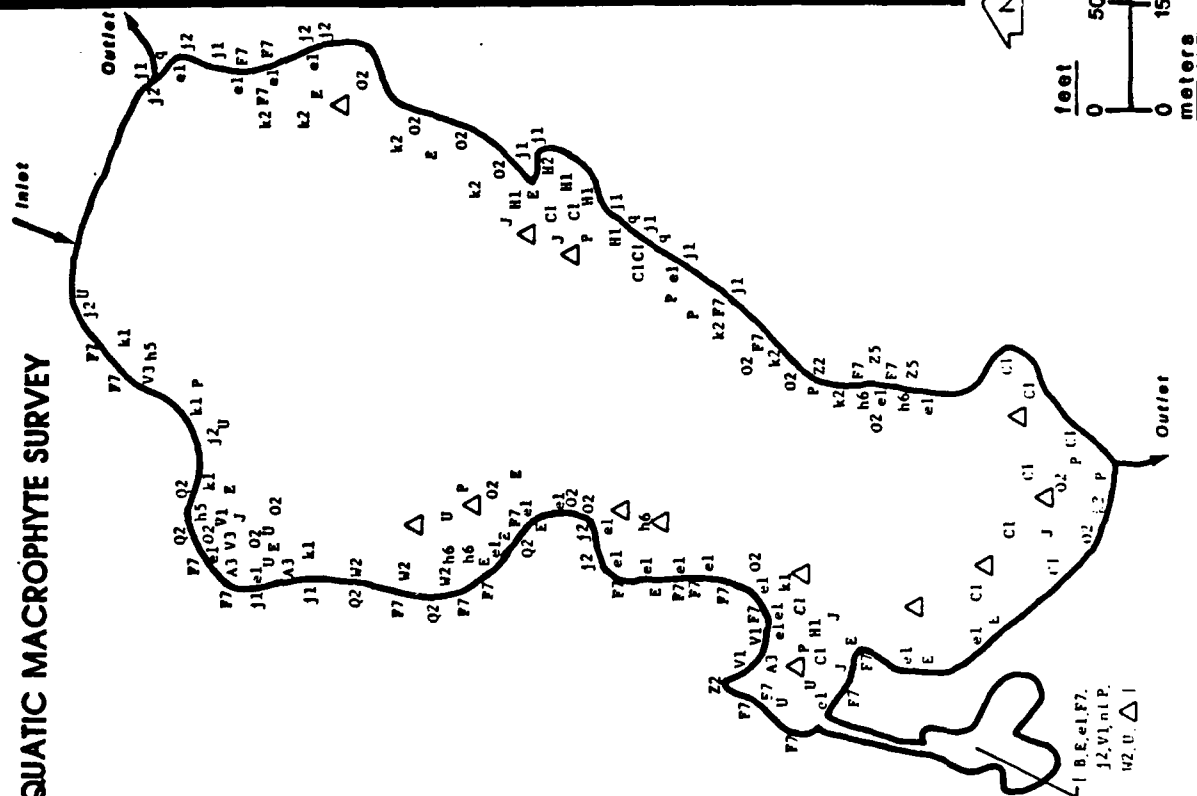


Figure 80

AQUATIC MACROPHYTE DENSITY

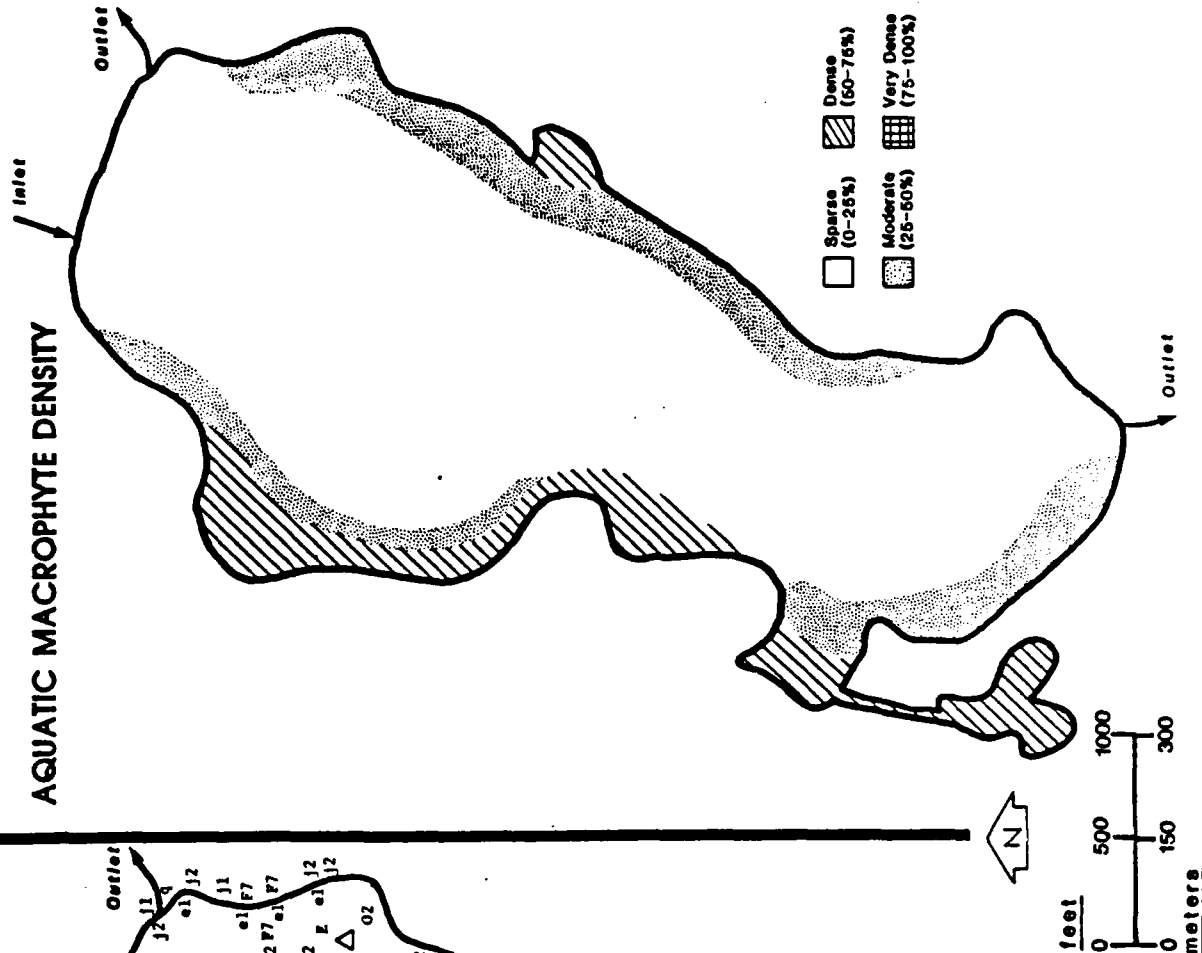


TABLE 57a

JOHNS POND

WATER QUALITY DATA (mg/l)

17 August 1978

STATION:	1					2					3					4					5				
	(Surface) (35 ft)					(57 ft)					(Surface)					(Canal)					(Inlet)				
PARAMETER																									
pH (Standard Units)	6.8	6.4	6.5	6.8	6.4	6.5	6.8	6.5	5.8	6.4	6.8	6.5	5.8	6.4	6.4	6.5	5.8	6.5	5.8	6.4	6.8	6.5	5.8	6.4	6.4
Total Alkalinity	7	9	19	8	9	19	8	8	6	8	8	8	6	8	8	8	6	8	6	8	8	6	8	8	8
Total Hardness	15	14	16	16	14	16	16	14	20	14	16	14	20	14	14	14	20	14	20	14	14	20	14	14	14
Specific Conductance (μ hos/cm)	75	76	86	76	76	86	76	78	87	75	76	78	87	75	75	78	87	78	87	75	75	87	75	75	75
Silica	0.4	0.0	2.4	0.0	0.0	2.4	0.0	0.2	7.6	0.6	0.0	0.2	7.6	0.6	0.6	0.2	7.6	0.2	7.6	0.6	0.6	7.6	0.6	0.6	0.6
Chloride	10	11	11	10	11	11	10	11	10	10	10	11	10	10	10	11	10	11	10	10	10	10	10	10	10
Color (Standard Platinum Units)	5	5	5	5	5	5	5	10	20	5	5	10	20	5	5	10	20	10	20	5	5	20	5	5	5
Ammonia-Nitrogen	0.00	0.01	0.47	0.01	0.01	0.47	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nitrate-Nitrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.0
Total Phosphorus	0.04	0.03	0.05	0.03	0.03	0.05	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.04	0.04
Total Iron	0.10	0.05	1.20	0.05	0.05	1.20	0.05	0.10	0.40	0.03	0.05	0.10	0.40	0.03	0.03	0.10	0.40	0.10	0.40	0.03	0.03	0.40	0.03	0.03	0.03
Total Manganese	0.05	0.03	1.00	0.02	0.03	1.00	0.02	0.01	0.10	0.01	0.02	0.01	0.10	0.01	0.01	0.01	0.10	0.01	0.10	0.01	0.01	0.10	0.01	0.01	0.01
Total Coliform Bacteria per 100 ml	10	-	-	5	-	-	5	160	520	160	5	160	520	160	160	160	520	160	520	160	160	520	160	160	160
Fecal Coliform Bacteria per 100 ml	5	-	-	5	-	-	5	5	20	10	5	5	20	10	10	5	20	5	20	10	10	20	10	10	10

TABLE 57b

JOHNS POND

WATER QUALITY DATA (mg/l)

13 August 1980

STATION: PARAMETER	1	1	1	2	2	2	5*
	(Surface)	(35 ft)	(57 ft)	(Surface)	(16 ft)	(30 ft)	(Outlet)
pH (Standard Units)	6.5	6.6	7.3	6.9	7.3	6.8	7.2
Total Alkalinity	6	10	15	6	10	23	8
Total Hardness	15	16	16	15	15	16	15
Specific Conductance (μ mhos/cm)	82	80	86	80	80	80	80
Chloride	11	11	11	10	10	10	11
Ammonia-Nitrogen	0.05	0.05	0.45	0.05	0.03	0.09	0.09
Nitrate-Nitrogen	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Kjeldahl-Nitrogen	0.38	0.50	0.23	0.28	0.37	0.39	0.42
Total Phosphorus	0.07	0.03	0.04	0.01	0.01	-	0.06
Total Iron	0.00	0.03	0.45	0.00	0.00	0.00	0.03
Total Manganese	0.02	0.07	1.00	0.00	0.00	0.00	0.03

* no flow

Figure 81

BATHYMETRY AND SAMPLE STATIONS

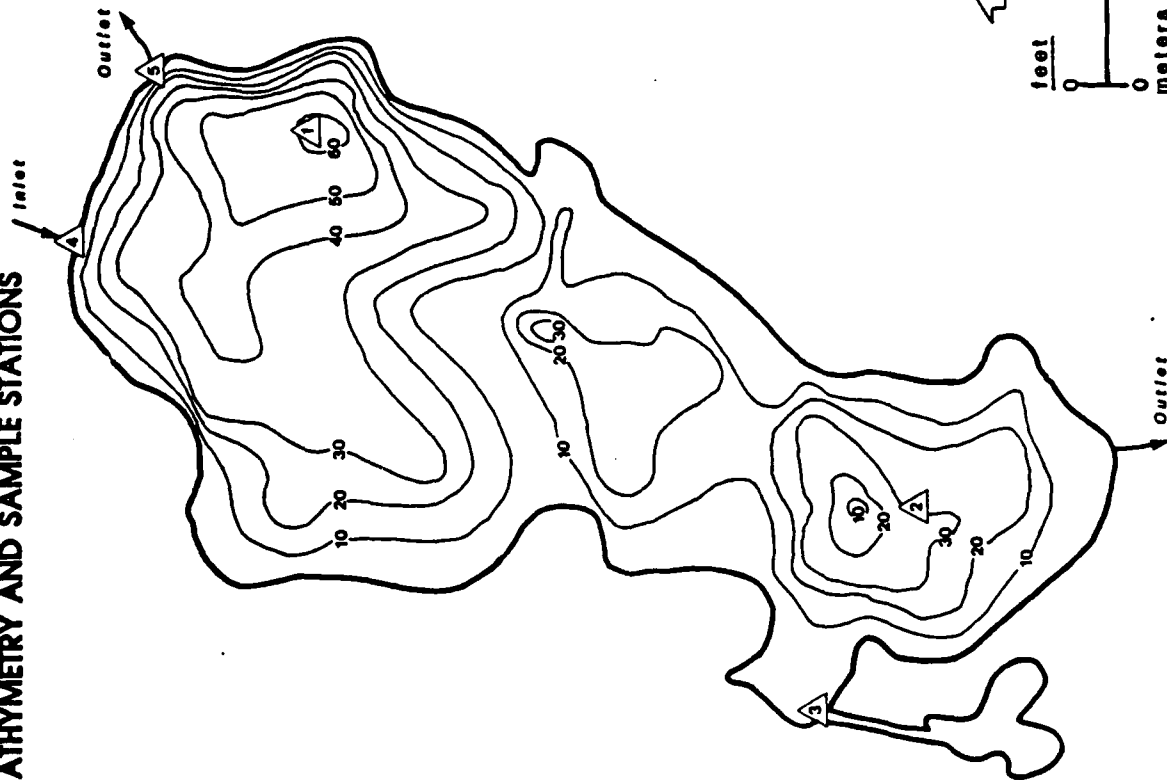
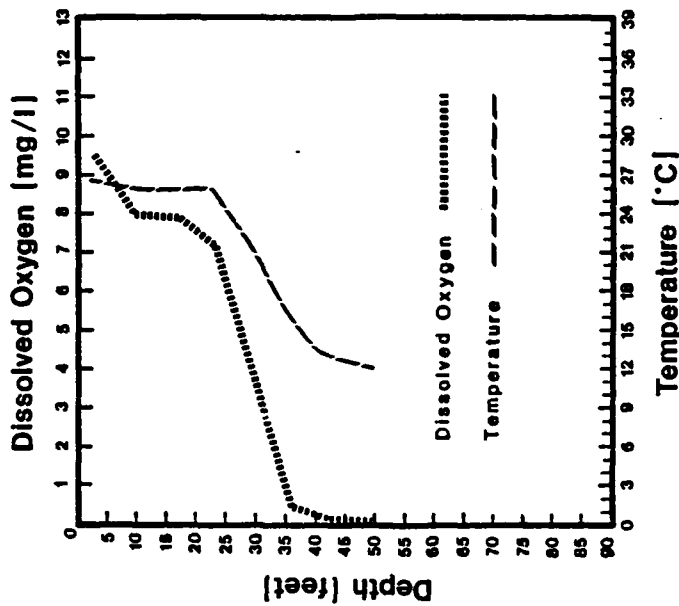


Figure 82A

DISSOLVED OXYGEN & TEMPERATURE PROFILES
13 August 1980



STATION 1			
DEPTH	D.O.	TEMP.	
(ft.)	(m)	(mg/l)	(°C)
1.6	0.5	9.5	26.5
9.8	2.5	8.0	26.0
16.4	5.0	7.9	26.0
23.0	7.0	7.1	26.0
29.5	9.0	3.9	21.5
36.1	11.0	0.4	16.0
42.6	13.0	0.1	13.0
49.2	15.0	0.0	12.0

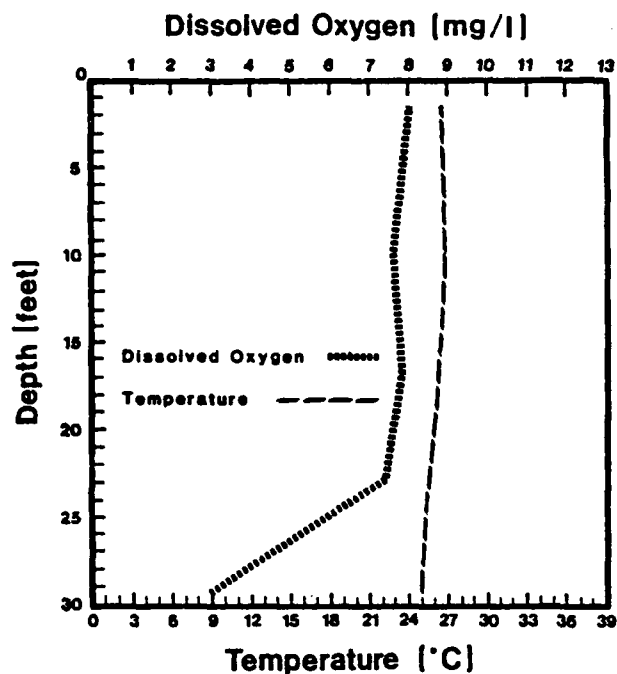
Secchi Disk Transparency 15.7 ft. (4.8 m)

JOHNS POND, Mashpee / Cape Cod Drainage Area

Figure 82B

DISSOLVED OXYGEN & TEMPERATURE PROFILES

13 August 1980



STATION 2

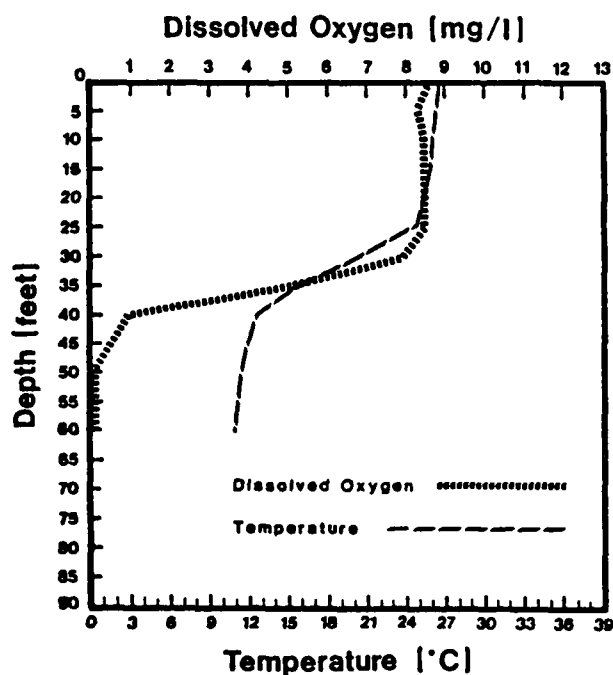
DEPTH (ft.)	DEPTH (m)	D.O. (mg/l)	TEMP. (°C)
1.6	0.5	8.0	26.5
9.8	2.5	7.6	26.5
16.4	5.0	7.9	26.0
23.0	7.0	7.4	25.5
29.5	9.0	3.0	25.0

Secchi Disk Transparency 11.8 ft. (3.4 m)

Figure 82C

DISSOLVED OXYGEN & TEMPERATURE PROFILES

17 AUGUST 1978



STATION 1

DEPTH (ft.)	DEPTH (m)	D.O. (mg/l)	TEMP. (°C)
0	0.0	8.6	26.5
5	1.5	8.3	26.5
10	3.0	8.4	26.0
15	4.6	8.4	26.0
20	6.1	8.4	25.5
25	7.6	8.4	25.0
30	9.1	7.9	21.0
35	10.7	5.1	16.0
40	12.2	1.0	13.0
45	13.4	0.4	12.0
50	15.2	0.0	11.5
55	16.8	0.0	11.0
60	18.3	0.0	11.0

Secchi Disk Transparency 18 ft. (5.5 m)

TABLE 58
JOHNS POND
MORPHOMETRIC DATA

Maximum Length	2,092 m	(6,864 ft)
Maximum Effective Length	2,092 m	(6,864 ft)
Maximum Width	644 m	(2,112 ft)
Maximum Effective Width	644 m	(2,112 ft)
Maximum Depth	19 m	(62 ft)
Mean Depth	5.9 m	(19.4 ft)
Mean Width	644 m	(2,112 ft)
Area	131 ha	(323 acres)
Volume	7,780,000 m ³	(6300 acre-ft)
Shoreline	7.0 km	(4.3 miles)
Development of Shoreline	1.73	
Development of Volume	0.93	
Mean to Maximum Depth Ratio	0.31	

TABLE 59a
 JOHNS POND
 STATION 1 (composite)
 PHYTOPLANKTON ENUMERATION
 17 August 1978

<u>ORGANISM</u>		<u>Cells/ml</u>
Bacillariophyceae (Diatoms)		
Unidentified	<u>72</u>	
Subtotal		<u>72</u>
Total		72

TABLE 59b
JOHNS POND
STATION 1 (composite)
PHYTOPLANKTON ENUMERATION
13 August 1980

<u>ORGANISM</u>		<u>Cells/ml</u>
Bacillariophyceae (Diatoms)		
<u>Synedra</u> sp.	14	
<u>Tabellaria</u> sp.	<u>14</u>	
Subtotal		28
Cyanophyceae (Blue-Greens)		
<u>Sphaerocystis</u> sp.	42	
Unidentified	<u>14</u>	
Subtotal		56
Chlorophyceae (Greens)		
<u>Cryptomonas</u> sp.	<u>14</u>	
Subtotal		14
Chrysophyceae (Golden-Browns)		
<u>Mallomonas</u> sp.	14	
Unidentified	<u>28</u>	
Subtotal		42
Dinophyceae (Dinoflagellates)		
<u>Peridinium</u> sp.	<u>28</u>	
Subtotal		<u>28</u>
Total		168

TABLE F-3
SUMMARY OF MMR WATER SUPPLY ANALYSES
FOR VOLATILE ORGANICS

Note: STONE = Stone School Water Supply
LYLE = Lyle School Water Supply
OTIS = Otis Memorial School Water Supply
FAL.AC = Falmouth Academy Water Supply

Source: ANGSC/SGB 1986

MMR SAMPLING PROGRAM SUMMARY~ (in ppb)
(08 Nov 85 - 03 Jun 86)

CONTAMINANT		"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
TETRACHLOROETHYLENE*							
(PCE)	HIGH	42.0	3.8	3.6*	4.0*	5.0*	4.0
	LOW	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN	17.69	0.57	0.56	0.57	0.80	0.66
	STD.DEV	10.70	1.12	1.13	1.11	1.63	1.40
TRICHLOROETHYLENE							
(TCE)	HIGH	4.9	5.0	0.0	0.0	0.0	0.0
	LOW	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN	0.39	0.33	0.0	0.0	0.0	0.0
	STD.DEV	1.24	1.22	0.0	0.0	0.0	0.0
TRICHLOROETHANE							
(TCA)	HIGH	22.0	2.1	2.1	0.0	1.6	1.3
	LOW	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN	1.49	0.07	0.07	0.0	0.18	0.04
	STD.DEV	4.04	0.38	0.38	0.0	0.54	0.23
TOT TRIHALOMETHANES							
(THMs)	HIGH	15.3	3.1	17.4	16.2	15.5	18.7
	LOW	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN	1.46	0.43	3.71	3.95	3.39	3.58
	STD.DEV	3.55	0.91	4.80	4.19	4.34	5.12
TRICHLOROFLUOROMETHANE							
(Freon 11)	HIGH	21.0	0.0	22.0#	28.0#	0.0	0.0
	LOW	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN	1.91	0.0	0.73	0.93	0.0	0.0
	STD.DEV	4.84	0.0	3.95	5.03	0.0	0.0
DICHLORODIFLUOROMETHANE							
(Freon 12)	HIGH	16.0	0.0	0.0	0.0	0.0	0.0
	LOW	0.0	0.0	0.0	0.0	0.0	0.0
	MEAN	0.87	0.0	0.0	0.0	0.0	0.0
	STD.DEV	3.33	0.0	0.0	0.0	0.0	0.0

NOTES: ~ - Does not include individual THMs. Only covers their sum total upon which the standard is based.

* - Does not include anomalous results described in detail in the results table for Tetrachloroethylene (PCE).

- Suspected as being caused by maintenance activities at subject schools.

Applicable Standards: Maximum Contaminant Level {MCL} or Proposed MCL(PMCL):

- | | |
|-------------------------|------------------------|
| 1. PCE - 5.0 ppb (PMCL) | 4. THM - 100 ppb (MCL) |
| 2. TCE - 5.0 ppb (PMCL) | 5. Freon 11 - N/A |
| 3. TCA - 200 ppb (PMCL) | 6. Freon 12 - N/A |

Comment: Summary results after 30 sample sets of 6 samples per set, for a total of 180 samples.

TETRACHLOROETHYLENE (PCE) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	1.9	ND	10.0*	ND
85/11/12	3.2	3.8	18.0*	19.0*	5.0	4.0
85/11/14	3.0	ND	9.8~	1.3	5.0	ND
85/11/18+	25.0	3.2~	3.6~	4.0~	3.9~	4.0~
85/11/20+	28.0	2.0~	3.6~	3.0~	3.8~	4.0~
85/11/22+	24.0	1.4~	2.0~	2.8~	2.8~	4.0~
85/11/25+	2.0	ND	ND	ND	ND	ND
85/12/04+	3.9	ND	ND	ND	ND	1.4
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	21.0	ND	ND	1.4	ND	ND
86/01/07+	6.4	ND	ND	ND	ND	ND
86/01/14+	7.4	ND	ND	ND	ND	ND
86/01/21+	38.0	3.1~	2.8~	2.7~	2.8~	2.5~
86/01/28+	13.0	1.7	ND	ND	ND	ND
86/02/04+	42.0	2.0	ND	ND	ND	ND
86/02/11+	13.0	ND	ND	ND	ND	ND
86/02/25+	18.0	ND	ND	ND	ND	ND
86/03/04+	19.0	ND	1.7	ND	ND	ND
86/03/11+	21.0	ND	ND	1.2	ND	ND
86/03/18+	26.0	ND	ND	ND	ND	ND
86/03/25+	23.0	ND	ND	ND	ND	ND
86/04/01+	30.0	ND	ND	ND	ND	ND
86/04/08+	17.0	ND	ND	ND	ND	ND
86/04/15+	19.0	ND	ND	ND	ND	ND
86/04/29+	17.0	ND	ND	ND	ND	ND
86/05/06+	18.0	ND	ND	ND	ND	ND
86/05/12+	19.0	ND	ND	ND	ND	ND
86/05/20+	27.0	ND	ND	ND	ND	ND
86/05/27+	26.0	ND	ND	ND	ND	ND
86/06/03+	21.0	ND	ND	ND	ND	ND

NOTES: * - These results are highly suspect as to their validity. Concentrations are far in excess of those found in the subject wells, and in the case of Otis school no PCE was detected in either "G" or "J" wells. In the case of Stone and Lyle schools, these concentrations coincide with levels of Freon 11 found in the schools on the same day. Suspect the Freon 11 and PCE were the result of maintenance activity and not due to well contamination.

~ - PCE level is three times greater than that found in well. Its validity is suspect.

- - These levels are suspected as being carry-over concentrations as a result of less than perfect purging of the GC column following the analysis for "G" well. Sequence of analysis prior to 86/02/25 was same as shown in above table from left to right. Beginning on 86/02/25 the sequence of analysis was reversed to preclude "G" Well carry-over.

+ - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

TRICHLOROFLUOROMETHANE (FREON 11) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	22.0*	28.0*	ND	ND
85/11/14	ND	ND	ND	ND	ND	ND
85/11/18+	ND	ND	ND	ND	ND	ND
85/11/20+	ND	ND	ND	ND	ND	ND
85/11/22+	ND	ND	ND	ND	ND	ND
85/11/25+	ND	ND	ND	ND	ND	ND
85/12/04+	ND	ND	ND	ND	ND	ND
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	ND	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	21.0	ND	ND	ND	ND	ND
86/01/28+	ND	ND	ND	ND	ND	ND
86/02/04+	17.0	ND	ND	ND	ND	ND
86/02/11+	5.0	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	5.1	ND	ND	ND	ND	ND
86/03/11+	1.6	ND	ND	ND	ND	ND
86/03/18+	4.1	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	3.4	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	ND	ND	ND	ND
86/05/27+	ND	ND	ND	ND	ND	ND
86/06/03+	ND	ND	ND	ND	ND	ND

NOTE: * - Samples results are suspected of being the result of maintenance activities at the two involved schools and not a result of well water contamination at the source!

+ - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

TRICHLOROETHYLENE (TCE) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	ND	ND	ND	ND
85/11/14	ND	ND	ND	ND	ND	ND
85/11/18+	4.8	5.0	ND	ND	ND	ND
85/11/20+	4.9	4.8	ND	ND	ND	ND
85/11/22+	2.0	ND	ND	ND	ND	ND
85/11/25+	ND	ND	ND	ND	ND	ND
85/12/04+	ND	ND	ND	ND	ND	ND
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	ND	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	ND	ND	ND	ND	ND	ND
86/01/28+	ND	ND	ND	ND	ND	ND
86/02/04+	ND	ND	ND	ND	ND	ND
86/02/11+	ND	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	ND	ND	ND	ND
86/03/11+	ND	ND	ND	ND	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	ND	ND	ND	ND
86/05/27+	ND	ND	ND	ND	ND	ND
86/06/03+	ND	ND	ND	ND	ND	ND

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!
ND - Signifies "None Detected"!

1,1,1-TRICHLOROETHANE (TCA) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	1.6	ND
85/11/12	ND	ND	ND	ND	1.4	1.3
85/11/14	ND	ND	2.1	ND	2.3	ND
85/11/18+	4.8	2.1	ND	ND	ND	ND
85/11/20+	3.1	ND	ND	ND	ND	ND
85/11/22+	3.2	ND	ND	ND	ND	ND
85/11/25+	ND	ND	ND	ND	ND	ND
85/12/04+	22.0	ND	ND	ND	ND	ND
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	3.1	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	3.1	ND	ND	ND	ND	ND
86/01/28+	ND	ND	ND	ND	ND	ND
86/02/04+	2.2	ND	ND	ND	ND	ND
86/02/11+	ND	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	ND	ND	ND	ND
86/03/11+	ND	ND	ND	ND	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	1.7	ND	ND	ND	ND	ND
86/05/27+	1.5	ND	ND	ND	ND	ND
86/06/03+	ND	ND	ND	ND	ND	ND

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

BROMODICHLOROMETHANE (TBM) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	1.6	1.5	ND	1.8
85/11/14	ND	ND	ND	ND	2.2	ND
85/11/18+	ND	ND	5.1	5.1	4.9	4.6
85/11/20+	ND	ND	4.7	3.6	4.5	4.7
85/11/22+	ND	ND	4.9	4.1	4.0	4.7
85/11/25+	3.6	ND	2.0	2.5	2.3	ND
85/12/04+	ND	ND	ND	1.1	ND	3.3
85/12/10+	ND	ND	ND	1.2	1.3	1.4
85/11/16+	ND	ND	ND	3.2	1.4	1.3
86/01/07+	ND	ND	1.4	1.1	1.9	ND
86/01/14+	ND	ND	ND	1.3	1.2	1.4
86/01/21+	ND	ND	3.8	4.8	3.8	4.0
86/01/28+	13.0	1.7	ND	1.4	1.3	1.4
86/02/04+	ND	ND	3.0	2.2	ND	1.4
86/02/11+	ND	ND	ND	ND	1.4	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	2.1	ND	ND	ND
86/03/11+	ND	ND	ND	1.1	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	1.9	1.7	1.7	1.6
86/05/27+	ND	ND	1.5	1.6	1.5	1.6
86/06/03+	ND	ND	2.0	2.0	1.7	1.6

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

BROMOFORM (THM) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	ND	ND	ND	ND
85/11/14	ND	ND	ND	ND	ND	ND
85/11/18+	ND	ND	ND	ND	ND	ND
85/11/20+	ND	ND	ND	ND	ND	ND
85/11/22+	ND	ND	ND	ND	ND	ND
85/11/25+	1.6	ND	ND	ND	ND	ND
85/12/04+	ND	ND	ND	ND	ND	1.1
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	ND	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	ND	ND	ND	ND	ND	ND
86/01/28+	ND	ND	ND	ND	ND	ND
86/02/04+	ND	ND	ND	ND	ND	ND
86/02/11+	ND	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	ND	ND	ND	ND
86/03/11+	ND	ND	ND	ND	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	ND	ND	ND	ND
86/05/27+	ND	ND	ND	ND	ND	ND
86/06/03+	ND	ND	ND	ND	ND	ND

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that time it has been used for sampling only!

ND - Signifies "None Detected"!

CHLOROFORM (THM) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	5.0	ND	ND
85/11/12	ND	ND	4.0	1.8	ND	ND
85/11/14	ND	ND	ND	ND	3.5	ND
85/11/18+	2.5	3.1	5.1	5.3	6.0	6.1
85/11/20+	2.2	2.0	1.4	2.0	2.8	5.0
85/11/22+	3.4	1.4	2.8	4.2	4.2	5.1
85/11/25+	5.9	ND	ND	3.8	2.9	1.9
85/12/04+	3.2	ND	ND	1.9	ND	2.1
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	1.2	ND	ND	1.9	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	ND	ND	2.0	2.2	2.2	2.0
86/01/28+	ND	ND	1.5	1.5	1.3	1.4
86/02/04+	ND	3.0	1.4	1.2	ND	ND
86/02/11+	ND	ND	1.2	1.3	1.3	1.3
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	1.4	ND	ND	ND
86/03/11+	ND	ND	ND	1.1	ND	ND
86/03/18+	ND	ND	1.7	1.4	1.4	1.5
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	1.2	ND	ND	ND
86/04/08+	ND	ND	1.9	1.7	1.6	1.3
86/04/15+	1.7	1.8	3.0	3.1	3.4	3.1
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	1.3	1.7	2.4	ND
86/05/27+	1.4	ND	2.0	2.0	2.1	2.2
86/06/03+	ND	ND	1.9	1.8	1.3	1.4

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

DIBROMOCHLOROMETHANE (THM) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	ND	ND	ND	ND
85/11/14	ND	ND	ND	ND	ND	ND
85/11/18+	ND	ND	7.2	5.8	4.6	4.2
85/11/20+	ND	ND	6.7	4.9	5.7	9.0
85/11/22+	ND	ND	9.0	4.5	4.5	6.8
85/11/25+	4.2	ND	2.4	3.3	3.1	1.2
85/12/04+	ND	ND	ND	1.2	ND	3.7
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	ND	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	ND	ND	4.3	3.5	3.3	3.5
86/01/28+	ND	ND	2.2	1.5	1.3	1.4
86/02/04+	ND	ND	1.4	1.8	ND	1.3
86/02/11+	ND	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	ND	ND	ND	ND
86/03/11+	ND	ND	ND	ND	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	1.7	1.1	1.4	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	2.5	2.4	2.4	2.3
86/05/27+	ND	ND	2.1	2.1	2.0	1.9
86/06/03+	ND	ND	1.9	2.1	1.8	1.7

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

TOTAL TRIHALOMETHANES (TTHMs) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	5.0	ND	ND
85/11/12	ND	ND	5.6	3.3	ND	1.8
85/11/14	ND	ND	ND	ND	5.7	ND
85/11/18+	2.5	3.1	17.4	16.2	15.5	14.9
85/11/20+	2.2	2.0	12.8	10.5	13.0	18.7
85/11/22+	3.4	1.4	16.7	12.8	12.7	16.6
85/11/25+	15.3	ND	4.4	9.6	8.3	3.1
85/12/04+	3.2	ND	ND	4.2	ND	10.2
85/12/10+	ND	ND	ND	1.2	1.3	1.4
85/12/16+	1.2	ND	ND	5.1	1.4	1.3
86/01/07+	ND	ND	1.4	1.1	1.9	ND
86/01/14+	ND	ND	ND	1.3	1.2	1.4
86/01/21+	ND	ND	10.1	10.5	9.3	9.5
86/01/28+	13.0	1.7	3.7	4.4	3.9	4.2
86/02/04+	ND	3.0	5.8	5.2	ND	2.7
86/02/11+	ND	ND	1.2	1.3	2.7	1.3
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	5.6	ND	ND	ND
86/03/11+	ND	ND	ND	2.2	ND	ND
86/03/18+	ND	ND	1.7	1.4	1.4	1.5
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	1.2	ND	ND	ND
86/04/08+	ND	ND	3.6	2.8	3.0	1.3
86/04/15+	1.7	1.8	3.0	3.1	3.4	3.1
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	5.7	5.8	6.5	3.9
86/05/27+	1.4	ND	5.6	5.7	5.6	5.7
86/06/03+	ND	ND	5.8	5.9	4.8	4.7

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

DICHLORODIFLUOROMETHANE (FREON 12) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	ND	ND	ND	ND
85/11/14	ND	ND	ND	ND	ND	ND
85/11/18+	ND	ND	ND	ND	ND	ND
85/11/20+	ND	ND	ND	ND	ND	ND
85/11/22+	ND	ND	ND	ND	ND	ND
85/11/25+	ND	ND	ND	ND	ND	ND
85/12/04+	ND	ND	ND	ND	ND	ND
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	ND	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01 21+	10.0	ND	ND	ND	ND	ND
86/01/28+	ND	ND	ND	ND	ND	ND
86/02/04+	16.0	ND	ND	ND	ND	ND
86/02/11+	ND	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	ND	ND	ND	ND
86/03/11+	ND	ND	ND	ND	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	ND	ND	ND	ND
86/05/27+	ND	ND	ND	ND	ND	ND
86/06/03+	ND	ND	ND	ND	ND	ND

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!

ND - Signifies "None Detected"!

DICHLORODIFLUOROMETHANE (FREON 12) - (in ppb)

DATE	"G" WELL	"J" WELL	STONE	LYLE	OTIS	FAL/AC
85/11/08	ND	ND	ND	ND	ND	ND
85/11/12	ND	ND	ND	ND	ND	ND
85/11/14	ND	ND	ND	ND	ND	ND
85/11/18+	ND	ND	ND	ND	ND	ND
85/11/20+	ND	ND	ND	ND	ND	ND
85/11/22+	ND	ND	ND	ND	ND	ND
85/11/25+	ND	ND	ND	ND	ND	ND
85/12/04+	ND	ND	ND	ND	ND	ND
85/12/10+	ND	ND	ND	ND	ND	ND
85/12/16+	ND	ND	ND	ND	ND	ND
86/01/07+	ND	ND	ND	ND	ND	ND
86/01/14+	ND	ND	ND	ND	ND	ND
86/01/21+	10.0	ND	ND	ND	ND	ND
86/01/28+	ND	ND	ND	ND	ND	ND
86/02/04+	16.0	ND	ND	ND	ND	ND
86/02/11+	ND	ND	ND	ND	ND	ND
86/02/25+	ND	ND	ND	ND	ND	ND
86/03/04+	ND	ND	ND	ND	ND	ND
86/03/11+	ND	ND	ND	ND	ND	ND
86/03/18+	ND	ND	ND	ND	ND	ND
86/03/25+	ND	ND	ND	ND	ND	ND
86/04/01+	ND	ND	ND	ND	ND	ND
86/04/08+	ND	ND	ND	ND	ND	ND
86/04/15+	ND	ND	ND	ND	ND	ND
86/04/29+	ND	ND	ND	ND	ND	ND
86/05/06+	ND	ND	ND	ND	ND	ND
86/05/12+	ND	ND	ND	ND	ND	ND
86/05/20+	ND	ND	ND	ND	ND	ND
86/05/27+	ND	ND	ND	ND	ND	ND
86/06/03+	ND	ND	ND	ND	ND	ND

NOTES: + - "G" Well disconnected from Water Distribution System on 85/11/15 due to contamination levels. Since that date it has been used for sampling only!
ND - Signifies "None Detected"!

O.E.H.L. TEST RESULTS OF SAMPLES FROM
WATER SUPPLY WELLS AND DISTRIBUTION SYSTEM
OTIS ANG BASE, MASS.

(Samples taken 13 November 1985)

Parameter	"J" Well	"G" Well	"B" Well	Lab Bldg. 169	Unit of Measure
Fluoride	< .1	< .1	< .1	.8	mg/L
Surfactants MBAS	< .1	< .1	< .1	< .1	mg/L
Residue, Flammable (TDS)	71	55	36	70	mg/L
Alkalinity, Phenolphthalein	0	0	0	0	mg/L
Alkalinity, Total	13	19	15	19	mg/L
Chloride	8	8	12	8	mg/L
Specific Conductance	90	79	67	112	umhos
Sulfate	17	4	7	13	mg/L
Alkalinity Bicarbonate	13	19	15	19	mg/L
Color	< 5	< 5	< 5	< 5	mg/L
Silica	9.0	5.5	8	10	mg/L
Carbon Dioxide	--	--	--	--	--
Arsenic	< 10	< 10	< 10	< 10	ug/L
Barium	< 200	< 200	< 200	< 200	ug/L
Cadmium	< 10	< 10	< 10	< 10	ug/L
Chromium	< 50	< 50	< 50	< 50	ug/L
Lead	< 20	< 20	< 20	< 20	ug/L
Mercury	< 1	< 1	< 1	< 1	ug/L
Selenium	< 10	< 10	< 10	< 10	ug/L
Silver	< 10	< 10	< 10	< 10	ug/L
Copper	156	157	< 20	213	ug/L
Iron	< 100	< 100	< 100	158	ug/L
Manganese	< 50	< 50	< 50	< 50	ug/L
Zinc	< 50	< 50	< 50	< 50	ug/L
Calcium	4.8	3.7	1.9	6.4	mg/L
Magnesium	3.8	2.3	1.1	3.7	mg/L
Potassium	1.2	.8	0.7	1.2	mg/L
Sodium	5.6	8.5	10.2	16.1	mg/L
Hardness	28	19	9	31	mg/L
Phosphorus, Total	< 11	.13	< .1	--	mg/L
Orthophosphate	< .1	< .1	< .1	--	mg/L
Oil and Grease (Fuel Screen)	< .3	< .3	.3	--	mg/L
Nitrate as N	.7	.3	.1	1.0	mg/L
Chromium	--	< 50	--	--	

D15

	<u>"J" Well</u>				<u>"G" Well</u>				<u>"B" Well</u>	<u>Unit of Measure</u>
	<u>Nov 12</u>	<u>Nov 13</u>	<u>Nov 14</u>	<u>Nov 18</u>	<u>Nov 12</u>	<u>Nov 13</u>	<u>Nov 14</u>	<u>Nov 18</u>	<u>Nov 13</u>	
<u>Volatile Halocarbons</u>										
Carbon Tetrachloride	--	--	--	--	--	1.2	--	2.5	--	ug/L
		--				1.3			--	
Chloroform	--	--	--	3.1	--	0.6	--	2.5	0.4	ng/L
			--			0.8			0.7	ug/L
1,2 Dichloroethane	--	--	--	--	--	0.6	--		0.6	ug/L
		--				--			--	ug/L
Methylene Chloride	--	--	--	--	--	Trace	--		--	ug/L
		--				--			--	ug/L
Tetrachloroethylene	3.8	1.0	3.0	3.2	3.2	9.7	--	25.0	0.2	ug/L
		0.9				9.5	--			ug/L
1-1-1 Trichloroethane	--	--	--	2.1	--	0.6	--	4.8	--	ug/L
		--				0.6			--	ug/L
Trichloroethylene	--	--	--	5.0	--	0.6		4.8	--	ug/L
		--				0.5			--	ug/L

Notes: 1. 12-14-18 Nov 85 by Contract Lab
13 Nov 85 by OEHL.

2. Well "G" off line 15 Nov 85.

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TABLE F-4
VOLATILE ORGANIC COMPOUNDS IN USGS
WELLS SOUTH OF MMR

SOURCE: LeBlanc (1984)

Table 9. Organic analyses by purge/trap and gas chromatography and mass spectrometry for samples from 1983 field season.

Well	Compound	Concentration µg/l
FSW		
166-67	Trichloroethene	0.3
	Tetrachloroethene	0.2
182-69	Not Found	
194-57	Trichloroethene	5.0
	Tetrachloroethene	7.0
232-58	1,1,1-Trichloroethane	0.2
	Tetrachloroethene	0.1
233-67	1,1,1-Trichloroethane	0.5
	Trichloroethene	4.4
	Tetrachloroethene	5.1
	1,1-Dichloroethane	0.1
	Trans-1,2-dichloroethene	1.6
236-106	Trichloroethene	0.1
	Tetrachloroethene	0.9
237-88	Trichloroethene	0.1
	Tetrachloroethene	0.7
239-64	1,1,1-Trichloroethane	0.1
	Trichloroethene	95.0
	Tetrachloroethene	134.0
	Trans-1,2-dichloroethene	34.0
	1,1-Dichloroethane	5.0
	1,1-Dichloroethene	0.2
	1,2-Dichloroethane	0.2
	Carbontetrachloride	0.1
	1,2-Dichloropropane	0.2
	1,1,2-Trichloroethane	0.1
	Chlorobenzene	0.2
240-95	1,1,1-Trichloroethane	0.2
241-98	1,1,1-Trichloroethane	1.4
242-77	Not Found	

Table 9 Continued. Organic compounds from purge/trap and gas chromatography and mass spectrometry for samples from the 1983 field season.

Well	Compound	Concentration µg/l
FSW		
244-90	1,1,1-Trichloroethane	0.5
	Trichloroethene	30.0
	Tetrachloroethene	245.0
	Trans-1,2-dichloroethane	113.0
	1,2-Dichloroethane	0.6
	Carbontetrachloride	0.2
	1,2-Dichloropropane	0.3
	1,1,2-Trichloroethane	0.1
	Chlorobenzene	0.3
	Ethylbenzene	0.2
254-216	Trichloroethene	0.3
	Tetrachloroethene	0.7
254-168	Trichloroethene	0.3
	Tetrachloroethene	0.7
	1,2-Transdichloroethene	0.3
254-140	Trichloroethene	4.5
254-107	1,1,1-Trichloroethane	2.8
	Trichloroethene	48.0
	Tetrachloroethene	16.0
	1,1-Dichloroethane	1.0
	1,2-Transdichloroethene	26.0
254-72	Trichloroethene	65.0
	Tetrachloroethene	417.0
	1,1-Dichloroethane	13.3
	1,2-Transdichloroethene	197.0
254-54	Trichloroethene	1.4
	Tetrachloroethene	3.6
	1,2-Transdichloroethane	3.0
254-26	Not Found	—
262-85	1,1,1-Trichloroethane	2.0
	Trichloroethene	27.0
	Tetrachloroethene	14.0
	1,2-Transdichloroethene	5.0
262-69	Trichloroethene	1.9
	Tetrachloroethene	0.3
	1,2-Transdichloroethene	1.5

Table 9 Continued. Organic analyses by purge/trap and gas chromatography and mass spectrometry for samples from the 1983 field season.

Well	Compound	Concentration µg/l
FSW		
267-88	1,1,1-trichloroethane	2.5
	Trichloroethene	0.6
	Tetrachloroethene	6.2
	Carbontetrachloride	0.1
	1,1,2-Trichloroethane	0.1
	Chlorobenzene	0.1
271-141	Not Found	
271-85	Not Found	
271-41	Not Found	
247-70	Not Found	
282-94	1,1,1-Trichloroethane	1.1
	Trichloroethene	3.9
	Tetrachloroethene	0.1
282-70	Not Found	
288-97	1,1,1-Trichloroethane	1.0
	Trichloroethene	10.0
	Tetrachloroethene	19.0
294-89	Trichloroethene	0.4
299-20	Not Found	
300-30	Trichloroethene	2.1
	Tetrachloroethene	0.8
	Trans-1,2-dichloroethene	0.9
	Chlorobenzene	0.1
Tap Water Otis Air National Guard Base		
	1,1,1-Trichloroethane	0.3
	Chloroform	5.0
	Bromodichloromethane	9.9
	Dibromochloromethane	7.3
	Bromoform	1.0
Ashumet Pond Boat Landing		
Sample 1	Trans-1,2-dichloroethene	0.3
Sample 2	Trichloroethene	0.1
Sample 3	Not Found	
Sample 4	Not Found	

TABLE F-5
AEHA MONITORING WELL WATER QUALITY

SOURCE: Camp Edwards DFAE 1986

WATER QUALITY OF
AEHA WELLS
AT MMR

<u>Well No.</u>	<u>Tetrachloro- ethylene (µg/L)</u>	<u>Trichloro- ethylene (µg/L)</u>	<u>Dichloro- fluoromethane (µg/L)</u>	<u>Toluene (µg/L)</u>	<u>Lead (mg/L)</u>
AEHA-1	14	7	3	3	<0.10
AEHA-2	<3	<3	<3	<3	<0.10
AEHA-3	<3	<3	<3	<3	0.112
AEHA-4	<3	<3	<3	<3	<0.10
AEHA-5	<3	<3	<3	<3	<0.10
AEHA-6	<3	<3	<3	<3	<0.10
AEHA-7	<3	<3	<3	<3	<0.10
AEHA-8*	<3	<3	<3	<3	<0.005
AEHA-9*	<3	<3	<3	<3	<0.005
AEHA-1A*	<3	<3	<3	3	<0.005
BHW-27**	23	<3	<3	<3	<0.10

NOTE

Samples taken on July 19, 1985

* Samples taken on September 16, 1985

** Former water supply observation well sampled July 19, 1985

Source: AEHA Files

WATER QUALITY OF
AEHA WELLS
AT MMR

<u>Well No.</u>	<u>Tetrachloro- ethylene (µg/L)</u>	<u>Trichloro- ethylene (µg/L)</u>	<u>Dichloro- fluoromethane (µg/L)</u>	<u>Toluene (µg/L)</u>	<u>Lead (mg/L)</u>
AEHA-1	14	7	3	3	<0.10
AEHA-2	<3	<3	<3	<3	<0.10
AEHA-3	<3	<3	<3	<3	0.112
AEHA-4	<3	<3	<3	<3	<0.10
AEHA-5	<3	<3	<3	<3	<0.10
AEHA-6	<3	<3	<3	<3	<0.10
AEHA-7	<3	<3	<3	<3	<0.10
AEHA-8*	<3	<3	<3	<3	<0.005
AEHA-9*	<3	<3	<3	<3	<0.005
AEHA-1A*	<3	<3	<3	3	<0.005
BHW-27**	23	<3	<3	<3	<0.10

NOTE

Units in µg/L

Samples taken on July 19, 1985

* Samples taken on September 16, 1985

** Former water supply observation well sampled July 19, 1985

Source: AEHA Files

APPENDIX G
HAZARD ASSESSMENT RATING
METHODOLOGY CRITERIA

USAF INSTALLATION RESTORATION PROGRAM HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

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 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) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH₂M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH₂M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes 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 the other hazardous waste site ranking models, the U.S. Air Force's 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 Record Search portion (Phase I) of the IRP. Scoring judgments 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 at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

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. 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 three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

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 scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. 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 factor to the sum of the scores for the other three categories.

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

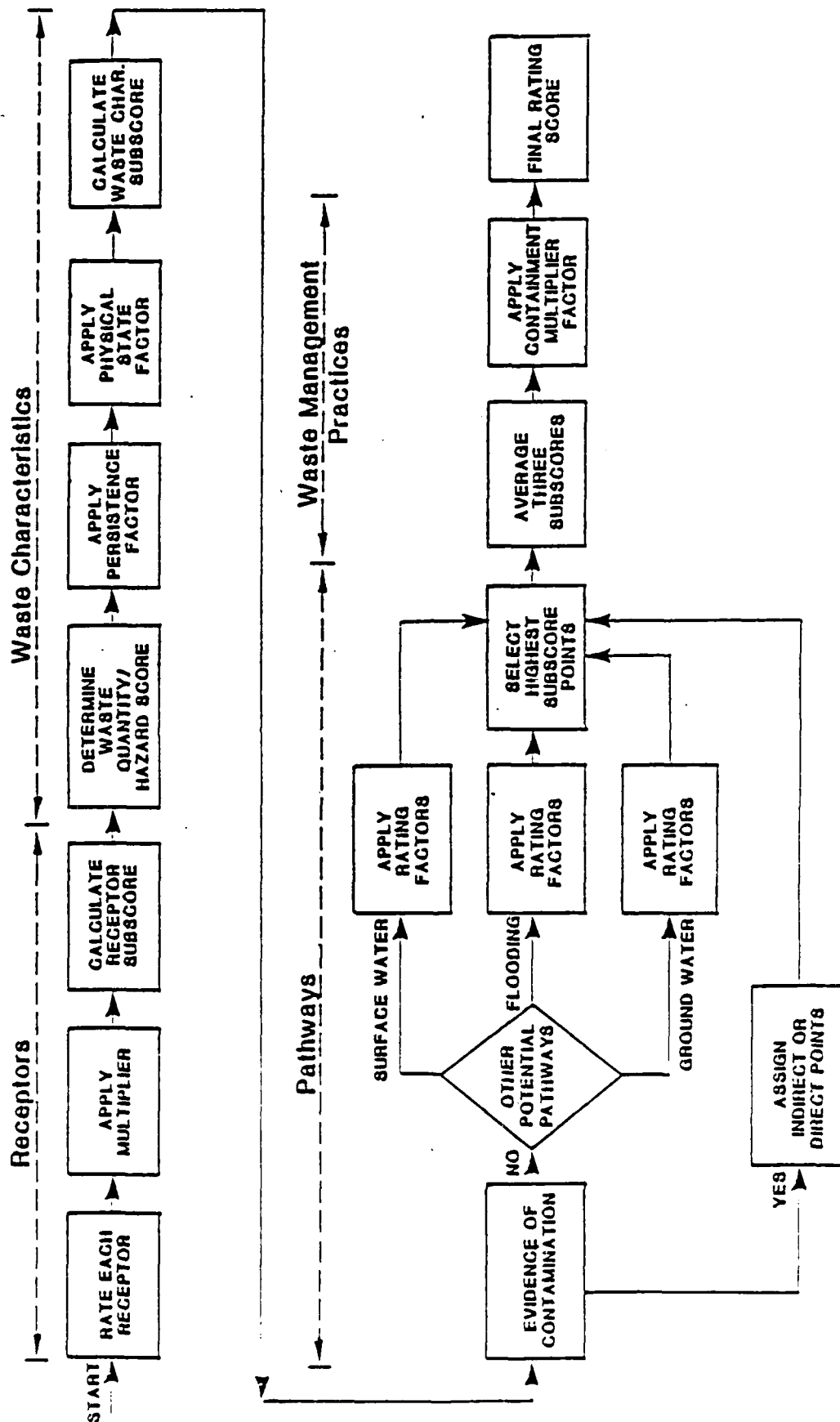


FIGURE 1

FIGURE 2 HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

NAME OF SITE _____
 LOCATION _____
 DATE OF OPERATION OR OCCURRENCE _____
 OWNER/OPERATOR _____
 COMMENTS/DESCRIPTION _____
 SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		4		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		4		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 1 miles downstream of site		4		
I. Population served by ground-water supply within 1 miles of site		4		

Subtotals _____

Receptors subscore (100 X factor score subtotal/maximum score subtotal)

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

Factor Subscore A (from 10 to 100 based on factor score matrix)

3. Apply persistence factor

Factor Subscore A X Persistence Factor = Subscore B

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

FIGURE 2 (Continued)

Page 2 of 2

III. PATHWAY

- Rating Factor
- | 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 30 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 ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		3		
Net precipitation		3		
Surface erosion		3		
Surface permeability		3		
Rainfall intensity		3		

Subtotals _____

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

2. Flooding

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		3		
Net precipitation		3		
Soil permeability		3		
Subsurface flows		3		
Direct access to ground water		3		

Subtotals _____

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 _____

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	_____
Waste Characteristics	_____
Pathways	_____
Total _____ divided by 3 =	Gross Total Score _____

- B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

_____ x _____ = _____

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factor	Rating Scale Levels			Multiplier	
	0	1	2		
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	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 1,000 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 or threatened species; presence of recharge areas; major wetlands.	10
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 1 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 1 miles of site	0	1 - 50	51 - 1,000	Greater than 1,000	6

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

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)
- S - Suspected confidence level
- o Verbal reports from interviewer (at least 2) or written information from the records.
- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.
- o Logic based on a knowledge of the types and 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

Hazard Category	Rating Scale Levels		
	0	1	2
Toxicity	Sax's Level 0 Flash point greater than 200°F	Sax's Level 1 Flash point at 140°F to 200°F	Sax's Level 2 Flash point at 80°F to 140°F
Ignitability	Flash point greater than 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 back-ground levels	3 to 5 times back-ground levels

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

Hazard Rating	Points
High (III)	3
Medium (II)	2
Low (I)	1

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristic 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
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	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 ratings can only be added in a downgrade mode, e.g., MCM + SCM = LCM if the total quantity is greater than 20 tons.
Examples: 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	0.5
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
Soluble	0.75
Solid	0.50

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES,

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, ground water, 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 Factor	Rating Scale Levels			Multiplier
	0	1	2	
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
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.
Surface erosion	None	Slight	Moderate	Severe
Surface permeability	0 to 150 clay (>10 ⁻² cm/sec)	151 to 300 clay (10 ⁻² to 10 ⁻³ cm/sec)	301 to 500 clay (10 ⁻³ to 10 ⁻⁴ cm/sec)	Greater than 500 clay (<10 ⁻⁴ cm/sec)
Mainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches

B-2 POTENTIAL FOR FLOODING

Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually
------------	----------------------------	-----------------------	-----------------------	-----------------

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.
Soil permeability	Greater than 500 clay (>10 ⁻² cm/sec)	301 to 500 clay (10 ⁻² to 10 ⁻³ cm/sec)	151 to 300 clay (10 ⁻³ to 10 ⁻⁴ cm/sec)	0 to 150 clay (<10 ⁻⁴ cm/sec)
Subsurface flow	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
Direct access to ground water (through faults, fractures, faulty well casings, subsurface features, etc.)	No evidence of risk	Low risk	Moderate risk	High risk

TABLE 1 (Continued)
HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characterization 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 characterization subcores.

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:

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

Surface Impoundments:

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

Spills:

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

Waste Prevention Training Areas:

- ☐ Concrete surface and berms
- ☐ Oil/water separator for pretreatment of runoff
- ☐ 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 H
HAZARD ASSESSMENT RATING
METHODOLOGY FORMS

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: UTES/BOMARC SITE

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1962-1973 BOMARC/1975-Present UTES

Owner/Operator: U.S. Army

Comments/Description: _____

Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>3</u>	4	<u>12</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>140</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>77.8</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 1
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

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

- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = 100 x 1.0 = 100
Subscore B

- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = 100 x 1.0 = 100
Waste Characteristics Subscore

* Based on waste motor oil spillage from the UTES site because this spillage offers a higher subscore than BOMARC activities.

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>66</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>61.1</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>

C. Highest pathway subscore

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

Pathways Subscore 80.0

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 77.8

Waste Characteristics 100.0

Pathways 80.0

TOTAL 257.8 divided by 3 = 85.9 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$$85.9 \times 1.0 = 85.9$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FORMER MOGAS STORAGE/TRANSFER

Location: (see map)

Date of Operation or Occurrence: 1941-1985

Owner/Operator: Army

Comments/Description: _____

Site Rated By: John Tewhey

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>1</u>	6	<u>6</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>130</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>72.2</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $70 \times 0.8 = 56$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $56 \times 1.0 = 56$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42.0</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>

- 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 72.2

Waste Characteristics 56.0

Pathways 80.0

TOTAL 208.2 divided by 3 = 69.4 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

69.4 x .95 = 65.9

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SOUTHERN TRUCK ROAD MOTOR POOLS

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: Army (1940-1946) AF (1950-1973)

Owner/Operator: Army/ANG

Comments/Description: _____

Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>146</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>81.1</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $70 \times 1.0 = 70$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $70 \times 1.0 = 70$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal/ total/maximum score subtotal)				<u>50.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				Pathways Subscore <u>50.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 81.1

Waste Characteristics 70.0

Pathways 50.9

TOTAL 202 divided by 3 = 67.3 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$67.3 \times 1.0 = 67.3$

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>46</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>43.9</u>

C. Highest pathway subscore

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

Pathways Subscore 46.0

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 75.0

Waste Characteristics 80.0

Pathways 46.0

TOTAL 201 divided by 3 = 67.0 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

67.1 x 1.0 = 67.0

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: ORGANIZATIONAL MAINTENANCE SHOP #22

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1950-1951, 1953-Present

Owner/Operator: Massachusetts Army National Guard

Comments/Description: Motor pool for up to 300 vehicles

Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>78.9</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $70 \times 1.0 = 70$
Subscore B

C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $70 \times 1.0 = 70$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>50.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 50.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 78.9

Waste Characteristics 70.0

Pathways 50.9

TOTAL 199.8 divided by 3 = 66.6 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

66.6 x 1.0 = 66.6

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FORMER REFUELER MAINTENANCE SHOP & FORMER SALVAGE YARD
Location: Massachusetts Military Reservation
Date of Operation or Occurrence: Army (1940-1946) Air Force (1955-1965)
Owner/Operator: Army/Air Force
Comments/Description: Also served as Army Munitions Shops
Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>1</u>	6	<u>6</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>130</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>72.2</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $70 \times 1.0 = 70$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $70.0 \times 1.0 = 70.0$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater		8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 46.3

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 72.2

Waste Characteristics 70.0

Pathways 46.3

TOTAL 188.5 divided by 3 = 62.8 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

62.8 x 1.0 = 62.8

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Current Product Tank #90

Location: Adjacent to OMS #22

Date of Operation or Occurrence: 1954 to Present

Owner/Operator: Army National Guard

Comments/Description: Currently under study

Site Rated By: S.A. Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>78.9</u>

II. WASTE CHARACTERISTICS

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

- Waste quantity (1 = small, 2 = medium, 3 = large) 3
- Confidence level (1 = confirmed, 2 = suspected) 2
- Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 70 x 0.8 = 56.0

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 56 x 1.0 = 56.0
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore _____

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
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	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				___
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>50.9</u>

C. Highest pathway subscore

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

Pathways Subscore 50.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 78.9

Waste Characteristics 56.0

Pathways 50.9

TOTAL 185.8 divided by 3 = 61.9 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

61.9 x 1.0 = 61.9

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: CPT-88Location: (See map)Date of Operation or Occurrence: 1968 - PresentOwner/Operator: ArmyComments/Description: Leaking TankSite Rated By: TWTI. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>127</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>70.5</u>

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 (1 = small, 2 = medium, 3 = large)	<u>3</u>
2. Confidence level (1 = confirmed, 2 = suspected)	<u>2</u>
3. Hazard rating (1 = low, 2 = medium, 3 = high)	<u>3</u>

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

- B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 70 x 0.8 = 56.0

- C. Apply physical state multiplier:

Subscore B x Physical State Multiplier =
Waste Characteristics Subscore 56 x 1.0 = 56.0

III. PATHWAYS

- A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 90 points for indirect evidence. If direct evidence exists, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water				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	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
Pathways Subscore				<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 70.6

Waste Characteristics 56.0

Pathways 43.9

TOTAL 190.5 divided by 3 = 56.8 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

56.8 x 1.0 = 56.8

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: CPT-115
 Location: (see map)
 Date of Operation or Occurrence: 1970-1985
 Owner/Operator: Army
 Comments/Description: Leaking tank, Removed in 1985
 Site Rated By: John Tewhey

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>123</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>68.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
 Factor Subscore A x Persistence Factor = $70 \times 0.8 = 56$
 Subscore B
- C. Apply physical state multiplier:
 Subscore B x Physical State Multiplier = $56 \times 1.0 = 56$
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore _____

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
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	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				_____
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ total/maximum score subtotal)				<u>43.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 43.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 68.3

Waste Characteristics 56.0

Pathways 43.9

TOTAL 168.2 divided by 3 = 56.1 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

56.1 x 1.0 = 56.1

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FORMER WW II MOTOR POOL/TRANSFER

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1941-1946

Owner/Operator: Army

Comments/Description: _____

Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>1</u>	6	<u>6</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>126</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>70.0</u>

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 (1 = small, 2 = medium, 3 = large) 2
 2. Confidence level (1 = confirmed, 2 = suspected) 2
 3. Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 50
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = 50 x 1.0 = 50
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = 50 x 1.0 = 50
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>2</u>	6	<u>12</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>1</u>	8	<u>8</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>52</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>46.0</u>

- C. Highest pathway subscore

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

Pathways Subscore 46.0

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 70.0

Waste Characteristics 46.0

Pathways 50.9

TOTAL 166.9 divided by 3 = 55.6 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

55.6 x 1.0 = 55.6

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: MOGAS SPILL AT E3

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: Summer 1985

Owner/Operator: Army

Comments/Description: Gas Spill 1200 gal./soil excavated

Site Rated By: M. Murphy

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>1</u>	10	<u>10</u>	30
C. Land use/zoning within 1-mile radius	<u>0</u>	3	<u>0</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>103</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>57.2</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 2
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 80
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $80 \times 0.8 = 64$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $64 \times 1.0 = 64$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore _____

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>

C. Highest pathway subscore

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

Pathways Subscore 43.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 57.2

Waste Characteristics 64.0

Pathways 43.9

TOTAL 165.1 divided by 3 = 55.0 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

55.0 x 0.95 = 52.3

* Soil has been removed.

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: 3" FUEL LINE SPILL (RANGE)

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: late 1972 or 1973

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>78.9</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 2
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 50
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $50 \times 0.9 = 40$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $40 \times 1.0 = 40$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore _____

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>43.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 43.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 78.9

Waste Characteristics 40.0

Pathways 43.9

TOTAL 162.8 divided by 3 = 54.3 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

54.3 x 1.0 = 54.3

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FORMER ANG PEST CONTROL SHOP/CURRENT NG PEST CONTROL SHOPLocation: Massachusetts Military Reservation

Date of Operation or Occurrence: _____

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJI. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>140</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>77.8</u>

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 (1 = small, 2 = medium, 3 = large) 1
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $40 \times 1.0 = 40$
Subscore B

- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $40 \times 1.0 = 40$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore _____

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	0	8	0	24
Net precipitation	3	6	18	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
SUBTOTALS			34.0	108
Subscore (100 x factor score subtotal/maximum score subtotal)				31.5
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Groundwater migration				
Depth to groundwater	1	8	8	24
Net precipitation	3	6	18	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	0	8	0	24
SUBTOTALS			50	114
Subscore (100 x factor score subtotal/maximum score subtotal)				43.9

C. Highest pathway subscore

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

Pathways Subscore 43.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 77.8

Waste Characteristics 40.0

Pathways 43.9

TOTAL 161.7 divided by 3 = 53.9 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

53.9 x 1.0 = 53.9

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FORMER ARMY COAL YARD

Location: Opposite Base Service Station

Date of Operation or Occurrence: 1941-1957

Owner/Operator: Army

Comments/Description: Coal Storage

Site Rated By: PSB

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>136</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>75.6</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 40
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = 40 x 1.0 = 40
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = 40 x 1.0 = 40
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore _____

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>43.9</u>

C. Highest pathway subscore

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

Pathways Subscore 43.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 75.6

Waste Characteristics 40.0

Pathways 43.9

TOTAL 159.5 divided by 3 = 53.2 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

53.2 x 1.0 = 53.2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: CPT-108

Location: (See map)

Date of Operation or Occurrence: 1952 - Present

Owner/Operator: Army

Comments/Description: Leaking Tank

Site Rated By: TWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>1</u>	6	<u>6</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>134</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>74.4</u>

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 (1 = small, 2 = medium, 3 = large) 1
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 40 x 1.0 = 40

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 40 x 1.0 = 40*
Waste Characteristics Subscore

*Based on amount of lead in MOGAS.

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water				24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		
SUBTOTALS				108
Subscore (100 x factor score subtotal / maximum score subtotal)				
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				
				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
Pathways Subscore				<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 74.4
Waste Characteristics 40.0
Pathways 43.9

TOTAL 158.3 divided by 3 = 52.8 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

52.8 x 1.0 = 52.8

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FUEL TRANSFER POINT

Location: 3500 Block - Massachusetts Military Reservation

Date of Operation or Occurrence: (?) to Present

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>123</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>68.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 40
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $40 \times 1.0 = 40$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $40 \times 1.0 = 40$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>43.9</u>

C. Highest pathway subscore

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

Pathways Subscore 46.3

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 68.3

Waste Characteristics 40.0

Pathways 46.3

TOTAL 154.6 divided by 3 = 51.5 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

51.5 x 1.0 = 51.5

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: DUMP AT NORTHEAST CORNER OF BASE

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: Present

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>138</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>76.7</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 60
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = 60 x 1.0 = 60
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = 60 x 0.5 = 30.0
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 38.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 76.7

Waste Characteristics 30.0

Pathways 38.9

TOTAL 145.6 divided by 3 = 48.5 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

48.5 x 1.0 = 48.5

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Propellant Burning Pads/155 Firing PointsLocation: Range Area - 12-15 PointsDate of Operation or Occurrence: 1973 - PresentOwner/Operator: ARNGComments/Description: Excess Bags of Propellant at SiteSite Rated By: MAKI. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>122</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>67.8</u>

II. WASTE CHARACTERISTICS

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

- Waste quantity (1 = small, 2 = medium, 3 = large) 1
- Confidence level (1 = confirmed, 2 = suspected) 2
- Hazard rating (1 = low, 2 = medium, 3 = high) 3

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

30

- B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B30 x 1.0 = 30

- C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 30 x 0.5 = 15
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>53.7</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 67.8

Waste Characteristics 15.0

Pathways 53.7

TOTAL 136.5 divided by 3 = 45.5 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

45.5 x 1.0 = 45.5

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: LOW-LEVEL RADIOACTIVE DISPOSAL SITE
Location: Massachusetts Military Reservation
Date of Operation or Occurrence: 1955-1984
Owner/Operator: Air Force 1955-1970/ANG 1970-1984
Comments/Description: Cathode Ray Tubes from Constellation Radar
Site Rated By: J. Farry

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>1</u>	10	<u>10</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>112</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>62.2</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 1
- Factor Subscore A (from 20 to 100 based on factor score matrix) 20
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $20 \times 1.0 = 20$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $20 \times 0.5 = 10$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>34</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>34</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 34

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 62.2

Waste Characteristics 10.0

Pathways 43.9

TOTAL 116.1 divided by 3 = 38.7 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

38.7 x 1.0 = 38.7

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Current Fire Training Area

Location: (See Map)

Date of Operation or Occurrence: 1958 - 1985

Owner/Operator: Air National Guard/Air Force

Comments/Description: _____

Site Rated By: JWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>78.9</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 1
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

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 1.0 = 100

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 100 x 1.0 = 100
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 100

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>50.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>50.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	<u>78.9</u>
Waste Characteristics	<u>100.0</u>
Pathways	<u>100.0</u>

TOTAL 278.9 divided by 3 = 92.9 Gross total score

- B. Apply factor for waste containment from waste management practices.
Gross total score waste management practices factor = final score.

$$92.9 \times 1.0 = 92.9$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Base Sanitary Landfill

Location: (See Map)

Date of Operation or Occurrence: 1944 - Present

Owner/Operator: Air Force

Comments/Description: _____

Site Rated By: JWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>126</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>70.0</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 1
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

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 1.0 = 100

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 100 x 1.0 = 100
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 100.0

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.89</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>1</u>	8	<u>8</u>	24
Direct access to groundwater	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>90</u>	114
Subscore (100 x factor score sub- total/maximum score subtotal)				<u>78.95</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>78.95</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 70.0

Waste Characteristics 100.0

Pathways 100.0

TOTAL 270.0 divided by 3 = 90.0 Gross total score

- B. Apply factor for waste containment from waste management practices.
Gross total score waste management practices factor = final score.

90.0 x 1.0 = 90.0

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Fire Training Area #2 (Landfill)

Location: (See Map)

Date of Operation or Occurrence: 1948 to 1956

Owner/Operator: Air Force

Comments/Description: _____

Site Rated By: JWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>122</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>67.8</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 1.0 = 100
- C. Apply physical state multiplier:
 Subscore B x Physical State Multiplier = 100 x 1.0 = 100
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>50.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>50.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 67.8

Waste Characteristics 100.0

Pathways 80.0

TOTAL 247.8 divided by 3 = 82.6 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

82.6 x 1.0 = 82.6

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Railroad Fuel Pumping Station
 Location: Massachusetts Military Reservation
 Date of Operation or Occurrence: Mid 50's - 1965
 Owner/Operator: _____
 Comments/Description: _____
 Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>1</u>	10	<u>10</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>112</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>62.2</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 0.8 = 80
- C. Apply physical state multiplier:
 Subscore B x Physical State Multiplier = 80 x 1.0 = 80
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 100

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>34</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>31.5</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	<u>62.2</u>
Waste Characteristics	<u>80.0</u>
Pathways	<u>100.0</u>
TOTAL	<u>242.2</u> divided by 3 = <u>80.7</u> Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$$\underline{80.7} \times \underline{1.0} = \underline{80.7}$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: AV-GAS Dump Area - Soil Spread Area

Location: Beyond SAC Area

Date of Operation or Occurrence: 1955 - 1969

Owner/Operator: Air Force

Comments/Description: _____

Site Rated By: LRH/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>138</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>76.7</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 1
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

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 0.8 = 80

- C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 80 x 1.0 = 80
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score sub- total/maximum score subtotal)				<u>43.8</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>46.3</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 76.7

Waste Characteristics 80.0

Pathways 80.0

TOTAL 236.7 divided by 3 = 78.9 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

78.9 x 1.0 = 78.9

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: SWALE - AQUA Farm Drainage Basin

Location: Behind N.D.I. Lab

Date of Operation or Occurrence: 1940 - Present

Owner/Operator: ANG

Comments/Description: _____

Site Rated By: _____

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>123</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>68.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 0.8 = 100
- C. Apply physical state multiplier:
- Subscore B x Physical State Multiplier = 80 x 1.0 = 80
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80.0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>60</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>52.6</u>

- C. Highest pathway subscore

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

Pathways Subscore 61.0

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 68.3

Waste Characteristics 80.0

Pathways 80.0

TOTAL 228.3 divided by 3 = 76.1 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

76.1 x 1.0 = 76.1

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Riey Road Drainage Basin

Location: Riey Road - MMR

Date of Operation or Occurrence: 1955 - Present

Owner/Operator: ANG

Comments/Description: Drainage Basin For Storm Drains

Site Rated By: PSB

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>73.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 1.0 = 100
- C. Apply physical state multiplier:
- Subscore B x Physical State Multiplier = 100 x 1.0 = 100
- Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>60</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>52.6</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>53.7</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 73.3

Waste Characteristics 100.0

Pathways 53.7

TOTAL 227.0 divided by 3 = 75.7 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

75.7 x 1.0 = 75.7

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: WWTP Sewerage Application Area

Location: MMR

Date of Operation or Occurrence: 1941 - Present

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>146</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>81.1</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 = 60 x 1.0 = 60
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	<u>114</u>
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>50.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>80.0</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	<u>81.1</u>
Waste Characteristics	<u>60.0</u>
Pathways	<u>80.0</u>

TOTAL 221.1 divided by 3 = 73.7 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$$73.7 \times 1.0 = 73.7$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: South Outer Road Drainage Basin #2

Location: South of Fuel Storage Area

Date of Operation or Occurrence: 1955 - Present

Owner/Operator: ANG

Comments/Description: POL Storage, Ramp Drainage, Hangar Storm Sewer Outfall

Site Rated By: PSB/JWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>78.9</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 70 x 0.8 = 56

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 56 x 1.0 = 56
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>66</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>61.1</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score sub- total/maximum score subtotal)				<u>50.8</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>80.0</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 78.9

Waste Characteristics 56.0

Pathways 80.0

TOTAL 214.9 divided by 3 = 71.6 Gross total score

- B. Apply factor for waste containment from waste management practices.
Gross total score waste management practices factor = final score.

71.6 x 1.0 = 71.6

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Engine Test Area

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1949 - 1985

Owner/Operator: Army 1949 - 1954, Air Force 1954 - 1970, ANG 1970 - 1985

Comments/Description: _____

Site Rated By: _____

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multi- plier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>132</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>73.3</u>

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 (1 = small, 2 = medium, 3 = large) | <u>3</u> |
| 2. Confidence level (1 = confirmed, 2 = suspected) | <u>1</u> |
| 3. Hazard rating (1 = low, 2 = medium, 3 = high) | <u>3</u> |

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 0.8 = 80

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 80 x 1.0 = 80
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>58.8</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>43.9</u>

C. Highest pathway subscore

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

Pathways Subscore 58.8

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 73.3

Waste Characteristics 80.0

Pathways 58.8

TOTAL 212.1 divided by 3 = 70.7 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

70.7 x 1.0 = 70.7

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: EASTERN TRUCK ROAD MOTOR POOLS

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1940-1946

Owner/Operator: Army

Comments/Description: _____

Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>136</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>75.6</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = 70 x 1.0 = 70
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = 70 x 1.0 = 70
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 53.7

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 75.6

Waste Characteristics 70.0

Pathways 53.7

TOTAL 199.3 divided by 3 = 66.4 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

66.4 x 1.0 = 66.4

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Fire Training Area #3

Location: (See Map)

Date of Operation or Occurrence: 1956 - 1958

Owner/Operator: ANG/Air Force

Comments/Description: _____

Site Rated By: JWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>146</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>81.1</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
- Factor Subscore A x Persistence Factor =
 Subscore B 70 x 1.0 = 70
- C. Apply physical state multiplier:
 Subscore B x Physical State Multiplier = 70 x 1.0 = 70
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>38.8</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	<u>81.1</u>
Waste Characteristics	<u>70.0</u>
Pathways	<u>43.9</u>

TOTAL 194.9 divided by 3 = 64.9 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$$64.9 \times 1.0 = 64.9$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: South Outer Road Drainage Basin #1Location: Empties To Cranberry BogDate of Operation or Occurrence: 1941 - PresentOwner/Operator: ANGComments/Description: Relieves Drainage From Runway; Aqua-FarmSite Rated By: PSBI. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>136</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>75.6</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

- B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 70 x 0.8 = 56

- C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 56 x 1.0 = 56
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>61.0</u>

- C. Highest pathway subscore

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

Pathways Subscore 61.0

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 75.6

Waste Characteristics 56.0

Pathways 61.0

TOTAL 192.6 divided by 3 = 64.2 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

64.2 x 1.0 = 64.2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Hangar 156 Leach PitLocation: ANG CAM AreaDate of Operation or Occurrence: 1955 - PresentOwner/Operator: ANGComments/Description: Drain From Vapor Degreaser Room - Leach PitSite Rated By: PSBI. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>140</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>77.7</u>

II. WASTE CHARACTERISTICS

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

- Waste quantity (1 = small, 2 = medium, 3 = large) 3
- Confidence level (1 = confirmed, 2 = suspected) 2
- Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

- B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 70 x 1.0 = 70

- C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 70 x 1.0 = 70
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
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	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.8</u>

- C. Highest pathway subscore

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

Pathways Subscore 43.8

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 77.7

Waste Characteristics 70.0

Pathways 43.8

TOTAL 191.5 divided by 3 = 63.8 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

63.8 x 1.0 = 63.8

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Army/Air Force Motor Pool

Location: Corner of Connery Ave. & Turpentine Road - MMR

Date of Operation or Occurrence: Army (1940-1946)/Air Force (1958-1967)

Owner/Operator: U.S. Army/U.S. Air Force

Comments/Description: Main Camp Edward WWII Motor Pool Main A.F. Motor Pool

Site Rated By: S.A. Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>122</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>64.4</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 2
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 1.0 = 80
- C. Apply physical state multiplier:
 Subscore B x Physical State Multiplier = 80 x 1.0 = 80
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	<u>64.4</u>
Waste Characteristics	<u>80.0</u>
Pathways	<u>43.9</u>

TOTAL 188.3 divided by 3 = 62.8 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$$\underline{62.8} \times \underline{1.0} = \underline{62.8}$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Current Coal & Ash Storage

Location: Behind Heating Plant

Date of Operation or Occurrence: 1955 - Present

Owner/Operator: ANG

Comments/Description: Leachate From Ash Storage Runs Into Drainage Ditch

Site Rated By: PSB

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>146</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>81.1</u>

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 (1 = small, 2 = medium, 3 = large) 1
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 40 x 1.0 = 40

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 40 x 1.0 = 40
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>66</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>61.1</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>60</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>52.6</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>61.1</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 81.1
Waste Characteristics 40.0
Pathways 61.1

TOTAL 182.3 divided by 3 = 60.7 Gross total score

- B. Apply factor for waste containment from waste management practices.
Gross total score waste management practices factor = final score.

60.7 x 1.0 = 60.7

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: 3" Line Leak (JP-4, Water Towers)

Location: MMR

Date of Operation or Occurrence: Late 1972 or Early 1973

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well J	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>123</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>68.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 2
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 0.8 = 64
- C. Apply physical state multiplier:
- Subscore B x Physical State Multiplier = 64 x 1.0 = 64
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>42</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>38.9</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>43.8</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>43.8</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 68.3

Waste Characteristics 64.0

Pathways 43.8

TOTAL 176.1 divided by 3 = 58.7 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

58.7 x 1.0 = 58.7

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: CPT-100 and 101

Location: (See map)

Date of Operation or Occurrence: 1941 - Present

Owner/Operator: ANG

Comments/Description: Leaking Tank

Site Rated By: TWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>123</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>68.3</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 70 x 0.8 = 56

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier =
Waste Characteristics Subscore 56 x 1.0 = 56

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
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	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				
				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
Pathways Subscore				<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 68.3

Waste Characteristics 56.0

Pathways 43.9

TOTAL 168.2 divided by 3 = 56.1 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

56.1 x 1.0 = 56.1

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Air Force Coal Yard

Location: West of Treatment Plant

Date of Operation or Occurrence: 1958 - 1984

Owner/Operator: ANG

Comments/Description: Coal Stored Leachate Drains Off Pad

Site Rated By: PSB

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>128</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>71</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 40
- B. Apply persistence factor:
- Factor Subscore A x Persistence Factor =
 Subscore B 40 x 1.0 = 40
- C. Apply physical state multiplier:
- Subscore B x Physical State Multiplier = 40 x 1.0 = 40
- Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	<u>114</u>
Subscore (100 x factor score subtotal/maximum score subtotal)				<u>50.8</u>

- C. Highest pathway subscore

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

Pathways Subscore 53.7

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 71.1

Waste Characteristics 40.0

Pathways 53.7

TOTAL 164.8 divided by 3 = 54.9 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

54.9 x 1.0 = 54.9

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Sludge Disposal Area

Location: MMR

Date of Operation or Occurrence: 1941 - Mid 60's

Owner/Operator: Mr. Creighton, Asst. Operator

Comments/Description: _____

Site Rated By: MEM/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>142</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>78.9</u>

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 (1 = small, 2 = medium, 3 = large) 1
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor:

Factor Subscore A x Persistence Factor =
Subscore B 40 x 1.0 = 40

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 40 x 0.75 = 30.0
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>50.9</u>

- C. Highest pathway subscore

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

Pathways Subscore 79.0

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 78.9

Waste Characteristics 30.0

Pathways 50.9

TOTAL 159.8 divided by 3 = 53.2 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

53.2 x 1.0 = 53.2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: NORTHERN TRUCK ROAD MOTOR POOLS

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1940-1946

Owner/Operator: Army - Camp Edwards

Comments/Description: _____

Site Rated By: Susan Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>133</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>57.2</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 3
 - Confidence level (1 = confirmed, 2 = suspected) 2
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- Factor Subscore A (from 20 to 100 based on factor score matrix) 70
- B. Apply persistence factor:
Factor Subscore A x Persistence Factor = $70 \times 0.8 = 56$
Subscore B
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = $56 \times 1.0 = 56$
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>0</u>	8	<u>0</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>34</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>31.5</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				43.9

C. Highest pathway subscore

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

Pathways Subscore 43.9

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 57.2

Waste Characteristics 56.0

Pathways 43.9

TOTAL 157.1 divided by 3 = 52.4 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

52.4 x 1.0 = 52.4

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Air National Guard Maintenance Shop

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1967 - Present

Owner/Operator: Air Force/Air National Guard

Comments/Description: Spill of TP-4 occurred 9/29/84

Site Rated By: S.A. Waite

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multi- plier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>2</u>	10	<u>20</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>132</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>73.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 0.8 = 16
- C. Apply physical state multiplier:
Subscore B x Physical State Multiplier = 16 x 1.0 = 16
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>46.3</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	114
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>50.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>50.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 73.3

Waste Characteristics 16.0

Pathways 50.9

TOTAL 140.2 divided by 3 = 46.7 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

$$46.7 \times .95 = 44.4$$

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Former Contractors Yard #1Location: Near CG Air Station - VEG Acre FarmDate of Operation or Occurrence: 1955 - 1985Owner/Operator: Pirenni

Comments/Description: _____

Site Rated By: PSBI. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	<u>0</u>	4	<u>0</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>2</u>	3	<u>6</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>135</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>75</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 1
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

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 1.0 = 100

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier =
Waste Characteristics Subscore 100 x 1.0 = 100

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 80

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>53.7</u>
2. Flooding		1		3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.8</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>43.8</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 75.0

Waste Characteristics 100.0

Pathways 80.0

TOTAL 255 divided by 3 = 85.0 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

85.0 x 0.95 = 80.8

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: John's Pond Landfill

Location: (See Map)

Date of Operation or Occurrence: _____

Owner/Operator: _____

Comments/Description: _____

Site Rated By: JWT

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>3</u>	4	<u>12</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>150</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>83.3</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 2
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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 1.0 = 80
- C. Apply physical state multiplier:
 Subscore B x Physical State Multiplier = 80 x 1.0 = 80
 Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>24</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>54.4</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>58</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>50.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>54.4</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 83.3

Waste Characteristics 80.0

Pathways 54.4

TOTAL 217 divided by 3 = 72.5 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

72.5 x 1.0 = 72.5

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: John's Pond Road Truck SpillsLocation: MMR (Off-base)Date of Operation or Occurrence: Late 50's - early 60's

Owner/Operator: _____

Comments/Description: _____

Site Rated By: MEM/ECJI. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>2</u>	4	<u>8</u>	<u>12</u>
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>3</u>	6	<u>18</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>146</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>81.1</u>

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 (1 = small, 2 = medium, 3 = large) 3
2. Confidence level (1 = confirmed, 2 = suspected) 2
3. Hazard rating (1 = low, 2 = medium, 3 = high) 3

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 0.8 = 64.0

C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = 64.0 x 1.0 = 64.0
Waste Characteristics Subscore

III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>1</u>	8	<u>8</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>43.9</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 81.1

Waste Characteristics 64.0

Pathways 53.7

TOTAL 198.8 divided by 3 = 66.2 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

66.2 x 1.0 = 66.2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: V.A. Hospital Heating PlantLocation: South of Connery AvenueDate of Operation or Occurrence: 1941 - 70

Owner/Operator: _____

Comments/Description: _____

Site Rated By: _____

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multi- plier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
F. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>1</u>	6	<u>6</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>130</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>72.2</u>

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 (1 = small, 2 = medium, 3 = large) | <u>1</u> |
| 2. Confidence level (1 = confirmed, 2 = suspected) | <u>2</u> |
| 3. Hazard rating (1 = low, 2 = medium, 3 = high) | <u>3</u> |

Factor Subscore A (from 20 to 100 based on factor score matrix)	<u>40</u>
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- B. Apply persistence factor:

Factor Subscore A x Persistence Factor = Subscore B	<u>40</u> x <u>1.0</u> = <u>40</u>
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- C. Apply physical state multiplier:

Subscore B x Physical State Multiplier = Waste Characteristics Subscore	<u>40</u> x <u>1.0</u> = <u>40</u>
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III. PATHWAYS

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>2</u>	8	<u>16</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	<u>24</u>
SUBTOTALS			<u>50</u>	108
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>46.2</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	<u>114</u>
Subscore (100 x factor score subtotal / maximum score subtotal)				<u>43.9</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>46.2</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 72.2

Waste Characteristics 40.0

Pathways 46.2

TOTAL 158.4 divided by 3 = 52.8 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

52.8 x 1.0 = 52.8

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: V.A. Cemetery/Pesticide

Location: Massachusetts Military Reservation

Date of Operation or Occurrence: 1980 - Present

Owner/Operator: Mr. Church

Comments/Description: _____

Site Rated By: LRH/ECJ

I. RECEPTORS

<u>Rating Factor</u>	<u>Factor Rating (0-3)</u>	<u>Multiplier</u>	<u>Factor Score</u>	<u>Maximum Possible Score</u>
A. Population within 1,000 feet of site	<u>1</u>	4	<u>4</u>	12
B. Distance to nearest well	<u>3</u>	10	<u>30</u>	30
C. Land use/zoning within 1-mile radius	<u>3</u>	3	<u>9</u>	9
D. Distance to reservation boundary	<u>2</u>	6	<u>12</u>	18
E. Critical environments within 1-mile radius of site	<u>3</u>	10	<u>30</u>	30
F. Water quality of nearest surface water body	<u>1</u>	6	<u>6</u>	18
G. Groundwater use of uppermost aquifer	<u>3</u>	9	<u>27</u>	27
H. Population served by surface water supply within 3 miles downstream of site	<u>0</u>	6	<u>0</u>	18
I. Population served by groundwater supply within 3 miles of site	<u>3</u>	6	<u>18</u>	18
SUBTOTALS			<u>136</u>	<u>180</u>
Receptors subscore (100 X factor score subtotal/maximum score subtotal)				<u>75.6</u>

II. WASTE CHARACTERISTICS

- A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.
- Waste quantity (1 = small, 2 = medium, 3 = large) 1
 - Confidence level (1 = confirmed, 2 = suspected) 1
 - Hazard rating (1 = low, 2 = medium, 3 = high) 3
- 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

- 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, proceed to C. If no evidence or indirect exists, proceed to B.

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface water migration				
Distance to nearest surface water	<u>3</u>	8	<u>24</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Surface erosion	<u>0</u>	8	<u>0</u>	24
Surface permeability	<u>0</u>	6	<u>0</u>	18
Rainfall intensity	<u>2</u>	8	<u>16</u>	24
SUBTOTALS			<u>58</u>	108
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>53.7</u>
2. Flooding	<u>0</u>	1	<u>0</u>	3
Subscore (100 x factor score/3)				<u>0</u>
3. Groundwater migration				
Depth to groundwater	<u>1</u>	8	<u>8</u>	24
Net precipitation	<u>3</u>	6	<u>18</u>	18
Soil permeability	<u>3</u>	8	<u>24</u>	24
Subsurface flows	<u>0</u>	8	<u>0</u>	24
Direct access to groundwater	<u>0</u>	8	<u>0</u>	24
SUBTOTALS			<u>50</u>	114
Subscore (100 x factor score subtotal/ maximum score subtotal)				<u>43.8</u>
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.			Pathways Subscore	<u>46.3</u>

IV. WASTE MANAGEMENT PRACTICES

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

Receptors 75.6

Waste Characteristics 60.0

Pathways 53.7

TOTAL 189.3 divided by 3 = 63.1 Gross total score

- B. Apply factor for waste containment from waste management practices. Gross total score waste management practices factor = final score.

63.1 x 1.0 = 63.1

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TABLE 2.1

Status of Leases, Licenses and Permits

EXECUTION DATE	DOC. NO.	"GRANTOR"	"GRANTEE"	LEASE	PERMIT LICENSE	"RECAPTAINABILITY"	TERM	BEGINNING DATE	TERMINATION DATE	GOVERNMENT RIGHTS	TERMINATION PROCESSED	LICENSE & PERMIT ISSUING AUTHORITY
1 July 1974	DACAS1-5-75-293 (*SEE DACAS1-4-76-192)	The Comm. of The United States Massachusetts of America Represented by Dept. of Air Force	X	Parcels are to be used for such military uses as the Government may require.	Year to Year after 30 June 1975	1 July 1974	30 June 2016 Revised to 30 Sept 2016 (See line 4)	Construct buildings and other work necessary to carry out requirements.	Partial: Consult at least 60 days prior to notice. 30 days written notice for partial or entire.	Need mutual agreement Govt. may grant license to Dept. Agency or State need written consent for other grants.		
5 Aug. 1975	DACAS1-5-75-293 Modification No. 1 (See Exhibit 20)	The Comm. of The United States Massachusetts of America Represented by Dept. of Air Force	Suppl. Agreement	No recapture clause on deleted property (Govt. never owned fee)	N/A	N/A	N/A	Right to use, maintain, repair, replace Govt. owned installed utility poles, lines, and cables on delation.	N/A	N/A		
3 Nov 1975	DACAS1-5-75-293 Modification No. 2	-	Suppl. Agreement	No recapture clause on deleted property (Govt. never owned fee)	N/A	N/A	N/A	No new lights cited	N/A	N/A		
1 July 1976	DACAS1-5-75-293 Modification No. 3	-	Suppl. Agreement	Parcels retained can be used for such military uses as the Govt. may require. (See line 1 above)	Still year to year after 30 June 1975 (See line 1 above)	1 July 1974 (See line 1 above)	30 Sept 2016 part of this modification (inclusive)	Govt. retains title to all utility systems in deleted parcels retaining right to use, enter, service, maintain repair, remove, improve to lands relinquished.	N/A	N/A		
1 July 1976	DACAS1-5-77-127 (See line 7, a sublease below) (See line 8 below) (See line 11 below)*	The Comm. of The United States Massachusetts of America Represented by the Dept. of the Army	X	Parcels are to be used for such military uses as the Govt. may require	Year to year after 30 Sept 1976	1 July 1976	30 Sept 2026 (inclusive)	Same as line 1 above	Same as line 1 above	Same as line 1 above		
1 July 1976	Document No. 31836 recorded in book 263, page 269 Barnstable Registry of Deeds (*See line 5 above)	The Comm. of The United States Massachusetts of America Represented by the Dept. of Transportation (U.S. Coast Guard)	X	Parcels are to be used for such military uses as the Govt. may require	Year to year after 30 Sept 1976	1 July 1976	30 Sept 2026 (inclusive)	Same as line 1 above	Same as line 1 above	Same as line 1 above		
6 July 1978	DACAS1-78-469 (Specifically subject to DACAS1-5-77-127)	Sec. of the Army	X	Revocable at will by Sec. of the Army - premises to be vacated within time designated by Sec. of the Army.	10 years	1 June 1978	31 May 1988	N/A	Lessee may terminate any time by notifying in writing Sec. of Army, through officer at least 10 days notice.	Lessee needs written permission to issue a license or grant out any interest.		