VOID SHEET

03006989

TO: License Fee Management Branch

FROM: Region I

SUBJECT: VOIDED APPLICATION

Control Number: 123815

Applicant: Department of the Army

Date Voided: 11/24/97

Reason for Void: Action submitted prematurely for license 29-01022-07 (030-06989). Before review.

M.A. Perkins 11/24/97
Signature Date

Attachment:
Official Record Copy of
Voided Action

FOR LFMB USE ONLY

Final Review of VOID Completed:

Refund Authorized and processed

~~No~~ Refund Due

~~Fee~~ Exempt or Fee Not Required

Comments: _____

Log completed

Processed by: EE 12/2

D/1

DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND
AND FORT MONMOUTH
FORT MONMOUTH, NEW JERSEY 07703-5000

REPLY TO
ATTENTION OF

030-06989

September 4, 1996

US Army Communications -
Electronics Command
ATTN: AMSEL-SF
Fort Monmouth, NJ 07703-5024

SUBJECT: Base Realignment and Closure (BRAC)

U.S. Nuclear Regulatory Commission
Region I
ATTN: Materials Licensing Section
475 Allendale Road
King of Prussia, PA 19406-1415

29-01022-07

As a result of mandated Base Realignment and Closure (BRAC) initiatives, the US Army Communications - Electronics Command (CECOM), Fort Monmouth, NJ will be closing and releasing for public use, a 270 acre annex to Fort Monmouth. The property designated as the Evans Area, is located in Wall township, NJ. Prior to release of this property, we are required by Federal Regulations to ensure the site is free of radiological contamination or has been remediated to accepted release levels of radiological contamination.

The CECOM Safety Office is performing the radiological evaluation and remediation of the Evans Area. The initial phase of the radiological evaluation is the radiological characterization of the site. The characterization will be conducted in accordance with the enclosed Radiological Characterization Plan (RCP).

The RCP is provided for review and comment. Any questions or comments can be discussed with our project manager, Mr. David Craig, IceSolv, Inc., Health Physics Consultant to the CECOM Safety Office, or the undersigned. Mr. Craig can be contacted at (908) 427-5591. Mr. Horne's phone number is (908) 427-4427.

Sincerely,

Steven A. Horne
Chief, CECOM Safety Office

Copies Furnished: AMCSF

SEP 12 1996

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RECD IN LAS OCT 22 1996

RADIOLOGICAL CHARACTERIZATION PLAN

Camp Evans, Fort Monmouth

Prepared for

U.S. Army Communications - Electronics Command
Fort Monmouth, New Jersey

Prepared :

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Reviewed:

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Joseph Santarsiero 9/5/96
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RADIOLOGICAL CHARACTERIZATION PLAN

Table of Contents

APPENDICES

List of Tables

List of Figures

Executive Summary

The Evans Area is located in Wall Township, Monmouth County, NJ approximately ten miles south of Fort Monmouth main post. The Evans Area consists of laboratories, field test areas and ancillary service buildings devoted to research and development of electronic and optical systems for Department of the Army (DA) use.

Base Realignment and Closure (BRAC), Army Execution Plan, BRAC 93, (Public Law 101-510) requires the U.S. Army Communications-Electronics Command (CECOM) and Fort Monmouth, NJ, to close the Evans Area sub-post by September 1997. The CECOM Safety Office is tasked to radiologically decommission the property and provide for its release for unrestricted use. This includes termination of Nuclear Regulatory Commission (NRC) License #29-01022-07 and #29-01022-10. It also includes "end-of-use" surveys for NRC Licenses #29-01022-06 and #29-01022-14. Additional details on these licenses is provided in the Introduction, Section 1.

Early in the atomic age, radioactive material was recognized as a source of power that could be utilized in electronic equipment. The Evans Area was one of the locations the Army used for radiation research in electronics. Alpha, beta, gamma, and neutron sources have been used in research at the Evans Area for almost 50 years. Radiation sources have been used in the design and development of radiation detection instrumentation for illumination of dials and switches, and to provide charged particles (alpha and beta) in the process path and electronic circuits of equipment. To support the Evans Area BRAC initiative, these past activities require that a site residual radiation study be performed to determine the magnitude of any radiation dose level, that is, the product of radioactive sources introduced to the site.

The decommissioning process consists of:

I. Historical Study
II. Scoping Surveys
III. Site Characterization
IV. Remediation (Decommissioning Plan)
V. Final Status Surveys
VI. Verification and Release for Unrestricted Use

This characterization survey plan outlines the general procedures that will be used to determine the current radiological conditions of the Evans Area. This plan incorporates the concepts of design and analysis of final status decommissioning surveys described in NUREG-1505 and related documents that are listed in Appendix A. The Base Realignment and Closure effort at Fort Monmouth is an accelerated program. The site will be surveyed in zones. When a zone satisfies release criteria, it will be released for public use. In the event that unacceptable contamination levels are found within a zone, the plan includes remediation actions that will be taken to ensure the area is remediated to satisfy regulatory compliance with the release limits for unrestricted use.

1.0 INTRODUCTION

The U.S. Army CECOM Safety Office manages four NRC licenses that reflect the current use of radioactive material at Evans Area. These licenses are summarized in Table 1-1.

The Evans Area, a satellite of Fort Monmouth, is located in Wall Township, NJ, approximately 10 miles south of the main post. The Evans Area is approximately 215 acres in size. The area is bounded on the north by Brighton Avenue, on the east by Marconi Road and a residential development, on the south by Belmar Boulevard, and on the west by a residential development. The location and boundaries of the Evans Area are shown on Map 1 in Appendix B.

Table 1-1
Current NRC Licenses

License #	Authorized Use	Status
29-01022-06	Research and development as defined in 10 CFR 30.4; for training and instrument calibration.	License will remain ACTIVE, however, activity within the Evans Area will be terminated.
29-01022-07	For irradiation of materials except explosives and flammable materials. [ ] Cs-137, Sealed) & [ ] Co-60, Sealed)	To be TERMINATED by Sept 30, 1997
29-01022-10	In an underwater (pool) irradiator for the irradiation of materials except explosives, flammable, corrosives or food for human consumption. [ ] Co-60, Sealed)	To be TERMINATED by Sept 30, 1997
29-01022-14	Calibration and operational checking of radiation detection instrumentation and optical coating on thermal imaging devices.	License will remain ACTIVE, however, activity within the Evans Area will be terminated.

All areas where these licenses were/are used do not have the same potential for residual contamination. Therefore all areas will not require the same level of survey coverage to achieve a full source term[1] characterization.

Historical records and employee interviews have identified twenty-one (21) buildings and their immediate outdoor areas, two open range areas, two underground liquid waste storage tanks, four chemical neutralization tanks, and the sanitary sewer system as locations with a potential for radiological contamination. These areas with a definite

[1] SOURCE TERM: The source term consists of all residual radioactivity remaining at the site, including material released during normal operations and during inadvertent releases or accidents, and includes radioactive materials which may have been buried at the site in accordance with 10 CFR Part 20.

potential for contamination will be surveyed as affected areas[2]. All of the affected areas have been further identified as non-uniform affected areas. The remaining one-hundred-forty-seven (147) structures and all other outside areas will be evaluated, and classified as either unaffected[3] or non-impacted[4] areas. Areas with low probability of contamination are classified as unaffected areas, requiring less survey activity. Areas with no radioactive material involvement are classified as non-impacted areas not requiring survey. If during the characterization evidence is found that contradicts a locations initial classification, that location will be reclassified and appropriate surveys performed.

The level of survey to be performed in each area and building was determined by a review of site historical data. The survey data collected and analyzed during the site characterization will be capable of determining the type and quantity of residual radiation present. Areas that meet all release criteria, that can be effectively segregated from the remainder of the Evans Area, may be released for unrestricted use prior to final closure of the Evans Area. All characterization surveys that identify areas or buildings that meets the radiological release criteria will be included in the site final survey report.

If a characterization survey identifies a location with an activity level that requires remediation, the characterization survey results will be used to develop a remediation effort and, if necessary, a Decommissioning Plan with a forecast of the volume of low-level radioactive waste that will be generated during the remediation.

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[2] AFFECTED AREAS: **Areas that have potential radioactive contamination (based on site operating history) or known radioactive contamination (based on past or preliminary radiological surveillance).**

[3] UNAFFECTED AREA: **Any area that is not expected to contain any residual radioactivity, based on a knowledge of site history and previous survey information.**

[4] NON-IMPACTED: **Areas that have no potential for residual contamination and, therefore, do not require any level of survey coverage. Residences, mess halls, and areas off-site would typically have this classification.**

2.0 SITE HISTORY.

2.1 General.

During World War I the U.S. Army purchased a tract of land in Little Silver, NJ. The land was a horse racetrack that had not been in use since 1908. On 17 June 1917, the U.S. Army inaugurated and opened the installation as Camp Little Silver. The mission of Camp Little Silver was to train Signal Corps operators for service in World War I. In 1925, Camp Little Silver became a permanent installation and was renamed Fort Monmouth.

In the early 1900's the Marconi Wireless Telegraph Company of America (MWTCA) purchased a 93 acre farm in Wall Township, NJ. This property, located approximately 10 miles south of Fort Monmouth, became the home of the Marconi Institute, a school for telegraphy. The site was also the location of wireless telegraph transmission and receiver equipment used for commercial transatlantic operations.

When the Unites States entered World War I in 1917, the federal government took over the Marconi operation in Wall Township. After the war, the government urged a consortium of American companies to buy the facility. Elements of General Electric, Westinghouse and AT&T coalesced in December of 1919 to form RCA. RCA owned the Wall Township facility until 1924, when operations were moved to more modern accommodations.

By the late 1920s, the main Marconi building had become the home of the New Jersey chapter of the Ku Klux Klan (KKK). In 1937, the property passed to a Reverend Percy Crawford, who established an interdenominational institution on the site called King's College. The school had 100 students enrolled when the government acquired the land in 1941. At that time, the site was designated Camp Evans, in honor of World War I Signal Corps officer COL Paul Wesley Evans.

When the Army bought King's College in November of 1941, it inherited six of the original Marconi buildings. These included the main Marconi building, two bungalows, the operations building, and what are now designated as Buildings 9006 and 9007. With the exception of the Marconi buildings constructed in 1914, most other construction dates to the early years of World War II, when Camp Evans was established. The mission at the Evans Area during and immediately following World War II was Research and Development (R&D) of radar technology. In 1951, the Evans Area R&D organizations began experiments that used radioactive material.

2.2 Nuclear.

Use of radioactive materials in the Evans Area began in 1951 at the Evans Signal Laboratory. Isotopes used in the 1950's included unsealed cobalt-60 (Co-60), polonium-210 (Po-210) and radium-226 (Ra-226) that was used to manufacture self-

luminous strips. In 1952, the Radiation Effects Laboratory (REL) was built and placed in operation. The REL was needed to satisfy the specialized shielding needs of ionizing radiation research. The REL is active today and a variety of radioactive sources are still used and stored there.

2.3 Historical Review.

Past and present Evans Area radiation workers were interviewed to obtain historical information on sites of potential contamination. Appendix C contains a copy of the questionnaire used to conduct the interviews and a list of the individuals interviewed. Several employees that had started working at the Evans Area during World War II were available for interview. Based upon the interviews, a historical document review and on-site evaluations, the buildings and areas listed in Table 2-1 are identified as affected areas. All other buildings and areas are classified as unaffected or non-impacted.

2.4 Historical Findings Brief.

The following outline of findings, from historical information, on buildings and areas explains why the locations listed in Table 2-1 were identified as locations with a potential for contamination from the use of radioactive material. These buildings with their locations are listed in Appendix D.

BUILDING 9045

An incident report written in 1962 describes strontium-90 (Sr-90) and Co-60 contamination incidents in this building. Written reports indicate that the clean-up effort was extensive requiring the removal of sink and floor drain pipes, laboratory equipment, concrete, and a portion of the building. The clean-up criteria used was 0.1 milli-roentgen equivalent man per hour (mrem/hr) for fixed activity and 10 counts per minute (cpm) per wipe removable contamination. These reports provided no information on the types of instruments or the efficiency of the instruments used for these surveys. The clean-up report states that in some areas contamination was not reduced to the selected clean-up criteria limits (0.1 mrem/hr fixed activity and 10 cpm per wipe removable activity).

Building 9045 has undergone renovation since 1962 that has changed the original floor plan. In February 1995, while researching the original floor plan layout, an area with a history of contamination in the building was identified. The area was surveyed with a thin-window G-M tube (pancake detector) and residual radioactivity greater than twice background levels was detected.

Employees interviews indicate that there may have been rubidium-87 (Rb-87) present in some equipment which was burned outside this building in the early 1950's. Therefore, there is a potential for Rb-87 contamination in the soil surrounding this building.

The building is currently in use as a radiation counting laboratory and a radiation survey instrument repair and calibration facility. A radioactive materials storage cabinet, with several low level radiation sources, is still in the building.

Table 2-1
Affected Areas

Location	INTERIOR Square Meters to be Surveyed	EXTERIOR Number of Survey locations
bldg 9045*	1600	120
bldg 9383*	100	80
bldg 9401*	2000	160
Area G	n/a	3966
bldg 9006	823	100
bldg 9010A	2200	400
bldg 9011A	2200	400
bldg 9032	2200	400
bldg 9036	4400	400
bldg 9037	4400	200
bldg 9039	5000	240
bldg 9040	3500	200
bldg 9041	3500	180
bldg 9047	1600	120
bldg 9049	1000	120
bldg 9053	40	160
bldg 9055	1600	160
bldg 9109	600	120
bldg 9345	2000	200
bldg 9392	900	160
bldg 9400	600	100

* These buildings and the fenced area they are located in are still radioactive material use, handling and storage facilities.

BUILDING 9383

This building was built in the 1950's to store radioactive waste. Survey documents show the soil around this building was contaminated with Co-60 in the 1970's. Survey reports show that the decontamination operation was successful and the contaminated soil was disposed of at Barnwell, SC, radioactive waste landfill.

This building is still in service as the radioactive waste storage site for all of Fort Monmouth.

BUILDING 9401

This building is the Radiation Research Facility (RRF) of the REL. Employee interviews indicated unsealed radioactive sources were used in this building. They also described localized contamination incidents that occurred in the building. The employees stated that the contaminated areas were always decontaminated to levels less than U.S. Army contamination limits listed in Army Regulation 385-11.

The RRF currently contains several sealed radioactive sources and a neutron generator that are used for research and radiation detection instrument calibrations. NRC Licenses 29-01022-07 and 29-01022-10, authorize the use of Co-60 and Cs-137 sources for irradiation of materials; these licenses are current and still used in the RRF. Also, isotopes listed on NRC Licenses 29-01022-06 and 29-01022-14 for calibration, operational checking, optical coating on thermal imaging devices and research and development, as defined in 10 CFR 30.4, are or may be used in the RRF.

AREA G

During the 1950's and early 1960's, Area "G" was the site of experiments using sealed Co-60 sources. This site is an open field with some wooded areas, secured by cyclone fence topped with barbed wire that encloses all of the southern portion of the Evans Area. Documents show that during the experiments, two locations were contaminated by leaking sources. The areas were cordoned-off with ropes and posted with caution signs that identified them as radioactive contaminated areas. Since the contamination occurred in the secure area of the site, no other actions were taken at that time. In 1963 the experiments were completed. There is no record of any use of radioactive sources in "G" Area after that time.

In 1976 workers clearing brush found radiation warning signs posted in "G" Area; work was halted and the CECOM Safety Office was notified. Initial survey results revealed the presence of radioactive contamination that was identified by gamma spectroscopy analysis as Co-60. The CECOM Safety Office requested the assistance of the US Army Environmental Hygiene Agency (AEHA), Aberdeen Proving Ground,

MD to conduct scoping, remediation, and verification surveys of the area. The scoping survey defined the region of contamination, and remediation surveys monitored the progress of the clean-up effort. The highest concentration of Co-60 found in the soil was 395.0 ± 12.7 picocuries per gram (pCi/g). Two pieces of plastic (removed as radiological waste) were contaminated with Co-60 to 6924.0 ± 99.0 pCi/g. Vegetation in the area was found with concentrations as high as 149.2 ± 7.8 pCi/g. The decontamination required the removal of soil in the immediate area down to a depth of 5 feet and removal of vegetation. The radioactive waste generated was collected in fifty-five gallon metal drums. A total of five-hundred-sixty-eight (568) drums were filled. The drums of waste were shipped off-site and disposed of at Barnwell, SC, radioactive waste landfill.

In November 1976, AEHA conducted a verification survey of the contaminated site. The area was surveyed at ground level for external radiation dose rates. Background in the region was 12 microroentgen per hour (uR/hr), no area was greater than twice background. Two soil bore samples were collected. The highest activity detected in the soil was 6.5 ± 1.6 pCi/g of Co-60. Based on the verification survey results the area was released for unrestricted use.

In March 1983, a brush clearing crew found radiation warning signs and a barrier rope around a concrete block structure (30" x 30" x 48") in the "G" Area; work was stopped and the CECOM Safety Office was notified. A radiation survey of the area revealed the presence of contamination that was identified by laboratory analysis as Co-60. This contaminated structure was approximately 100 feet from the border of the first contamination found in the "G" Area and, for report purposes, was designated "G-2". The highest Co-60 concentration in the soil against the bottom blocks was 21 pCi/g. Seven inches away from the base of the structure the highest concentration was 7 pCi/g. The contaminated soil and concrete was collected in fifty-five gallon metal drums and shipped to the Barnwell, SC, radioactive waste landfill.

AEHA performed verification surveys of the "G-2" Area in April 1983. Based on the results of the survey the area was released for unrestricted use. A second verification survey was performed by AEHA in June 1985 and this survey confirmed the results of the pervious verification survey.

Remaining Affected Historical Buildings.

The historical records search and employee interviews identified the other buildings listed in Table 2-1 as radioactive material use areas. These buildings all had recorded periods of use, storage, and/or maintenance of radioactive materials. The activities in these buildings included research and development projects that used radioactive materials.

Underground Storage Tanks.

Two underground storage tanks are located adjacent to building 9045. The purpose of these tanks is to collect water from the laboratory and decontamination room drains in building 9045. Another influent to the tanks is the discharge line from the Co-60 pool irradiator in the RRF. The tanks are alternately connected to these drains. When a tank is full it is valved out-of-service and the building and pool drains are valved to the other tank. Prior to release into the sewer system the water collected in a tank is analyzed for contamination. A water sample is taken from the tank that has been valved out-of-service. The sample is analyzed for radioactive isotopes prior to release of the tank's contents. The analyses of the tanks' contents is a license requirement for the Co-60 pool irradiator. The purpose of the analyses is to ensure that no contaminated water is released.

When all radioactive sources are removed from the pool irradiator and building 9045, these tanks will be surveyed as affected areas in preparation for removal.

Underground Neutralization Tanks.

The Evans Area had four underground neutralization tanks. These tanks were located outside of closed chemistry laboratories. The contents of these tanks, the pits they occupied and the surrounding soil, were sampled for radioactive contamination in preparation for removal. The samples were analyzed for contamination from gamma, alpha and beta emitters. The analysis results revealed no radioactive contamination. The tanks have been declared free of radioactive contamination and released for removal.

Three more underground storage tanks have been identified at the Evans Area since the four neutralization tanks were removed. All underground tanks will be characterized to determine if they were involved in radioactive material use.

Sanitary Sewers.

Prior to 1950, there were no sanitary sewer radioactive material release limits. When regulated limits were established in the 1950's, they were very liberal in comparison to current limits. The dumping of small quantities of radioactive isotopes into the sewers was an accepted practice during this period. For these reasons and due to the wide spread use of radioactive material throughout the Evans Area, the sanitary sewers have been classified as affected.

Unaffected Areas and Non-impacted Areas.

The remaining operation areas have no history of radioactive material use (indoor and outdoor). They will be surveyed as unaffected areas. The buildings at Evans Area

with no operations history, and the immediate area around these buildings (administrative, residence, utilities, shelters, etc.), have been identified as non-impacted areas. No characterization surveys will be performed in these buildings. However, each building will be evaluated. Some non-impacted buildings in the Evans Area may be used as reference areas[1]. All of the Evans Area buildings are listed in Appendix E.

[1] **Reference Area:** Geographical area from which representative reference samples will be collected for comparison with samples collected in geographically similar surveyed areas at the remediated site.

3.0 GOALS.

3.1 Objectives.

The characterization survey will assess the current radiological condition of the Evans Area. The surveys and analysis of results will be performed quantitatively and qualitatively with a precision that will satisfy the release criteria described in paragraph 3.2 of this chapter. This will allow characterization survey results for a building or area that is below release limits to be used in the Final Status Survey Report. The survey and results analysis will be designed to satisfy requirements outlined in NUREG-1505, "A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys".

3.2 Release Criteria.

The NRC and New Jersey Department of Environmental Protection (NJDEP), Bureau of Environmental Radiation release criteria are currently being revised and draft regulations for both agencies are in the review process. The release criteria that will be used in the final survey report, for the Evans Area, is that proposed in draft NRC regulation, Title 10, Code of Federal Regulations, Part 20, Subpart E. The draft regulation specifies that radioactivity from licensed operations be reduced to a level as-low-as-is-reasonably-achievable (ALARA) below the level that would result in a 15 millirem per year (mrem/yr) dose to the average individual in the critical group. This release criteria satisfies purposed New Jersey State release limits detailed in the New Jersey Department of Environmental Protection Draft Report for Comment, "A Pathway Analysis Approach for Determining Generic Cleanup Standards for Radioactive Materials", January 1996. The same release criteria will be applied to naturally occurring radioactive materials that have been concentrated for use, i.e., Ra-226 in illuminating paints, Th-232, Depleted Uranium, etc.

Survey results that indicate a zone's annual dose from residual radiation is less than or equal to 4 mrem, will require no ALARA evaluation.

Surface Contamination.

Table 3-1 lists all isotopes that were authorized for use in the Evans Area by NRC licenses. One of the NRC licenses for the Evans Area was a general license. The NRC general license authorizes use of any byproduct isotope with atomic number 1 through 83; in fact the number of different isotopes used in the Evans Area was limited. Surface contamination surveys will focus on the detection of isotopes that were known to be used in an area. Table 3-2 provides default concentration values taken from NUREG-1505 that are equivalent to 15 milli-roentgen equivalent per year for each area use scenario. Surface contamination, not removable by simple

decontamination procedures, that exceeds the values listed in Table 3-3[a], will require a written decommissioning plan for the area.

Drinking Water.

If contamination is found in ground water wells, the potential impact on drinking water supplies will be evaluated. Based on the historical review, no ground water contamination is anticipated.

Soil.

The concentration of radioactive materials in the soil will be compared to the Residential Scenario models found in NUREG/CR-5512, Volume 1, using the default parameter values listed. The concentrations for all isotopes for the Residential Scenario which produce a 15 mrem/yr Total Effective Dose Equivalent (TEDE) are listed in NUREG-1500.

For some isotopes, the NRC and Environmental Protection Agency (EPA) have approved some isotope concentrations which exceed the default values listed in NUREG-1500. Table 3-4 lists the concentrations from NUREG 1500. The values in parentheses on Table 3-4 are approved values that exceed the NUREG-1500 concentrations. These values were taken from the following sources, Federal Register/Vol. 57, No. 34/ Thursday, February 20, 1992/Notices, and Federal Register/Vol. 46, No. 205/Friday, October 23, 1981/Notices.

[a] Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material, April 1993, U.S. Nuclear Regulatory Commission Division of Fuel Cycle, Medical, Academic and Commercial Use Safety.

Table 3-1
List of Isotopes

ISOTOPE	CHEMICAL/PHYSICAL FORM
Any Byproduct Material with Atomic Number 1-83	Any
Tritium	Any
Cobalt 60	Any
Krypton 85	Any
Rubidium 87	Any
Strontium 90	Any
Cesium 137	Any
Polonium 210	Any
Thorium 234	Any
Thorium 230	Electroplated
Thorium 232	Metal foils, solid (thorium fluoride coating on optical systems)
Plutonium 238	Sealed
Plutonium 239	Electroplated, resin on acrylic plastic disk
Uranium (natural or depleted)	Any
Americium 241	Any
Californium 252	Sealed
Radium 226	Any
Ra-Be	Sealed

Table 3-2
Default Concentration Values to Achieve 15 mrem/y for Each Scenario

Decay Chain	Soil Concentration Residential Scenario (pCi/g)	Surface Concentration Building Occupancy (dpm/100cm^2)	Volume Concentration Renovation Scenario (pCi/g)	Source Term Drinking Water Scenario (total pCi)	Soil Concentration Drinking Water Scenario (pCi/g)
H-3	4.14E+02	2.64E+07	4.66E+07	1.21E+11	9.76E+02
Co-60	2.97E+00	5.19E+03	1.94E+01	1.32E+12	1.07E+04
Sr-90	1.14E+01	9.94E+03	6.96E+03	4.85E+09	3.92E+01
Ra-226	7.87E-01	7.57E+02	2.71E+01	7.83E+08	6.34E+00

Table 3-3
Acceptable Surface Contamination Levels

Nuclide[b]	Average[cdf]	Maximum[bef]	Removable[bfg]
U-nat, U-235, U-238, and associated decay products	5000 dpm α/100cm^2	15000 dpm α/100cm^2	1000 dpm α/100cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm /100cm^2	300 dpm /100cm^2	20 dpm /100cm^2
Th-nat, Th-232, Sr-90, Ra-232, Ta-224, U-232, I-126, I-131, I-133	1000 dpm /100cm^2	3000 dpm /100cm^2	200 dpm /100cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission except Sr-90 and others noted above)	5000 dpm $\beta\gamma$/100cm^2	15000 dpm $\beta\gamma$/100cm^2	1000 dpm $\beta\gamma$/100cm^2

[b] Where surface contamination by both alpha and beta-gamma emitting nuclide exists, the limits established for alpha and beta-gamma emitting nuclide should apply independently.

[c] As used in this table, dpm (disintergrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[d] Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.

[e] The maximum contamination level applies to an area of not more than 100cm^2.

[f] The amount of removable radioactive material per 100cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[g] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

Table 3-4
Unrestricted Soil Concentrations

ISOTOPE	Soil Concentration @ 15 mrem/yr Residential Scenario (pCi/g)	ISOTOPE	Soil Concentration @ 15 mrem/yr Residential Scenario (pCi/g)
H-3	4.14E+02	Pu-238	2.10E+00 (25.0)[1]
Co-60	2.97E+00 (8.0)	Pu-239	1.89E+00 (25.0)
Sr-90	1.14E+01 (5)	U-234	1.90E+01
Cs-137	1.07E+01 (15.0)	U-235	1.49E+01
Pu-210	1.10E+01	U-238	1.97E+01 (35.0)
Th-234	2.93E+03	Am-241	1.83E+00 (30.0)
Th-230	2.61E+00	Cf-252	6.53E+00
Th-232	8.71E-01	Ra-226-C	5.62E+00

[1] The values in parentheses are approved values that exceed the NUREG-1500 concentrations.

4.0 ACTIVITIES.

4.1 General.

This section describes the overall plan to accomplish the radiological characterization of the Evans Area of Fort Monmouth. General sequences and descriptions of activities for different areas are contained in this section. The planned survey activities are based on historical document reviews and personnel interviews. The decommissioning operations and quality assurance activities will be conducted in accordance with procedures approved by the Program Manager and Radiation Protection Officer.

This plan will assess and evaluate the levels of residual radioactive material that remain at the site as a result of the use of licensed radioactive material and the concentration of natural occurring radioactive isotopes.

Based on inspections and the historical review that identified known contamination locations and other radioactive material use, storage, and maintenance operations, the facilities undergoing characterization have been placed in one of five categories.

1) Indoor Affected Areas
2) Indoor Unaffected Areas
3) Outdoor Affected Areas
4) Outdoor Unaffected Areas
5) Non-impacted

The Evans Area has been divided into six survey zones. These zones allow for portions of the property to be surveyed and scheduled for early release. The six zones are outlined on Map 2 located in Appendix B. Appendix D contains photographs for the affected buildings and gives their locations.

The zones are separated by roads, fences or other easily identified geographical features. Since the zones are separated they will be treated as independent projects. When a zone's surveys have been completed, data analysis shows all release criteria are satisfied and regulatory agencies approve, the zone may be released for private use. This survey approach will allow property release to the public at the earliest possible time while ensuring release criteria are achieved.

In conjunction with zone surveys, reference (background) surveys will be conducted in a physically similar non-impacted area. Areas within a zone, which are classified as affected, will be gridded in a triangular pattern that will produce adequate data collection for statistical analysis. The location of each data collection point will be recorded with a precision that will allow, if needed, verification data collection in the

area of the point at a later date. All samples and data collected will be analyzed for release criteria compliance. The final results will be compiled into a zone final survey report which will be used to release the zone. The zone reports will become the body of the final site survey report.

4.2 Reference (Background) Data.

Reference data is essential to the release survey process. Reference radiation concentrations are the levels of radiation present in a non-impacted area that is physically similar to the area in which survey data will be collected. When required the radioactive material concentrations in water, soil, and building materials will also be addressed in the reference studies.

Reference data will be collected in a location that has spatial and temporal relations similar to the area to be surveyed. An example would be the collection of reference data in a brick building that was non-impacted to compare with survey data taken in an affected brick building located in the survey area. The data collection in the reference area and the survey area will be taken with the same materials and instruments. The number of samples collected in the reference area will be large enough to provide a statistical analysis of the survey sample population.

Data collection in the reference and survey area will occur within the same time period. Any outside events (atmospheric nuclear weapons tests, volcanic eruption, etc.) that impact the region's (Monmouth County) residual radioactive characteristics, will require new reference data to be collected for comparison with any survey data collect after the event.

Reference locations will be selected from non-impacted areas located in the Charles Wood Area, Evans Area and Fort Monmouth main post. A reference area may be used for comparison to several sets of survey data as long as the physical, spatial and temporal conditions are similar. Reference areas will be accurately described and located so that verification data can be collected.

4.3 Gridding.

A reference grid system will be used in affected areas in order to provide a location code for each data/sample location. The location code will enable verification data to be collected at the original survey data locations. Each indoor affected area will be gridded in an equilateral triangle pattern. The side of the triangle will be a minimum of one meter in length but can be larger if survey parameters indicate that any potential contamination can be detected with a greater (more distance between data points) sampling interval. Triangle grid patterns that are performed with triangle sides that are greater than one meter, will have the data used to determine the sampling interval

attached to the survey information page. Outdoor affected areas will be gridded using the same methods, but the minimum triangle side will be five meters in length.

Indoor unaffected areas will not require gridding. The floor plan of the surveyed area will be marked at each data/sample point with sufficient information to accurately return to the point. This location data will be used if verification surveys are performed in any area.

Outdoor unaffected areas will be gridded with a triangle grid side of twenty-five meters long. Outdoor unaffected areas are gridded for accurate location of data points due to the lack of structured bench marks.

All outdoor gridding start points will be selected randomly. The random selection is performed using a random number generator software program that generates three digit random numbers. The random numbers are used to develop map coordinates in the area. The map coordinates are entered on a survey map and into a Global Positioning System (GPS) that is used to locate the point in the field. The grid is laid using land survey instruments. If the terrain or ground cover vegetation makes land survey impractical in an unaffected area, sample points will be located by GPS.

4.4 Survey Procedures.

Each survey in a zone will have a sampling plan and survey packets prepared prior to the performance of the survey. The packet will include:

1) Survey maps (structural and grids)
2) List of required samples and instrument readings
3) Sampling location codes (hard copy or electronic)
4) Work permit, if required

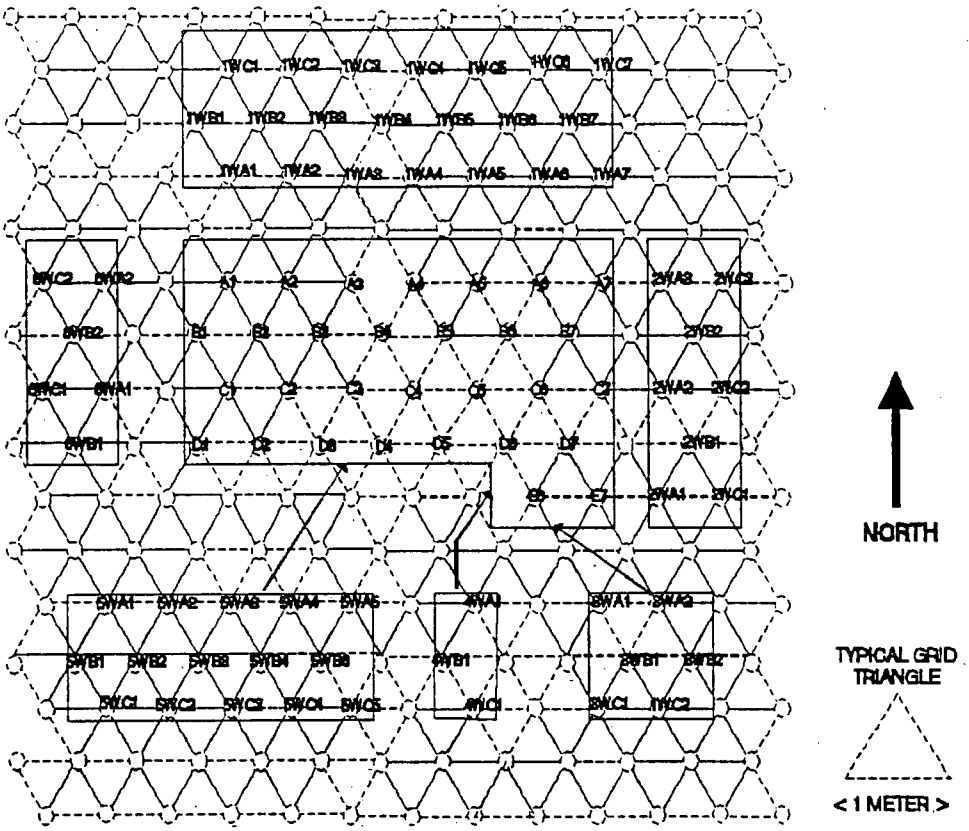
INDOOR AFFECTED AREAS.

Prior to the start of any work in an affected area, the area boundaries will be defined and any required administrative controls implemented. All indoor affected areas will be evaluated prior to the start of work by a senior health physics (SHP) technician for potential safety hazards. The area will be secured and, if required, a work permit posted at the entrance to the area. The work permit will identify any industrial and radiological hazards, list special instructions, any contamination control procedures and protective clothing and/or equipment that may be required for entry. It will also contain emergency phone numbers and any special procedures for the area. Areas that require a work permit will have all items that are removed from the area wiped and then scanned with an instrument prior to removal from the area. Items identified as contaminated will be held for decontamination or disposal. If the area does not require

a work permit for entry, the project manager will notify the survey team's SHP Technician to start work and note that decision on the survey form.

The area will be gridded in accordance with survey procedures. The grid system will be further defined in the survey packet for each area. The sample locations will be labeled alpha-numerically. The floor rows are alphabetically labeled (most northern is "A") and the columns (most westerly is "1") are numerically designated. Figure 4-1 provides an example of the indoor affected area gridding system. It shows the alpha numeric designator for each grid. The sample location code uses this designator in the samples identification code.

FIGURE 4-1
TYPICAL AFFECTED ROOM GRID PATTERN



One hundred percent of the surface area will be scanned for contamination using appropriate instruments. If contamination is found, the boundary of the contamination will be determined. It is also necessary to determine if the contamination is removable or fixed. If the contamination is fixed the extent of leaching into the subsurface must be determined. When survey instruments indicate an area of elevated activity, a wipe will be collected at the point and analyzed for type and quantity of removable contamination. When scanning results are negative, fixed readings will be recorded following the triangle pattern (Figure 4-2). The three corners of the triangle pattern will be the data points of the survey. If no contamination is found above the release criteria, the area will be posted to identify it as prepared for release and restricted from further introduction or use of radioactive materials.

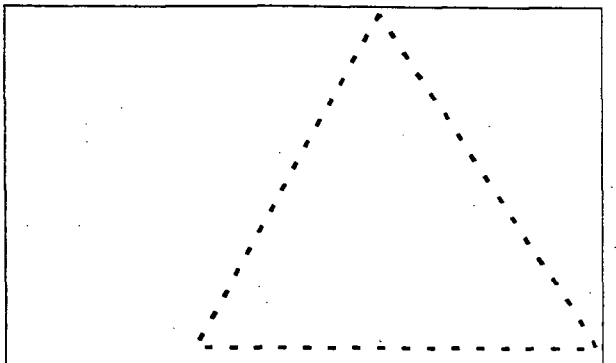


Figure 4-2: Samples and measurements taken at triangle corners.

Along with survey instrument readings, the removable contamination in all areas will be assessed. If required, both a wipe for liquid scintillation analysis and a wipe for gross alpha/beta counting will be taken from the triangle points of each grid. If an instrument reading in a grid is higher than the action level, of two times daily QA check background reading for the instrument (i.e. background 40 cpm beta, scan reading 80 cpm beta) a wipe for gross alpha/beta will be collected from that location as well. If counting results determined the activity is fixed, the location will be further evaluated to determine if a grab sample will be collected. A grab sample is a physical sample of building material, soil or ground cover material which appears to be the cause of the elevated instrument readings.

Each area will have its own sampling requirements. These requirements will be outlined in the individual survey packets for the area.

INDOOR UNAFFECTED AREAS.

These areas are not expected to be contaminated. No work permit is required for these areas. Gridding is not required for reproduction of the survey data. The survey teams will be provided with building floor plans. The sample locations will be marked on the map. When needed a brief description of the sample location may be included on the data sheet.

Only two unaffected buildings, 9011 and 9043, have more than 1500m^2 surface area. These buildings require 60 random sample locations and a 10% surface scan. In the remaining unaffected buildings, a minimum 10% surface scan and 30 random sampling

locations will be surveyed. In addition, any drains, vents, and fume hoods will be surveyed. If residual radioactivity is found that exceeds 70 percent of the release guidelines, then the areas classification will be changed to affected area and the sampling plan adjusted. If gamma activity, when averaged over $10m^2$, is 5 uR/hr or greater than background, then the area will be reclassified as affected.

At each sample location alpha and beta-gamma surface measurements will be taken. A gamma exposure measurement will be taken at one meter from each sample point. A liquid scintillation and a gross alpha/beta wipe will also be collected at each sample point.

OUTDOOR AFFECTED AREAS.

These areas have not been used since the 1960's for research involving radioactive material. All known incidents of contamination in these areas have been remediated. If any residual radioactive material is still present the quantities are expected to be small. For these reasons, surveyors will not be required to wear anti-contamination protective clothing when performing these surveys. If contamination is detected, work permits and control procedures will be initiated and the boundary of the area posted with an entry/exit point.

One hundred percent of the surface area will be scanned for gamma radiation. Any location where activity is detected that is greater than 70% of the guidelines for gamma exposure, will be marked and a soil sample will be collected. Soil release limits for some isotopes that will be considered are less than the detectable limits for the portable survey instruments being used for scanning. Therefore, the area's characterization will be based upon the collection of soil samples and laboratory analysis of the samples.

Affected areas will be gridded with an equilateral triangle pattern with 5 meter or greater sides. Grid sides greater than 5 meters will be justified by performing calculations discussed in NUREG-1505, paragraph 5.5.4, Probability of Detecting an Area of Elevated Activity. The sample points of the grid are the three corners of the triangle pattern. Figure 4-3 is an example of a gridded affected outdoor survey area. It represents the survey grid system that will be used in Area G.

Other media, such as surface water, vegetation, etc., may require sampling due to the composition of the area being surveyed. The need for other samples will be evaluated on a case-by-case basis. Each area will have its own sampling requirements. These requirements are outlined in the individual survey packets for each location.

OUTDOOR UNAFFECTED AREAS.

No work permit will be required in these areas. These areas are assumed to have no contamination present based on historical data. Unaffected areas do not require gridding to select sample point. However, large areas will be gridded to ensure adequate samples are taken to justify the release decision for the area. When used, the grid pattern will be an equilateral triangle pattern with sides 25 meters in length. Typically a soil sample and gamma dose rate reading will be taken at each sample point.

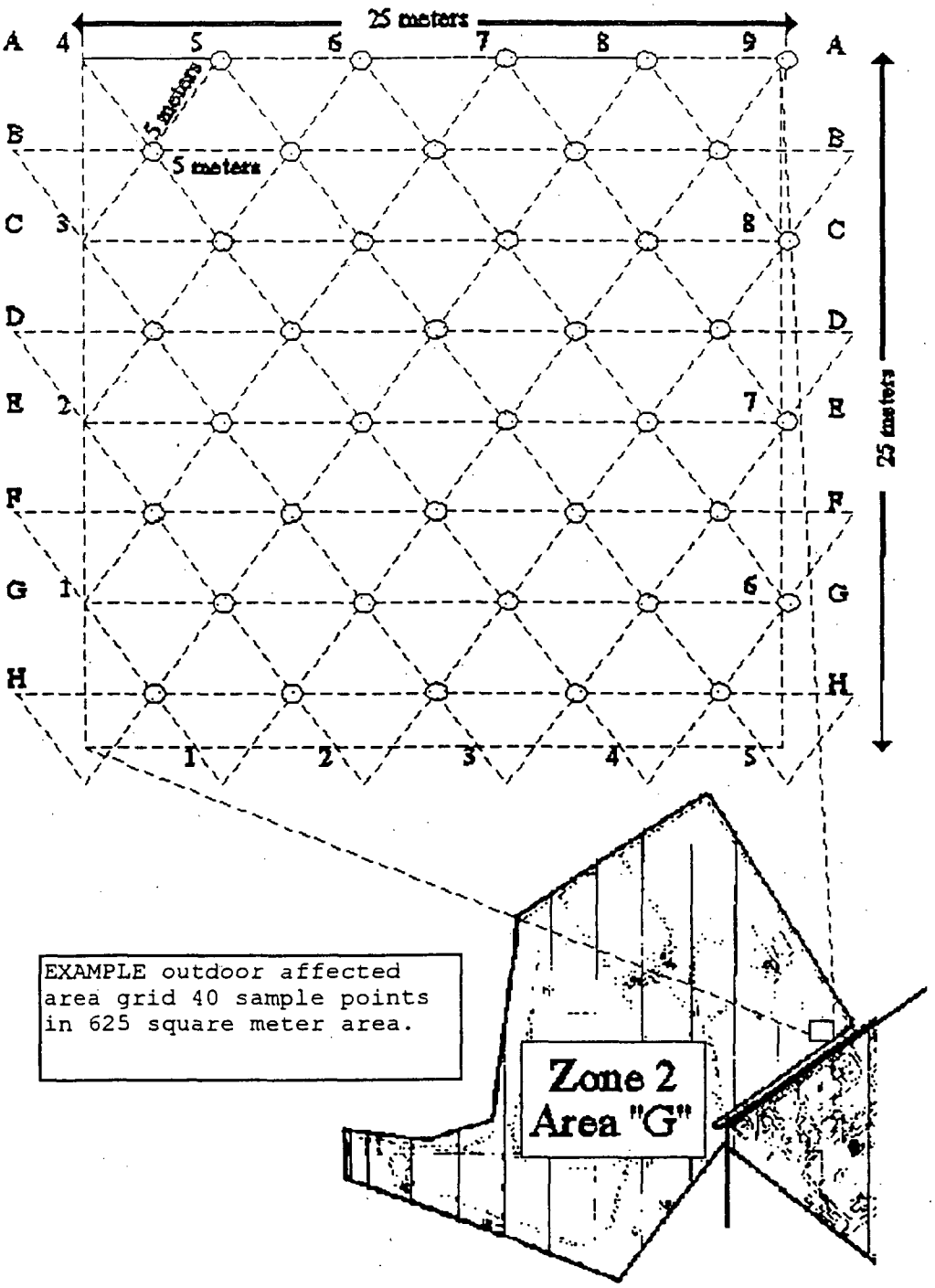
Release limit concentrations for some isotopes are below the Minimum Detectable Activity of available scanning instruments. The characterization of the area will be based on the analysis of physical samples collected. However, scanning will still be conducted in these areas to verify that no elevated activity areas are present. In unaffected areas, a minimum of 1 % of the surface will be scanned.

For areas of less than 20,000 square meters sampling will be performed at a minimum of 30 randomly selected locations. In addition to randomly selected locations, samples will also be collected where past geophysics reports have identified anomalies (i.e., landfills, dumps established after 1950).

MANHOLES.

The sewers may have been affected by historical work conducted at the Evans Area. Each manhole will be entered and the vertical shaft and immediate sewer tunnel will be characterized. Each manhole entry will be a confined space entry, and safety procedures for confined spaces will be followed for each entry.

Figure 4-3
Example Outdoor Affected Grid System
"AREA - G"



There are 47 manholes through-out the Evans Area. Lines will be drawn on the vertical shaft walls in the due east and westerly directions. This divides the manhole shaft into north and south walls. The north and south shaft walls will be divided into one meter vertical grids and the sewer tunnel floor (shaft bottom) will be a grid. (See Figure 4-4)

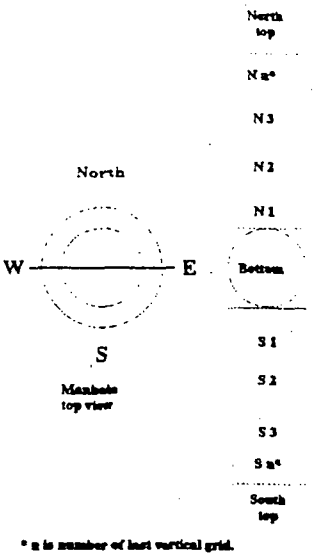


Figure 4-4

Each manhole tunnel floor grid will have two sediment and, if possible, two water samples collected. The shaft wall grid surfaces will be surveyed following the same protocols as an indoor affected area.

UNDERGROUND STORAGE TANKS.

There are two underground storage tanks located next to building 9045. The contents of the tanks will be sampled for alpha, beta and gamma activity. Other underground storage tanks in the area that were laboratory discharge line tanks will be surveyed for radioactive contamination. The soil above and on all sides of these tanks will be sampled before any excavation begins. If no contamination is found the soil will be excavated and the storage tanks removed. After the tanks are removed the area under the tanks will be sampled. If no contamination is detected the hole will be filled.

UNDERGROUND NEUTRALIZATION TANKS.

Four underground neutralization tanks were identified in the historical review of the Evans Area. These tanks were located outside of closed chemistry laboratories in the Evans Area. The contents of the tanks were known to contain hazardous liquid waste. The EPA requires the prompt disposal of hazardous waste once identified. To satisfy the EPA prompt disposal requirement, the contents of these tanks, the pits they occupied and the surrounding soil, were sampled for radioactive contamination in preparation for removal. The samples were analyzed for contamination from gamma, alpha and beta emitters. The analysis of the contents of the four tanks verified that there was no radioactive

contamination in the tanks. The tank contents were disposed of as hazardous waste. The soil samples collected and analyzed showed the tanks were free of external radioactive contamination and they are released for disposal.

5.0 SCHEDULE.

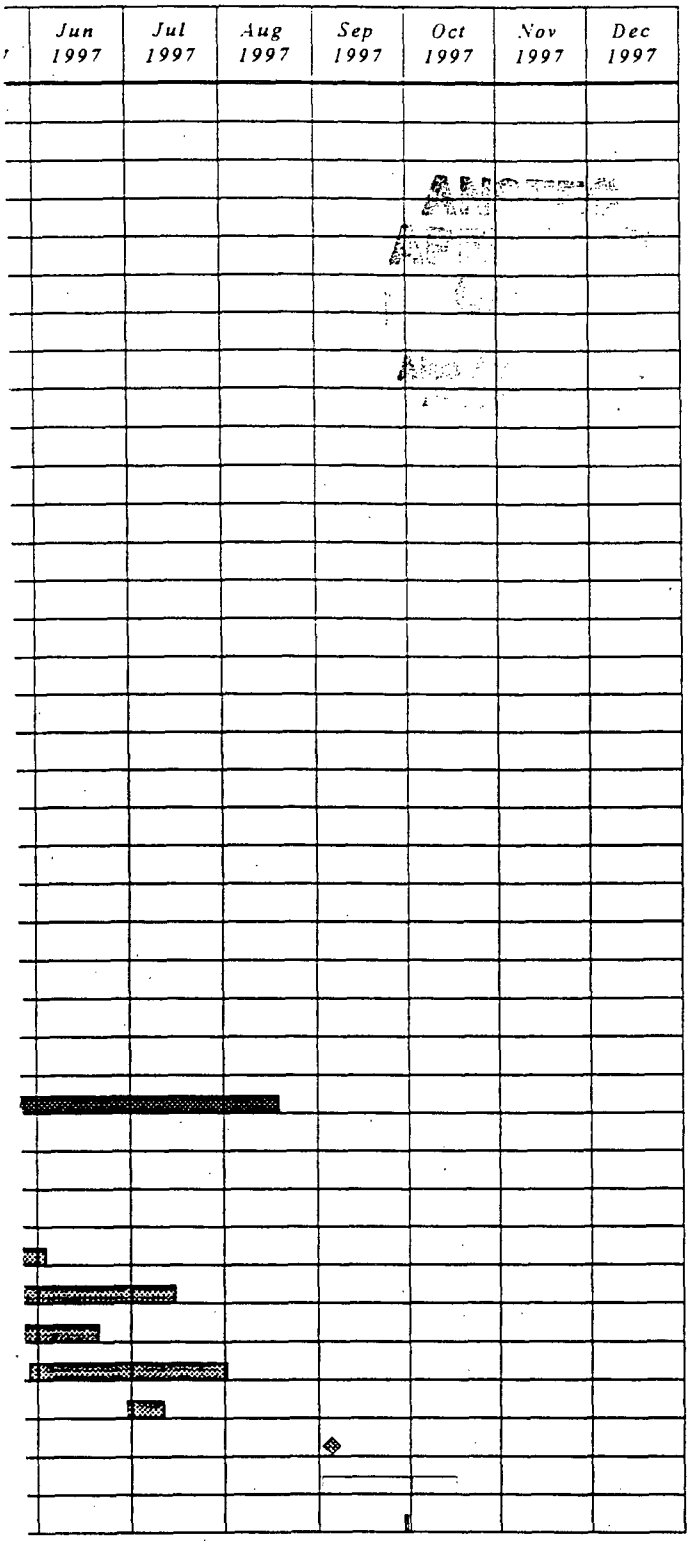
The decommissioning process consists of the following activities.

I. Historical Study
II. Scoping Surveys
III. Site Characterization
IV. Remediation (D-Plan)
V. Final Status Surveys
VI. Verification and Release for Unrestricted Use

The characterization phase of the decommissioning process is composed of the following sub-phases. The following schedule (page 5-2) is a tentative timeline contingent primarily upon the movement of personnel from the Evans Area. Buildings must be vacated with no future operations scheduled prior to survey.

Table 5-1
Timeline of Events

I. Background Study ..... September 1995
II. Site Preparation ..... May 1996 - July 1996
III. Surveying ..... August 1996 - September 1997
IV. Sample Analysis ..... August 1996 - October 1997
V. Initial Draft Characterization Report and Decommissioning Plan ..... January 1997
VI. Final Draft Characterization Report and Decommissioning Plan ..... August 1997
VII. Characterization Report and Decommissioning Plan complete..... September 1997
VIII. Remediation/Decommissioning ..... January 1997 - January 1998



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6.0 MANAGEMENT.

6.1 Key Players and Responsibilities.

CECOM is the NRC license holder for the material used in the Evans Area. Figure 6-1 is an organizational chart showing CECOM's position relative to the Department of the Army. CECOM has the direct responsibility for the radiological decommissioning of Evans Area. Figure 6-2 shows the on-site project organization.

The CECOM Radiation Protection Officer (RPO) is located in the CECOM Safety Office at Fort Monmouth. The RPO is responsible for CECOM's installation and worldwide radiation safety programs. The RPO has the responsibility for all activities and programs which involve the use, storage, or shipment of radioactive materials at Fort Monmouth, to include all annexes.

The RPO will provide guidance on creating working conditions and operating procedures that comply with applicable regulations and guidelines. The RPO, or designee, will also document and provide instruction to decommissioning personnel in safe working practices, emergency procedures, harmful effects of radiation overexposure, and other related safety topics. He will evaluate and document hazards related to specific operations involving the radiological decommissioning of the Evans Area of Fort Monmouth.

An independent organization will conduct quality assurance (QA) assessments of survey and laboratory data. The U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM), formally US Army Environmental Health Agency (AEHA), a subordinate command of the Major Command, Medical Command, has the personnel and equipment to perform this role and will be the preferred supplier of this service. If USACHPPM resources are not available to perform this role a comparable government or private sector organization will be used.

Project Manager.
The Project Manager (PM) will plan and organize the decommissioning efforts of the Evans Area. The PM will also coordinate all plans and reports with the regulatory community and internal Army QA program.

Lead Chemist.
Will ensure all sample preparation for analyses is completed using approved procedures and equipment to ensure data validity and accuracy. The lead chemist will also be responsible for sample accountability and security.

Counting Laboratory Lead (CLL).
Will ensure all samples are counted using approved procedures and instruments. The CLL is responsible for maintenance of QA documentation of counting equipment performance.

Survey Lead.
The Survey Lead (SL) will have oversight of field technicians. The SL will ensure proper survey protocol is followed and maintained. The SL will be the first line for data quality assurance checks. The SL will prepare daily work packages for the survey teams.

Quality Assurance/Quality Control Coordinator.
This individual will be a Senior Health Physics Consultant (HPC). The HPC will conduct program reviews and audits. The HPC will ensure QA samples are being collected and analyzed by an independent third party (i.e., USACHPPM). The HPC will provide technical document and statistical analysis reviews of both the field and laboratory data.

Waste Management.
Industrial Operations Command (IOC), a subordinate command of the Army Materiel Command, which is a major command, is the designated agent of the U.S. Army for the removal and disposal of low level radioactive waste. IOC will provide, on request, technical escorts to guard shipments of radioactive materials. IOC will maintain records for DA on the type and quantity of radioactive items disposed and manage the Army contracts for burial of radioactive waste at licensed land burial sites in the United States.

Figure 6-1

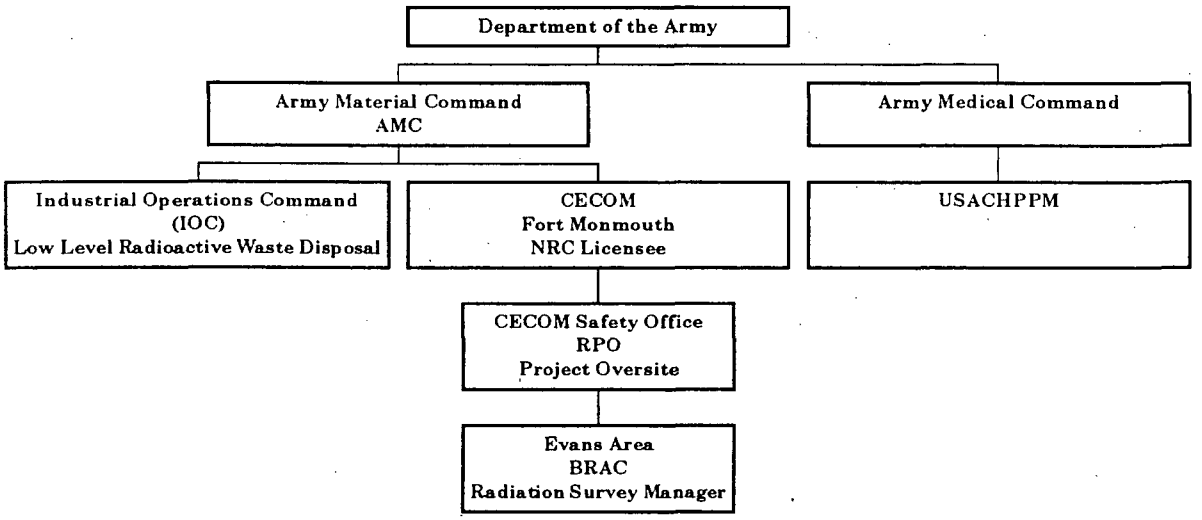
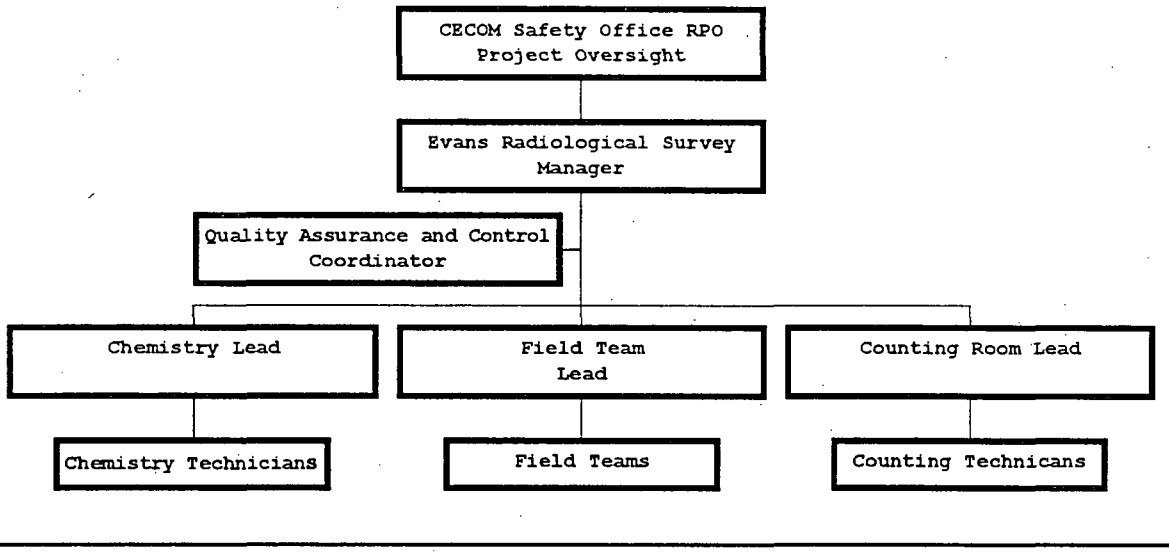


Figure 6-2
Evans Decommissioning Project

On-Site Team



6.2 Training.

Prior to performing field work survey team personnel will attend 8 hours of site-specific radiation and site safety training. Training records will be maintained by the PM.

The survey team lead health physics technician will meet the education and experience requirements of ANSI 3.1.

6.3 Health and Safety Program.

CECOM has written procedures and policies to assist personnel in minimizing occupational health risks. These procedures state that exposure during any activity involving radioactive materials will be as low as is reasonably achievable (ALARA). The applicable exposure limits in state and federal regulations are addressed with operating procedures and administrative controls. These policies and procedures are presented in manuals, prepared by the CECOM Safety Office. All decommissioning personnel will familiarize themselves with the safety concerns that are applicable to their job. In addition, if the workers are working in an area where another organization has safety responsibility, the workers must comply with that organization's policies and procedures.

Appendix F is the Site-Specific Health and Safety Guidance for Site Investigation at Fort Monmouth, New Jersey, prepared by Roy. F. Weston, Inc.

Documentation of the workers review of Health and Safety protocols and training received will be kept on file by the PM for the duration and review period of the project.

Work permits will be issued for areas where the Fort Monmouth Garrison Safety Office, CECOM Safety Office, or the Project Manager deem necessary. The work permit for an area will identify all hazards in that area and provide directions and administrative controls to minimize the health and safety risks.

7.0 SURVEY AND TECHNIQUES.

7.1 Instrumentation.

Portable field instruments used during the characterization surveys will be selected based upon reliable field performance and sensitivity. Instruments will be calibrated with the appropriate detectors for the radiation of concern. The probe types that will be used and their typical sensitivity to the radiation of concern are listed in Table 7-1.

Table 7-1
Radiation Survey Probes

Instrument Detector	Radiation Detected	Typical Sensitivity or Minimum Detectable Activity (MDA)*
Sodium Iodide (NaI)	Gamma and X-ray	1 uR/hr
Zinc Sulfide (ZnS)	Alpha	70 dpm/100cm^2
Geiger-Mueller tube (GM)	Beta, Gamma, and X-ray	1700 dpm/100cm^2
* Note: Actual MDA values are the product of procedure established counting times, detector efficiency, background readings and active probe area.		

Survey meters are calibrated using a radioactive source traceable to the National Institute for Standards and Technology (NIST). The radioisotope used will have an energy close to the energy of the isotope of concern. If the calibration energy is not a close approximation of the isotope of concern, an energy correction factor will be calculated and used with the instrument. An efficiency factor will be calculated at the time of calibration, to correlate the meter reading to the actual radioactivity present. Calibration sources will be decay corrected before instrument calibration and efficiency determination.

$$\text{efficiency} = \frac{\text{Gross reading - background reading}}{\text{actual source activity}} \quad \frac{\text{cpm}}{\text{dpm}}$$

example: $\frac{\text{355 cpm (gross) - 87 cpm (bkg)}}{\text{1056 dpm (source act.)}} = \frac{\text{264 cpm}}{\text{1056 dpm}} = 0.25$

Units of disintegrations per minute (dpm)/100 cm^2 are typically used in regulatory criteria tables. Most survey instruments read out in other units. For reporting purposes instrument reading units will be converted by the application of correction factors.

When necessary a correction factor to extrapolate the probe surface area to a normalized 100 cm^2 area will be calculated by dividing 100 cm^2 by the probes window surface area.

$$\frac{100\ cm^2}{\text{Probe Area } cm^2} \qquad \textit{example:} \quad \frac{100}{15.5} = 6.45$$

Dividing the count rate by the instrument efficiency and multiplying by the probe area conversion factor will convert the instrument reading to dpm/100 cm^2..

example: 20 cpm reading (gross - bkg)
15.5 cm^2 probe surface area CF = 6.45
Efficiency = .25

calculation:

20 cpm x 6.45 / .25 = 516 dpm / 100 cm^2

The MDA for each instrument-detector configuration will be calculated and documented. The alpha and beta/gamma readings will be taken in the integrate mode for fixed readings and rate meter mode will be used for scanning. The count time used for integrate mode measurements will be long enough to provide a MDA value that is less than 70% of the release limit. The MDA for survey instruments will be calculated using the equation shown in Figure 7-1.

Figure 7-1
MDA Equation

$$MDA = \frac{\frac{2.71}{t_{s+b}} + 3.29\left[\frac{R_b}{t_b}\left(1+\frac{t_b}{t_{s+b}}\right)\right]^{\frac{1}{2}} * G}{E}$$

MDA = Minimum Detectable Activity
R_b = Background rate [cpm]
t_{s+b} = Sample counting time in minutes
t_b = Background counting time in minutes
E = Instrument efficiency (counts/disintegrations)
G = Probe area ratio (100/area) to normalize to dpm/100cm^2

All portable survey meters are calibrated at an interval not to exceed 180 calendar days. Survey instruments will be calibrated following any repair. If an instrument fails daily QA checks, the failure will be verified and the instrument removed from service until repairs are made.

Typical alpha survey meters will use ZnS probes. Efficiency and probe area conversion factors will be applied to the instrument readings to provide results in dpm/100 cm^2. Two operational checks will be performed daily using an alpha source (i.e., Th-232).

Typical beta-gamma survey meters will use a 1.4 to 2 mg/cm^2 density window G-M tube (pancake) probe. Efficiency and probe area conversion factors will be applied to the instrument readings to provide results in dpm/100 cm^2. Two operational checks will be performed daily using a radioactive source (i.e., Tc-99, Th-232).

Typical gamma survey meters will use a NaI(Tl) detector. The gamma dose rate at sample locations will be measured in microroentgens per hour. Operational checks will be performed twice daily using a gamma source (i.e., Cs-137, Th-232).

7.2 Quality Assurance.

Each member of a survey team is responsible for the quality of their work and the team's surveys. Laboratory technicians, project supervisors and managers are responsible for the quality of results and reports created from the survey samples collected.

Survey meters will be verified as calibrated at the start of each day and the first of two daily QA checks will be passed. The following operational checks will be performed twice daily and recorded on an instrument QA log sheet.

(1) Check calibration due date on calibration sticker.
(2) Perform battery check.
(3) Check cables, probe, and case for physical damage.
(4) Take background reading.
(5) Perform a radioactive source check to verify instrument is reading within the quality control chart limits.

Radioactive source checks will be performed twice daily, once at the beginning of the work and a second time at the end of work. For these checks the probe and source will always be oriented in the same position relative to each other. If needed to produce a repeatable positioning, a jig may be used to position the probe and source.

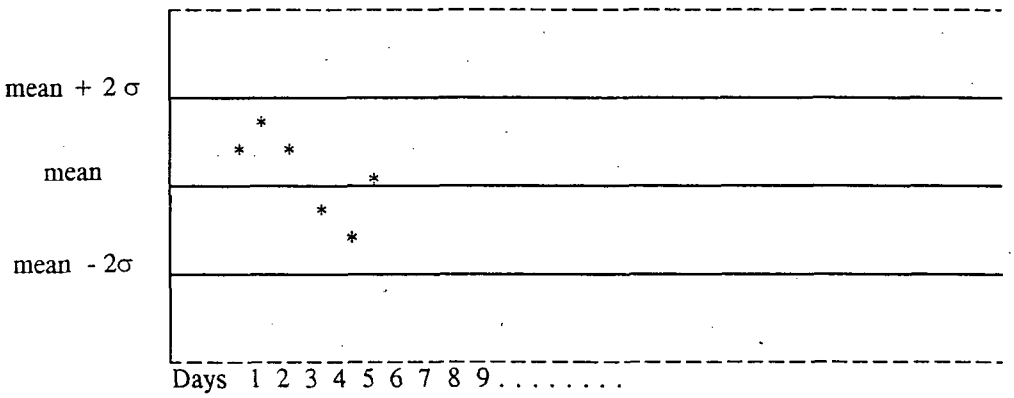
An instruments QA chart is produced by taking 20 readings with the instrument and its assigned radioactive check source in a fixed position. The mean and the standard deviation of these readings is calculated and used to develop the QA chart mean and

limits. Using the calculated mean and standard deviation, a graph with days on the horizontal axis and instrument readings on the vertical axis is created. On the graph a horizontal line is drawn at the mean value. Two more horizontal lines are drawn at the mean value plus and minus two standard deviations (see Figure 7-2). Graphs produced by this method will be used to plot the daily operational checks for survey meters that have a digital display.

Similar charts will be created for analog meters, except the lines drawn will be for the mean, the mean plus 20%, and the mean minus 20%. Determine the mean for an analog meter by placing the probe and check source in a repeatable geometry position and allowing the meter needle to stabilize at the reading. When the needle has stabilized, watch the needle for 1 to 2 minutes. Note the high-low boundary of the needle's deflection. The median reading is the meter reading at the midpoint of the needle's high-low readings. Draw a line on the chart at this median value. Then draw lines at 0.8 and 1.2 times the mean.

If an instrument's radioactive source reading falls outside the two standard deviations or 20% limit, repeat the daily operational checks. Remove the instrument from service if it fails the second test. Repair and calibrate the instrument before returning to service. Instruments suspected of malfunctioning will be immediately removed from service. Upon return of an instrument from calibration create a new QA chart.

Figure 7-2
Typical Operational Check Log



Laboratory instruments will have, as a minimum, the same QA standards as survey meters. The desired MDA for the laboratory instruments will be 10% of the release criteria. However, if elevated backgrounds or unreasonable counting times make 10% unachievable, then a "best achievable MDA" that does not exceed 60% of the release criteria will be acceptable. Keep performance records (daily operational check or control charts) for each laboratory counting system. Blank (background) samples will be introduced during the survey process. The counting laboratory will be unable to

distinguish the blanks from survey samples. These blank samples will serve as a laboratory procedure QA check.

All instrument and survey data collected will be reviewed for accuracy and completeness on a daily basis.

7.3 Survey Techniques.

Scanning.

Before conducting any fixed measurements, surfaces will be scanned to identify the presence of any elevated direct radiation which might indicate residual gross activity or hot-spots. Scans are conducted for all radiation (except low energy beta emitters, i.e., H-3, Ni-63) potentially present. Keep the scanning detector as close as possible to the surface (alpha and beta ideally within 0.5 centimeter of floors and other smooth surfaces).

Scanning speed for alpha and beta detection will be 1/3 the detector width per second, this will allow the instrument to respond to any residual activity.

Scanning for gamma radiation is performed by moving the detector in a serpentine pattern while advancing at a speed of about 0.5 meters per second.

Fixed Readings.

Fixed alpha readings will be taken with the probe less than 0.5 centimeters (cm) above the surface surveyed. The alpha probe will remain in place for the designated count time that will achieve the desired MDA. When the isotope of concern changes, the survey team lead will verify the count time duration is correct or change it to achieve the desired MDA.

Beta-gamma fixed readings will be taken with the probe no more than one centimeter away from the surface. The beta-gamma probe is held in place for the designated count time to achieve the desired MDA. When the isotope of concern changes, the survey team lead will verify the count time duration is correct or change it to achieve the desired MDA.

Fixed gamma readings will be taken with the probe one meter from the surface being surveyed. The instrument may be used in the rate meter mode to take the reading.

Grid Sampling

In the survey grid triangle pattern there are three data points located at the triangle corners. The identification code for the data points provides adequate information to locate the points. The identification code identifies the zone, sub-area zone (area,

building, room), grid pattern point and sample type collected (i.e., Zone 1 grid point D22 is sample point Zone 1, D22 (soil, gamma dose rate, etc.). The triangle grid pattern will be used for all surveys that require gridding. The grid triangle size for each survey will be determined by the area's potential for the presence of residual radiation.

Building Surveys.

The survey will take instrument readings for alpha, beta-gamma and gamma. Wipes for liquid scintillation counting and gross alpha and beta counting will be taken at each point. At locations where an instrument reading is higher than the 50% of the release criteria for that instrument, a gross alpha-beta wipe will be taken. If none of the activity is removable a grab sample will be taken. A grab sample is a physical sample of building material, dirt or whatever the media is which appears to have activity causing the elevated instrument readings. If the activity is removable the survey results will be reviewed to determine what additional sampling will be required for characterization.

Survey Documentation.

All survey activities will be documented. Data sheets will be used in the field to record fixed instrument readings and comments. When the survey is completed the data sheets are reviewed for completeness and accuracy. Electronically collected data field will be transferred to the projects review data base file in the master computer. After the review has verified completeness and accuracy, the data will be transferred to the survey master database file.

APPENDIX A

REFERENCES

1. AR 40-5, 15 October 1990, Preventive Medicine.

2. AR 40-14, 30 June 1995, Occupational Ionizing Radiation Personnel Dosimetry.

3. AR 385-11, 1 May 1980, Ionizing Radiation Protection

4. AR 700-64, 19 April 1985, Radioactive Commodities in the DoD Supply Systems.

5. AR 750-25, 1 September 1983, Army Test, Measurement, Diagnostic Equipment (TMDE) Calibration and Repair Support Program.

6. DOD Instruction No. 6055, 31 March 1989, Occupational Radiation Protection Program.

7. NUREG/CR-5849, ORAU-92/C57, June 1992, Manual for Conducting Radiological Surveys in Support of License Termination, Draft Report for Comment.

8. NUREG-5512, October 1992, Residual Radioactive Contamination From Decommissioning, Final Report.

9. NUREG-1500, August 1994, Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC Staff's Draft for Comment.

10. NUREG-1505, August 1995, A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys.

11. New Jersey Department of Environmental Protection Bureau of Environmental Radiation Report, A Pathway Analysis Approach for Determining Generic cleanup Standards for Radioactive Materials, January 1996.

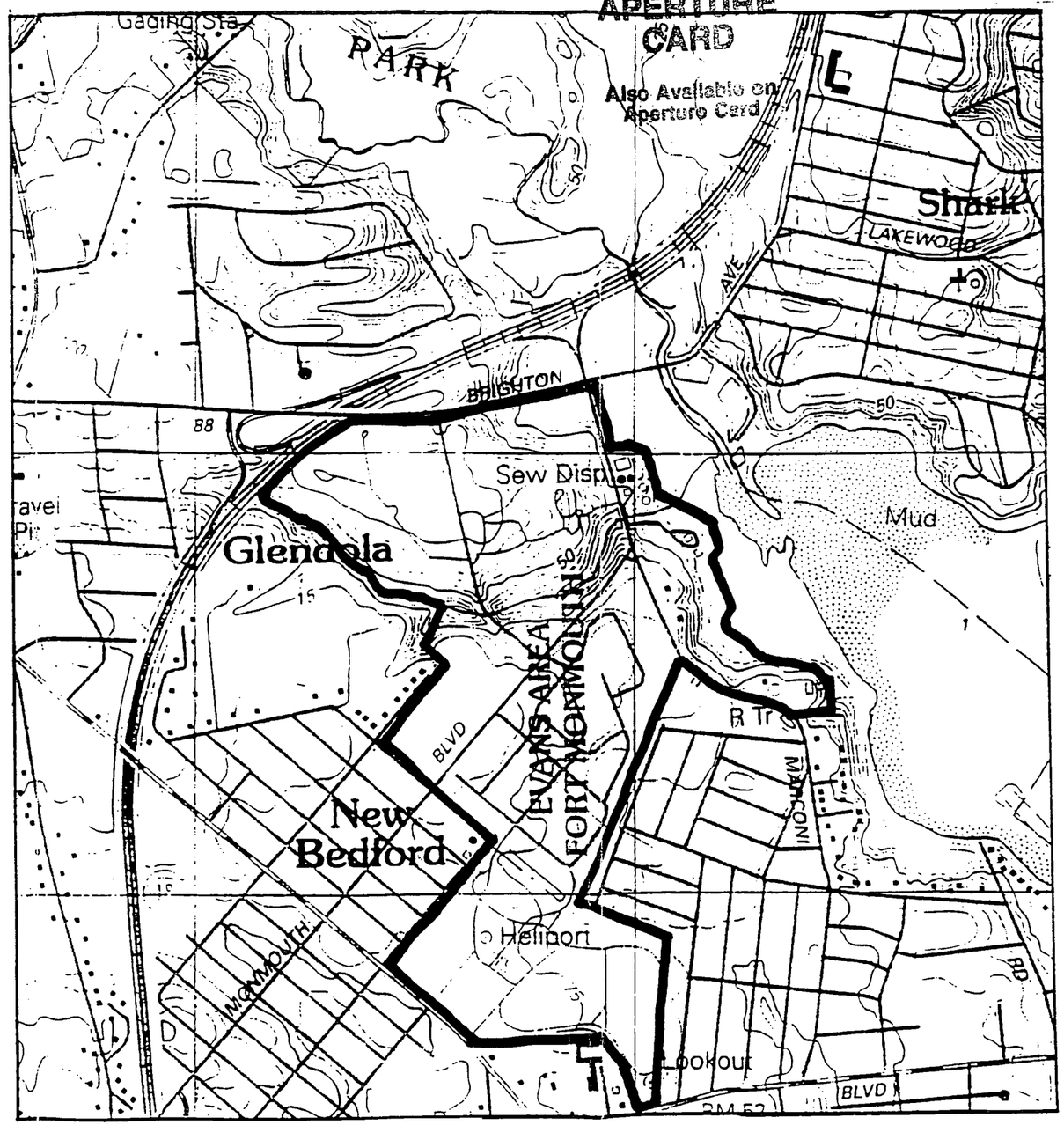
12. BTP-Branch Technical Position on Site Characterization for Decommissioning, November 1994, Division of Waste Management, Office of Nuclear Material Safety and Safeguard, Nuclear Regulatory Commission.

13. Titles 10, 21, 29, 40, 49 Code of Federal Regulations. 1994 rev.

14. TM 3-261, 12 May 1988, Handling and Disposal of Unwanted Radioactive Material.

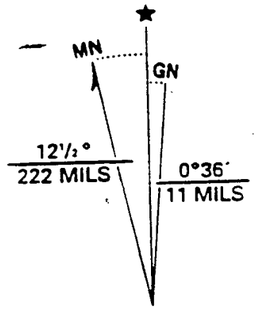
EVANS AREA

MAPS



NEW JERSEY

QUADRANGLE LOCATION



UTM GRID AND 1989 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

$^{44}49^{000m}$

$^{44}48^{000m}$

$^{5}79^{000m}$

$^{5}80^{000m}$

**** REFERENCE MAP ID ****

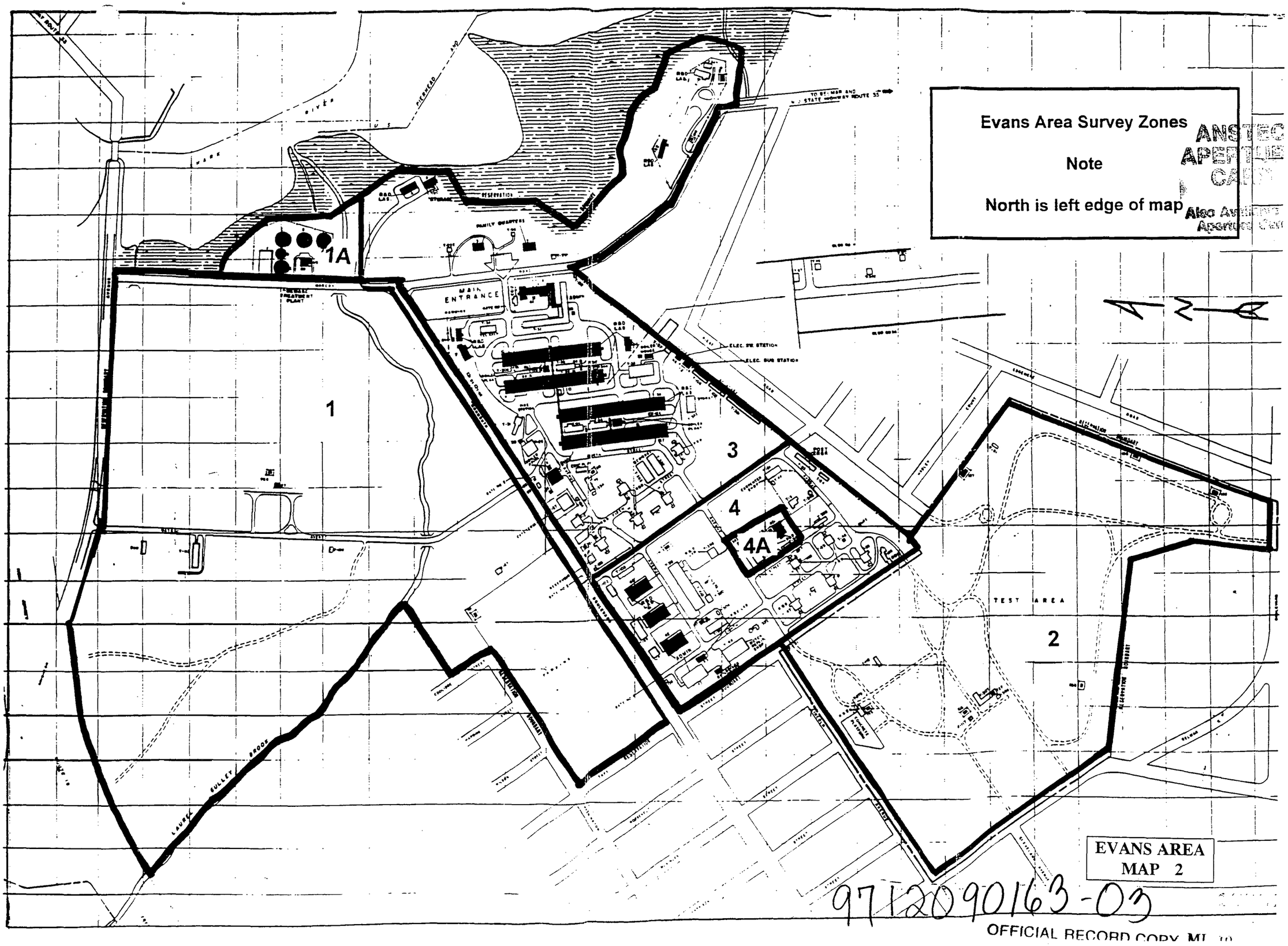
INTERIOR — GEOLOGICAL SURVEY, RESTON, VIRGINIA — 1989

ASBURY PARK, N.J.

40074-BI-TF-024

1989

DMA 6164 II NE-SERIES V822



Camp Evans Employee Questionnaire
Radiation Work History

Dear former or current employee:

You have been identified as a employee or former employee at Fort Monmouth with work experience at Camp Evans, Wall Township, New Jersey. Your answers to the enclosed questionnaire will assist the CECOM Safety Office in the development of a final radiological decommissioning plan for the Camp Evans area. A final radiological survey must be performed at Camp Evans in order to release the property from the government to the public.

The entire Camp Evans area will be surveyed but the intensity of sample frequency will be determined by the radioactive material use history of each building or outdoor area. The Nuclear Regulatory Commission (NRC) Licenses and Department of the Army Radiation Authorizations (DARA) and Permits (DARP) that were/are in effect at Camp Evans have been reviewed and the specified locations where radioactive material was used, stored, or prepared for shipment are scheduled for survey. Additional data on the locations of radioactive material use has been collected from surveys and radiation incident reports on file.

The information collected on these questionnaires will be used to ensure that all areas are surveyed at the appropriate level. We do need your name and work location so we may contact you if additional information is needed.

When you finish with the questions, if you would please mail the completed forms to the following address it would be greatly appreciated.

Commander
U.S. Army Communications-Electronics Command and Fort Monmouth
ATTN: AMSEL-SF-RER (BRAC Radiation Survey)
Fort Monmouth, NJ 07703-5024

Please feel free to use additional sheets if necessary. Thank you for your time and consideration in this matter.

The information you provide us will ensure the U.S. Army identifies and remediates all areas that require remediation prior to release for public use. The only purpose of this questionnaire is to locate all areas that require evaluation, nothing else. Thank you for your cooperation.

Camp Evans Employee Questionnaire

Radiation Work History

Name:_____ Date:_____

Present Work Assignment:_____

_____

Day Phone Number:_____

Home Phone Number:_____

GENERAL.

1. What is/was your position at the Evans Area? _____

_____

2. Did/do you know if any radioactive materials (RAM) or items containing RAM were ever used or stored in your work area at the Evans Area?

NO_____ YES_____

3. Were any work areas or buildings posted with a Caution, Radioactive Material Warning Signs? (if yes, could you remember the building # and room.

NO_____ YES_____

4. Was maintenance or research activities performed on electron tubes? (if yes, what locations?).

NO_____ YES_____

5. Were any foreign captured equipment/materials ever handled/stored in your work areas? If yes, in what locations?

NO_____ YES_____

If you never worked directly with RAM then you are finished and we thank you for your time. If you have worked directly with RAM then please continue.

RADIATION WORKERS ONLY.

6. Circle the first year in which you worked at Camp Evans. Underline the years that you associate w radioactive material experience (see example on right).

					Example	
1945	1955	1965	1975	1985	19xx	19zz
1946	1956	1966	1976	1986	19xx	19zz
1947	1957	1967	1977	1987	(19xx)	19zz
1948	1958	1968	1978	1988	19xx	19zz
1949	1959	1969	1979	1989	19xx	19zz
1950	1960	1970	1980	1990	19xx	19zz
1951	1961	1971	1981	1991	19xx	19zz
1952	1962	1972	1982	1992	19xx	19zz
1953	1963	1973	1983	1993	19xx	19zz
1954	1964	1974	1984	1994	19xx	19zz

7. Do you recall any instances of broken or leaking radiation sources or any other contamination incidents or accidents? If yes, in what areas?

NO_____ YES_____

8. Were you involved in any work in which you were aware of the release of radioactive material and contamination into the environment? If yes, in what areas?

NO_____ YES_____

9. On the attached map mark, with an "X", all the buildings or field locations where your work involved the use of radioactive material. Also, if possible, list the room number

10. Where did you store any radioactive material scheduled for disposal? If you can remember, where was it finally disposed?

11. Can you describe the procedures used if a radioactive commodities/device/material was damage or broken?

12. What was done with any contaminated material/waste?

Thank you for completing the questionnaire. We may find it necessary to contact you for further information after reviewing your answers. Please, review the above answers for completeness. Again, thank you.

Camp Evans, Fort Monmouth, NJ Historical Background Personnel Interviews

The following personnel were employed in the Evans Area of Fort Monmouth during periods of radioactive material use.

Name: Abraham E. Cohen
Interview date: 5 June 95

Past/Present work assignment: 1966-1981, Chief Radiac Branch (Retired) 1966-1981, 1981- Current, consulting with radiac.

Name: Stanley Kronenberg
Interview date: 5 June 95

Past/Present work assignment: 1953-Current, Resident Scientist.

Name: Sol Schneider
Interview date: 8 June 95

Past/Present work assignment: 1948-Current, Physicist in the Electron Tubes Division.

Name: John Carter
Interview date: 8 June 95

Past/Present work assignment: 1949-Current, Physicist in Vitronics.

Name: Samual Stine
Interview date: 6 June 95

Past/Present work assignment: 1943-Current, Scientist for meteorology section.

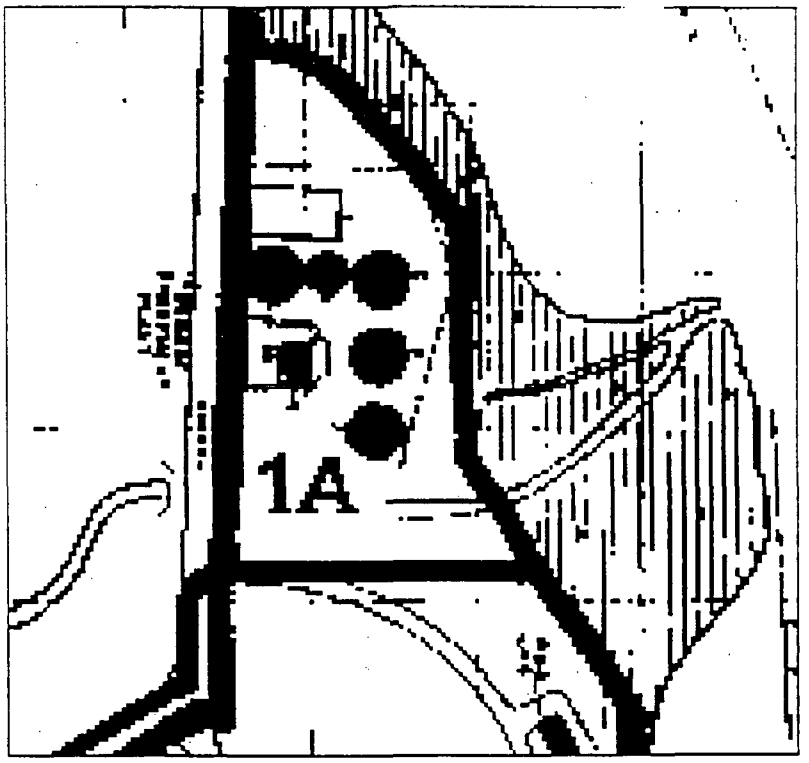
Name: Steven A. Horne
Interview date: 31 May 95

Past/Present work assignment: CECOM Safety Office employee, 1985 to present Chief CECOM Safety Office.

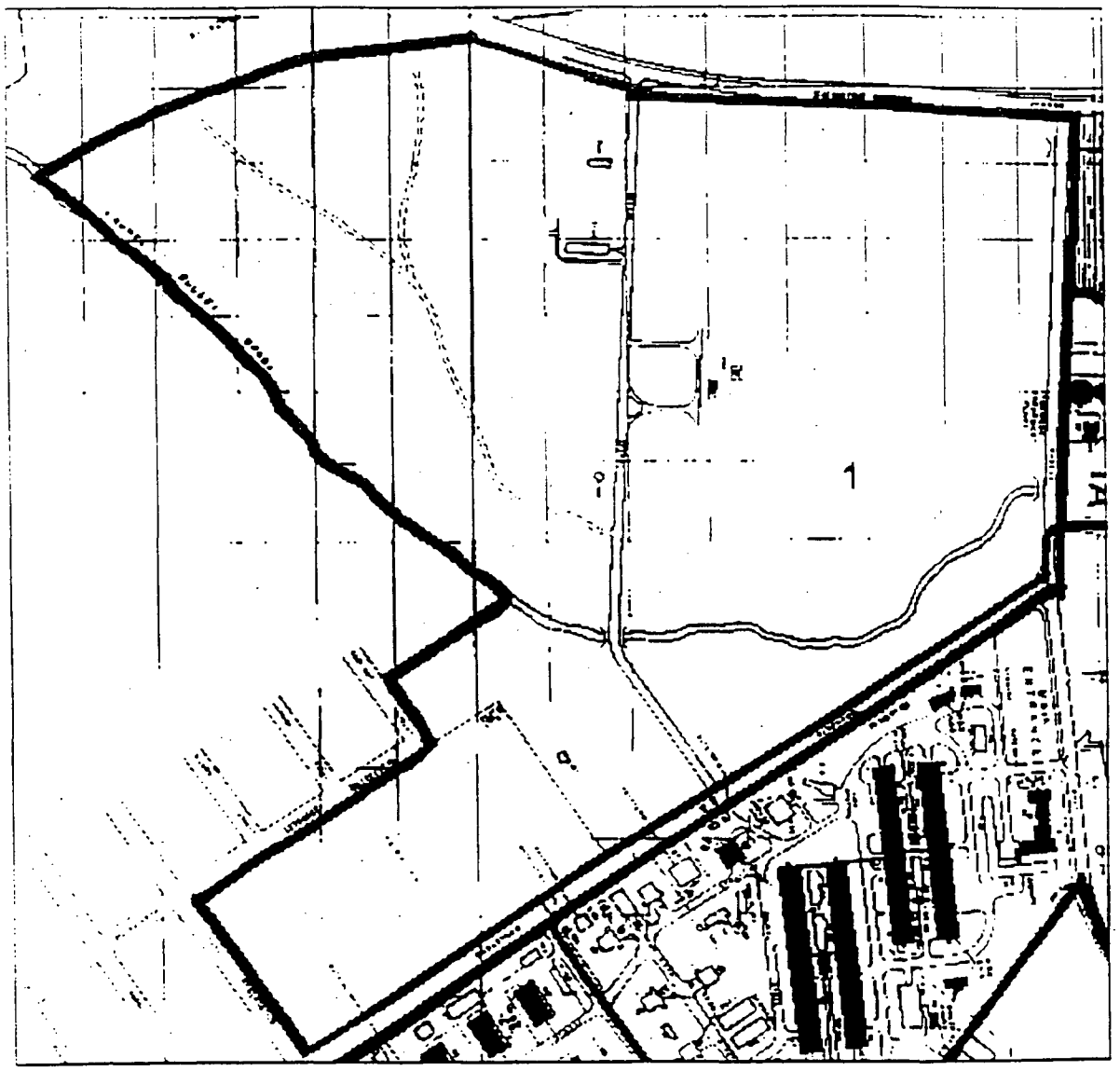
Name: Gordon Lodde
Interview date: 30 May 95

Past/Present work assignment: Lieutenant Colonel (retired) USAEHA., Health Physics Consultant.

ZONE 1A: (NO AFFECTED AREAS/ BUILDINGS)

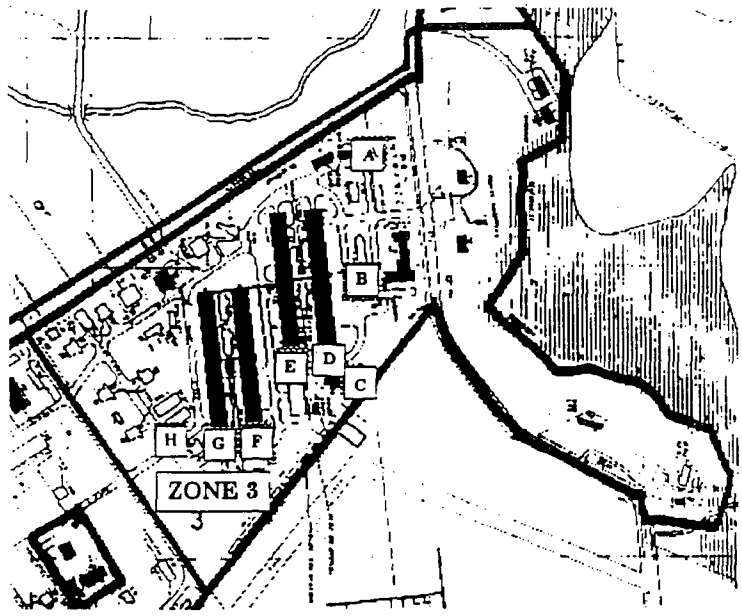


ZONE 1: (NO AFFECTED BUILDINGS/AREAS)



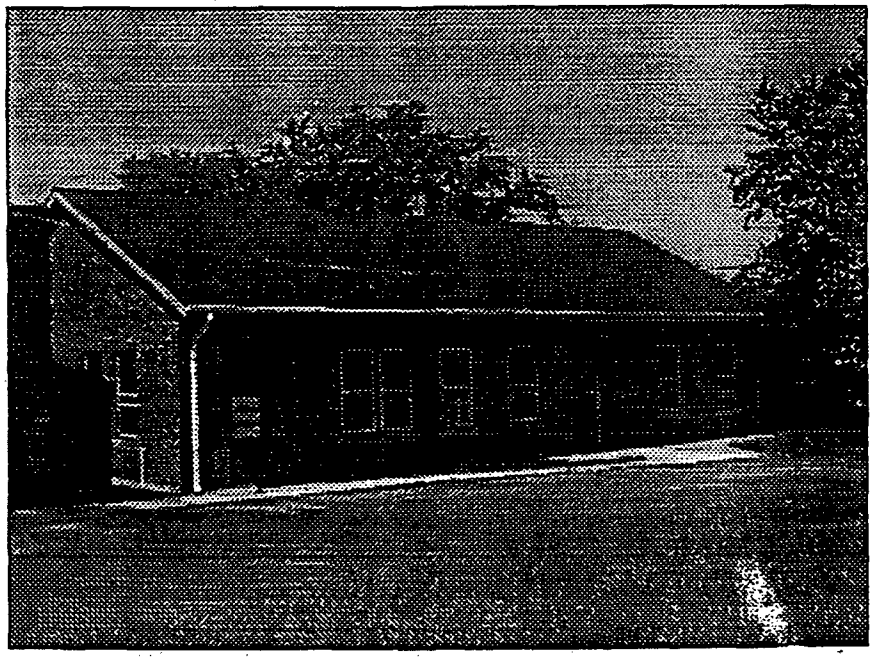
ZONE 3: AFFECTED BUILDINGS.

A. 9006
B. 9032
C. 9400
D. 9010A
E 9011A
F. 9036
G. 9037
H. 9392

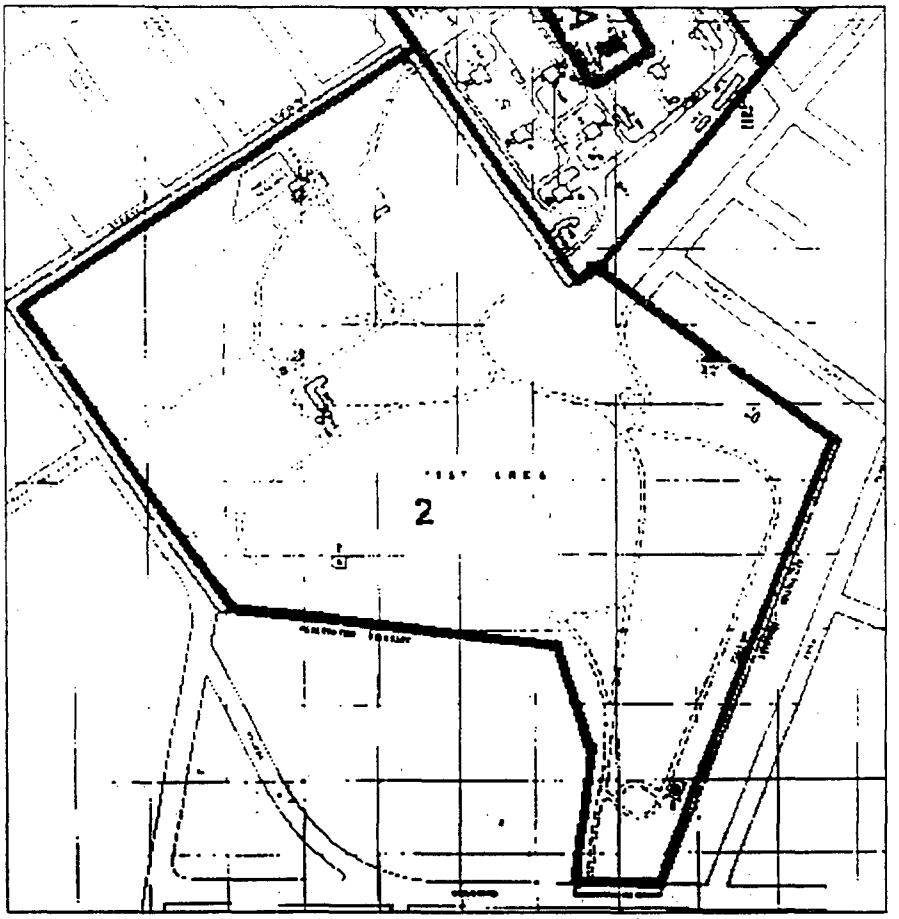


A. 9006
Red brick one story building with an atttic storage area.

Site location:
18T MGRS - New WV
79960e 48683n



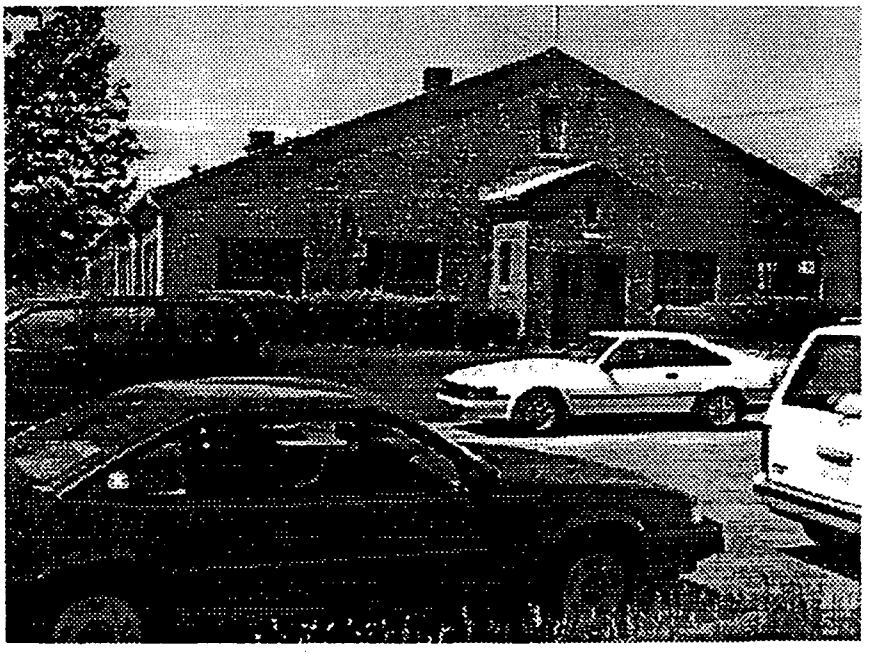
ZONE 2:



AREA G (TEST AREA) AFFECTED.

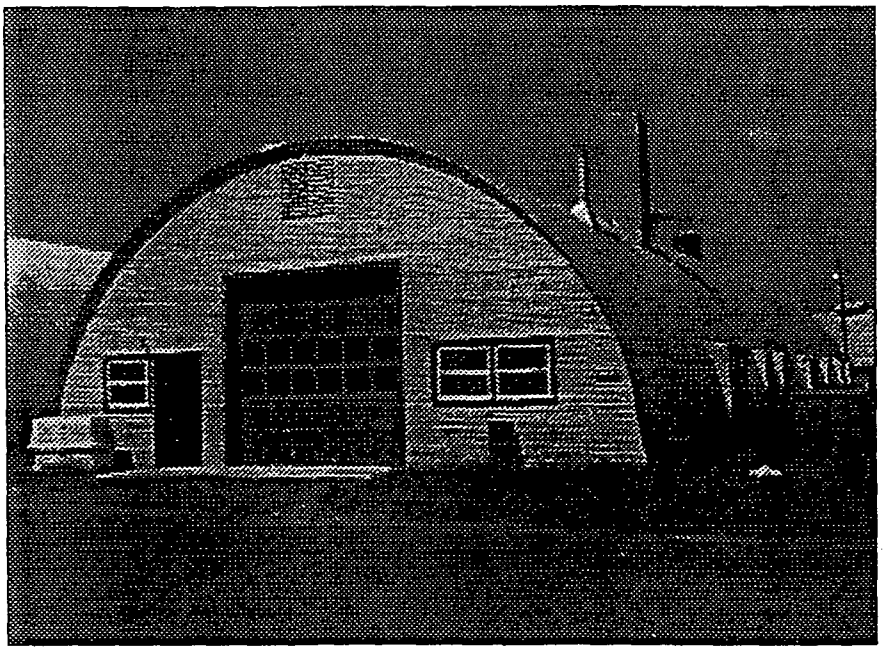
D. 9010A
Red brick one story building.
Location:
18T MGRS - New WV
80003e 48484

E 9011A
Red brick one story building.
Location:
18T MGRS - Nw WV
79980e 48467n

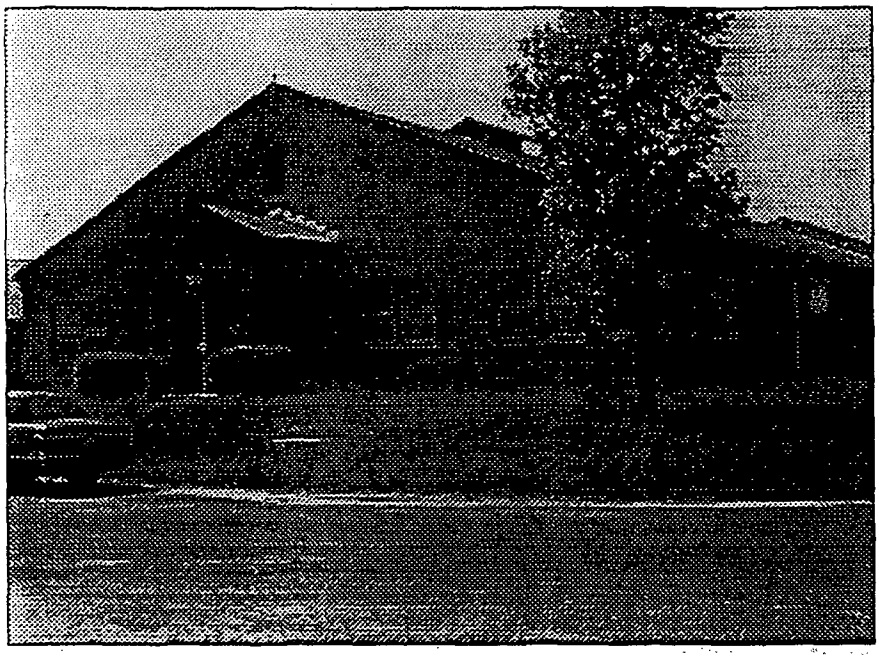


B. 9032
Wood frame one story building.
Location:
18T MGRS - New WV
79988e 48623n

C. 9400
Wood frame one story sturcture.
Location:
18T MGRS - New WV
80023e 48469n



H. 9392
Quanset building.
Location:
1ST MGRS - New
MV
79825e 48362n

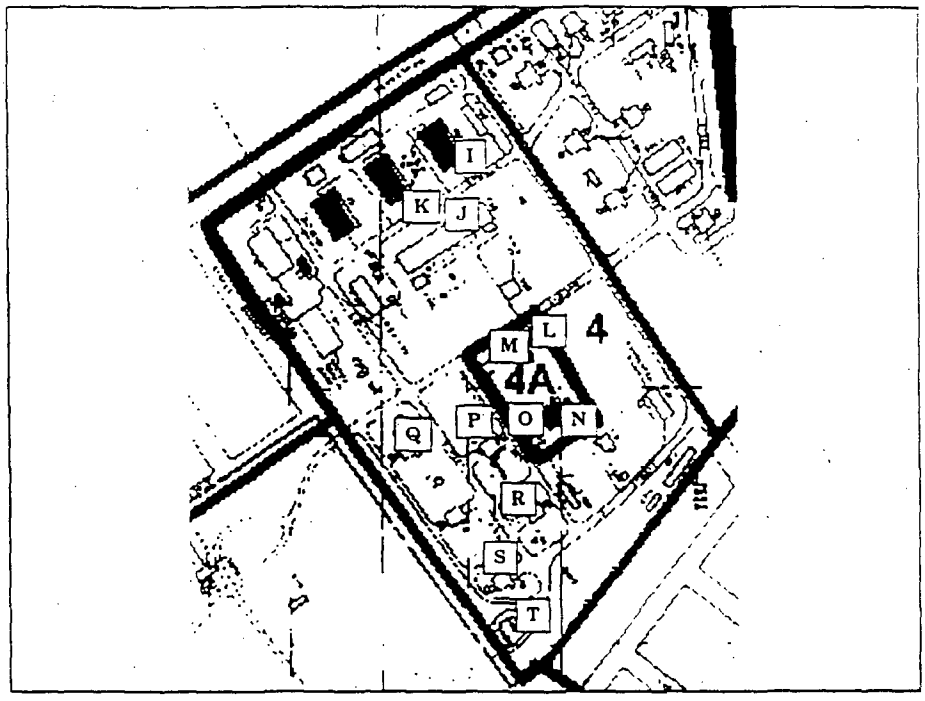


F. 9036A
Red brick one story building.
Location:
18T MGRS - New WV
79948e 48381n

G. 9037
Red brick one story building.
Location:
18T MGRS - New WV
79916e 48360n

ZONE 4 & 4A: AFFECTED BUILDINGS

I. 9040
J. 9039
K. 9041
L. 9383
M. 9045
N. 9401
O. 9345
P. 9049
Q. 9047
R. 9053
S. 9055
T. 9105

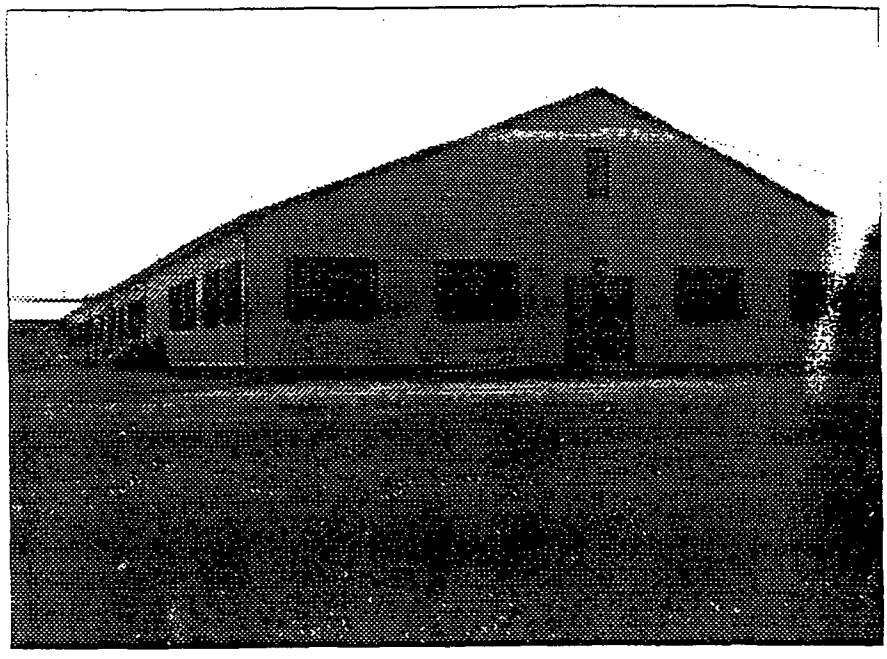


I. 9040

Location:
18T MGRS -
New WV
79716e 48324n

J. 9039

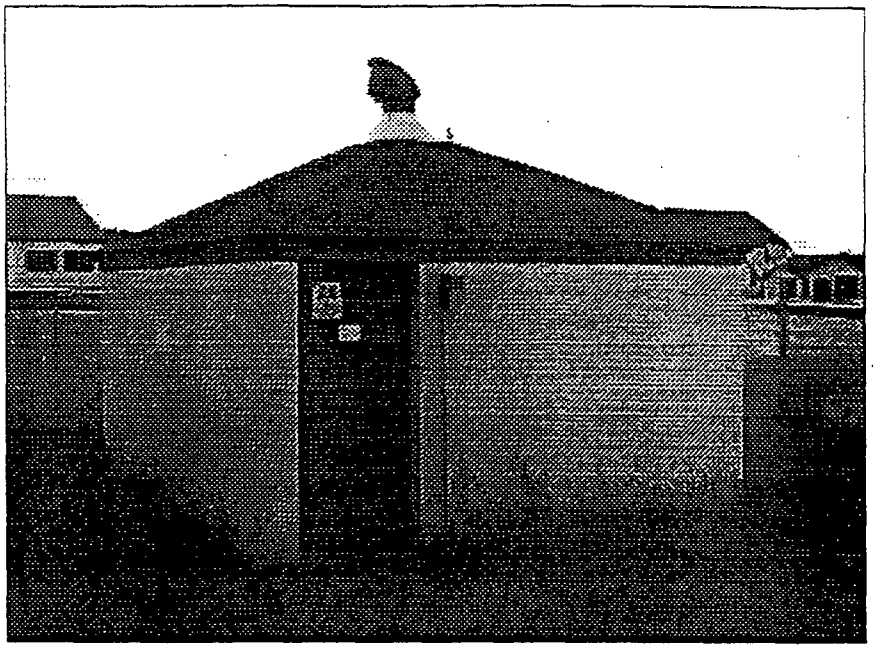
Located:
18T MGRS - New WV
79713e 48288n



K. 9041

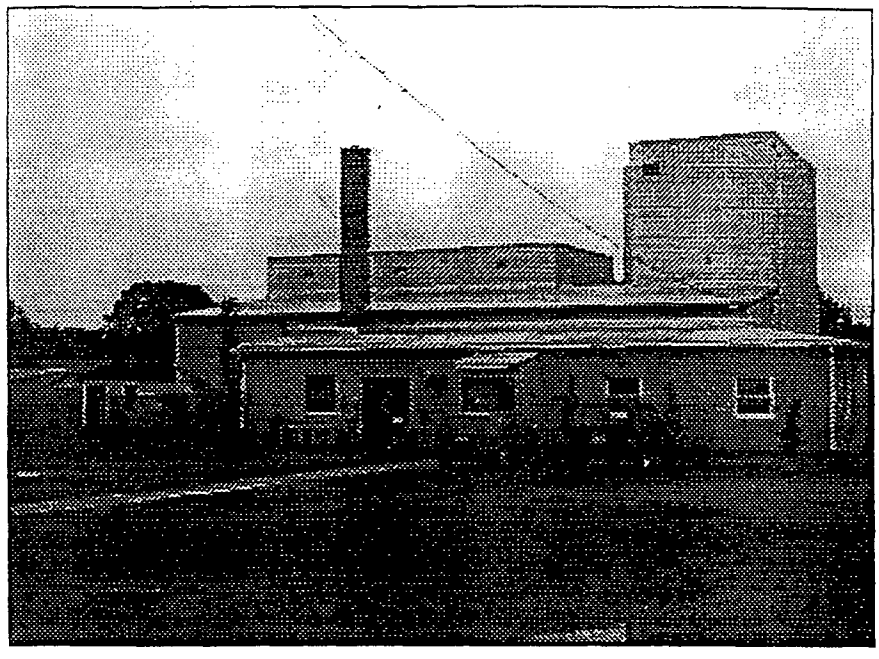
Located:
18T MGRS - New WV
79825e 48180n

L. 9383
Located:
18T MGRS - New WV
79802e 48234n



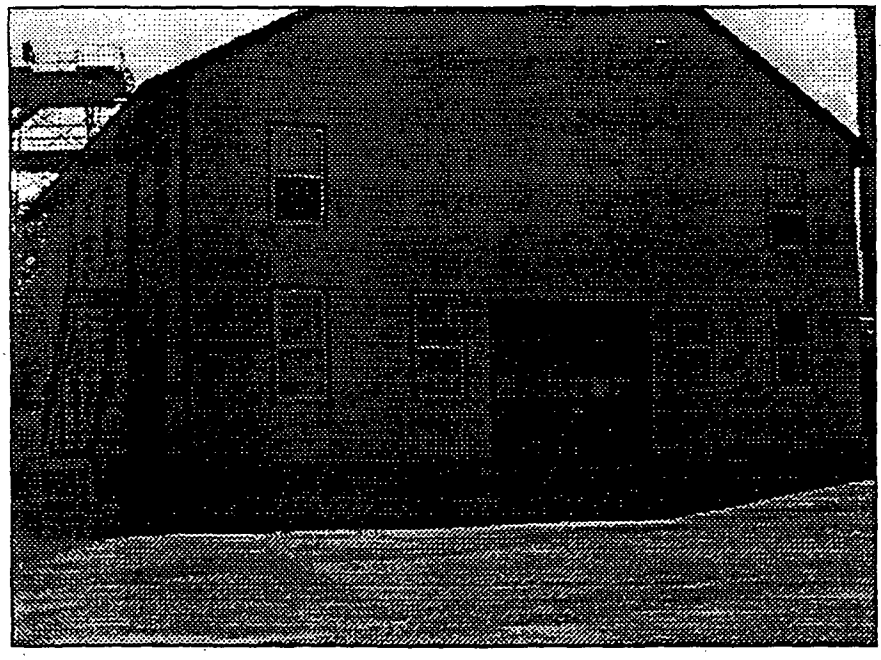
M. 9045
Located:
18T MGRS - New WV
79783e 48204n

N. 9401 Located:
18T MGRS - New WV
79825e 48180n



O. 9345 Located:
18T MGRS - New WV
79822e 48162n

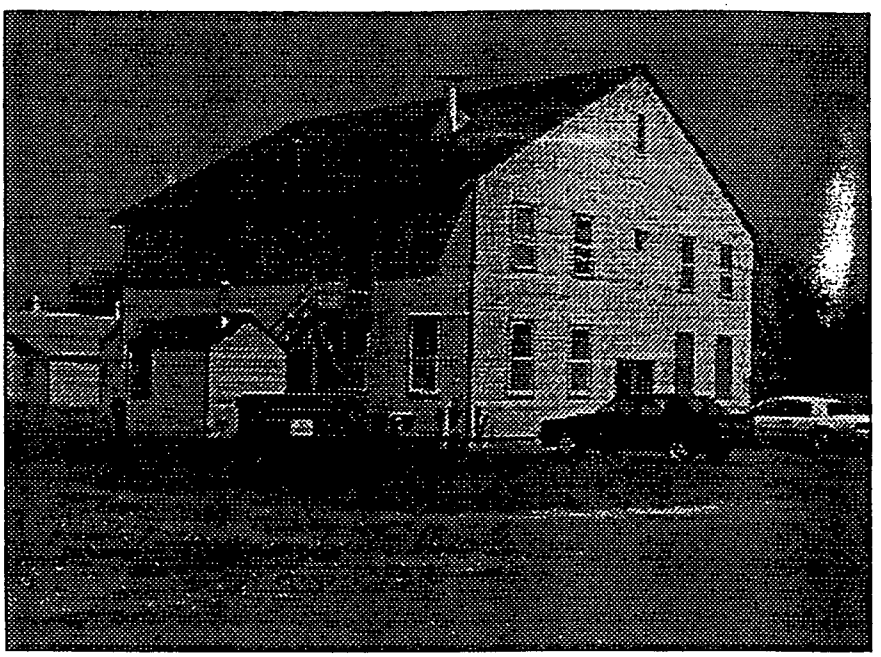
P. 9049 Located:
18T MGRS - New WV
79793e 48128n

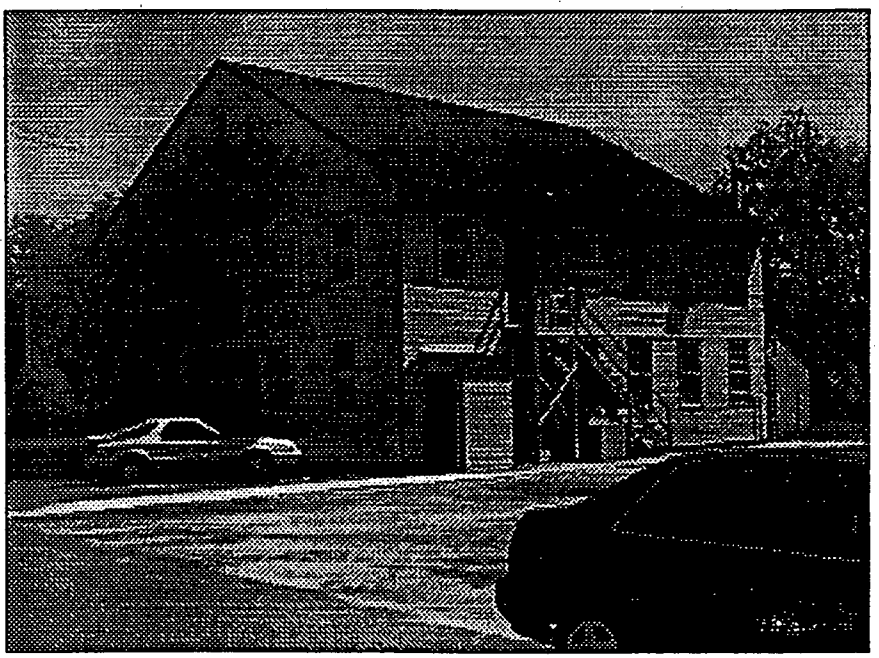


Q. 9047
Located:
18T MGRS - New WV
79741e 48141n

R. 9053 annex
Small storage shed in left foreground.

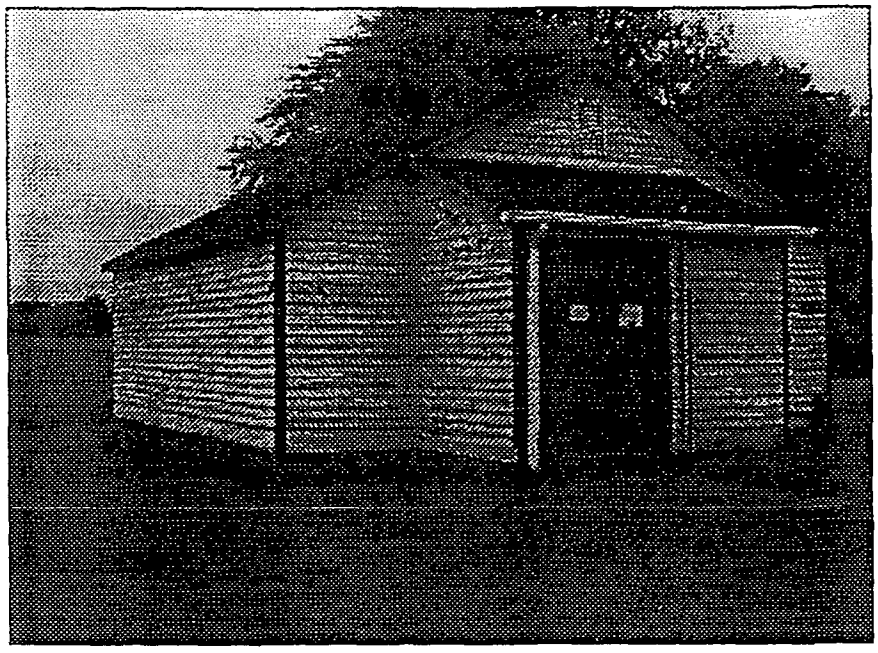
Located:
18T MGRS - New WV
79829e 48107n





S. 9055
Wood frame two story building.

Located:
18T MGRS - New WV
79833e 48068n



T. 9105
Wood frame one story building

Located:
18T MGRS -
New WV
79838e 48049n

EVANS AREA BUILDINGS AND FACILITIES

FACILITY IDENTIFICATION NUMBER	RESPONSIBLE [1] ORGANIZATION	CURRENT USE	CURRENT SURVEY [2] CLASSIFICATION	CLASSIFICATION CHANGES
8004	RDEC-EW/RSTA	Storage	UA	
8009	RDEC-EW/RSTA	Site Support	UA	
8010	RDEC-C3 Systems	A&E Div ITT	TBD	
9001	PM Radar	Administration	TBD	
9002	Housing Office	dwelling	N-I	
9003	Housing Office	dwelling	N-I	
9004	Vacant		UA	
9005	Vacant		UA	
9006	RDEC-NV	SSEB	A	
9007	Vacant		UA	
9008	unknown	Flag pole base	TBD	
9009	E-System	Storage	UA	
9010A	RDEC-EW/RSTA	Administration	A	
9010B	RDEC-IEW	Administration	A	
9010C	PM JStars	Administration	TBD	
9010D	PM JStars	Administration	TBD	
9011	VACANT		UA	
9011A	RDEC-ESA	Machine shop	UA	
9011B	RDEC-ESA	Wood shop	UA	
9011C	RDEC-ESA	Tool crib / dock	UA	
9012	E-System	Oil heat plant	N-I	
9013	RDEC-ESA	Shop	UA	
9014	E-System	Oil heat plant	N-I	
9015	RDEC-NV	Administration and Laboratory	UA	
9017	RDEC-IEW	Administration and Laboratory	UA	
9018	E-System	Septic tank	TBD	
9019	E-System	Storage/Admin	UA	
9020	E-System	Septic tank	TBD	
9021	RDEC-IEW	Storage	UA	
9022	E-System	Septic tank	TBD	
9023	RDEC-ESA	Administration	TBD	
9024	E-System	Septic tank	TBD	
9025	RDEC-C2SID	Admin-SSEB	TBD	
9027	LRC-PIPE	Admin-SSEB	TBD	
9028	E-System	Oil heat plant	N-I	
9029	PM EW/RSTA	Admin-SSEB	TBD	
9030	E-System	Oil heat plant	N-I	
9031	VACANT		UA	
9032	PM RADAR	Administration	A	
9032	LRC-ILS	Administration	TBD	
9033	E-System	Oil heat plant	N-I	
9034	LRC-PIPE	Administration	TBD	
9035	E-System	Oil heat plant	N-I	
9036A	LRC-PIPE	Administration	A	
9036B	ARL-VAL	Administration	A	
9036C	RDEC-IEW	Administration	A	

9037	RDEC-IEW	Administration and Laboratory	A	
9038	E-System	Oil heat plant	N-I	
9039	PM SW	Administration	A	
9040	PM EW/RSTA	Administration	A	
9041	C3I	Adminstration-evaluation team	A	
9042	PM EW/RSTA	Administration	TBD	
9043	TMDE SPT CTR	Laboratory	UA	
9044	PM EW/RSTA	Depot	UA	
9045	AMSEL-SF	Radiological Laboratory and Administration	A	
9047	LRC	Admin-SSEB	A	
9048	E-System	Storage tank	TBD	
9049	VACANT		A	
9051	RDEC-Space & Terr	Radiation Division and Adminstration	UA	
9053	LRC-LMD	Admin-SSEB	A	
9055	PM JStars	Admin-SSEB	A	
9057	E-System	Standby Generator	N-I	
9058	DPW	reservoir	TBD	
9059	USAISC	Exchange building	TBD	
9060	E-System	Transformer Bldg	N-I	
9061	E-System	Carpentry/metal shop	UA	
9062	E-System	Transformer Bldg	N-I	
9063	VACANT		UA	
9064	E-System	Oil heat plant	N-I	
9065	E-System	Transformer Bldg	N-I	
9066	E-System	Transformer Bldg	N-I	
9067	E-System	Transformer Bldg	N-I	
9068	E-System	Transformer Bldg	N-I	
9069	E-System	Transformer Bldg	N-I	
9070	E-System	Transformer Bldg	N-I	
9071	E-System	Transformer Bldg	N-I	
9079	RDEC-IEW	Weight room	TBD	
9080	E-System	STP control building/ laboratory	UA	
9081	E-System	Water well building	N-I	
9082	E-System	Water well building	N-I	
9083	E-System	Maintenance Facility	TBD	
9084	RDEC-IEW	Administration	TBD	
9085	RDEC-C3	Fabrication	UA	
9086	RDEC-IEW	Administration	TBD	
9087	VACANT		UA	

9088	RDEC-IEW	Storage	UA	
9089	C3I	Administration	TBD	
9090	PM EW/RSTA	Warehouse	UA	
9091	UNKNOWN	unknown	TBD	
9092	RDEC-ESA	Laboratory	UA	
9093	PROVOST MARSHAL	Guard HQ	N-I	
9094	E-System	Storage	UA	
9097	RDEC-ESA	unknown	TBD	
9099	RDEC-ESA	Storage	UA	
9100	RDEC-IEW	Laboratory and Administration	UA	
9102	RDEC-ESA	Storage	UA	
9103	RDEC-ESA	Storage	UA	
9104	CECOM LEGAL	Storage	UA	
9105	LRC-LMD	Storage	UA	
9106	RDEC-ESA	Storage	UA	
9108	RDEC-ESA	Fabrication branch	UA	
9109			A	
9110	DPW	Storage	UA	
9111	54TH ORD DET	Training	TBD	
9112	E-System	Electrical sub-station	N-I	
9113	54TH ORD DET	Storage	UA	
9114	E-System	Electrical Switch Station	N-I	
9115	ARL	Storage	UA	
9116	MUSEUM	Storage	UA	
9118	RDEC-IEW	Storage	UA	
9120	VACANT		UA	
9123	UNKNOWN	Storage	UA	
9124	VACANT		UA	
9127	E-System	Water well house	N-I	
9155	PROVOST MARSHAL	Sentry Station	N-I	
9162	LRC-PIPE	Administration	TBD	
9164	RDEC-IEW	Laboratory	UA	
9181	E-System	Transformer Bldg	N-I	
9182	E-System	Transformer Bldg	N-I	
9183	E-System	Transformer Bldg	N-I	
9184	E-System	Transformer Bldg	N-I	
9186	E-System	Transformer Bldg	N-I	
9188	E-System	Transformer Bldg	N-I	
9189	E-System	Transformer Bldg	N-I	
9190	E-System	Transformer Bldg	N-I	
9191	E-System	Transformer Bldg	N-I	
9192	E-System	Transformer Bldg	N-I	
9193	E-System	Transformer Bldg	N-I	
9194	E-System	Transformer Bldg	N-I	
9196	E-System	Transformer Bldg	N-I	
9197	E-System	Transformer Bldg	N-I	
9302	UNKNOWN	Storage	UA	

9306	VACANT		UA	
9307	LRC	Illustration files repository	TBD	
9307X	E-system	Transformer Bldg	N-I	
9312	VACANT		UA	
9332	VACANT		UA	
9334	VACANT		UA	
9342	VACANT		UA	
9344	VACANT		UA	
9345	RDEC-NV	Machine room	A	
9350	RDEC-IEW	Radar Tower	UA	
9351	RDEC	Storage	UA	
9352	RDEC	Fabrication Shop	UA	
9359	VACANT		UA	
9375	UNKNOWN	Storage	UA	
9380	DOL	Hazardous Waste Storage	TBD	
9383	AMSEL-SF	Radiological Storage	A	
9392	RDEC-ESA	Paint Shop	A	
9393	RDEC-EW/RSTA	Laboratory	UA	
9396	RDEC-IEW	Laboratory	UA	
9400	CECOM LEGAL	Admin-litigation	A	
9401	RDEC-NV	Laboratory	A	
9600	PROVOST MARSHAL	Sentry Station	N-I	
9602	UNKNOWN	Storage	UA	
9610	E-System	General Storage	UA	
9614	UNKNOWN	Storage	UA	
9617	UNKNOWN	Storage	UA	
9619	E-System	Lumber Storage	TBD	
9625	E-System	Storage	UA	
9629	E-System	Electrical switching station	N-I	
9720	E-System	Transformer Bldg	N-I	
9721	E-System	Transformer Bldg	N-I	
9729	E-System	Transformer Bldg	N-I	

[1] Organization with current responsibility for the facility.
[2] The classifications are:

A Affected, history of radioactive material use.
UA Unaffected, potentially used for radioactive material.
N-I Non-impacted, no reason to suspect radioactive material.
TBD To be determined, further evaluation will be done before classification.

SITE HEALTH AND SAFETY GUIDANCE

SITE-SPECIFIC HEALTH AND SAFETY GUIDANCE FOR SITE INVESTIGATION AT FORT MONMOUTH, NEW JERSEY

November 1993

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W.O. No. 03886-089-001

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

LIST OF FIGURES

LIST OF TABLES

WESTON

SECTION 1

SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.1 INTRODUCTION

The following Health and Safety Guidance (HSG) addresses the site-specific health and safety considerations for site investigation activities at Fort Monmouth. It outlines the various safety and health requirements and provides decision logic used in their selection.

This HSG does not in any way relieve the Site Investigation Contractor from responsibility for the safety and health of its personnel. Candidate Contractors will be required to review site conditions and work to be performed to determine specific safety and health requirements for their personnel and document such requirements in a site-specific Safety Health and Emergency Response Plan (SHERP). Furthermore, candidate Contractors will be required to have developed and maintained a Health and Safety Program in compliance with the requirements of Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120(b)(1) through (b)(4).

This HSG has been written to be consistent with all applicable federal, state, and local safety and health requirements, including:

- 29 CFR 1910 and 1926 (OSHA General Industry and Construction Standards, respectively).
- 40 CFR 260-270 (U.S. Environmental Protection Agency [EPA] Solid Waste Standard).
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1).
- Fort Monmouth safety and health requirements.

This HSG specifically covers the following tasks that will be completed during the site investigation:

- Geophysical surveys and other nonintrusive activities.
- Surface soil sampling.
- Borings, well installation.
- Sediment sampling.
- PCB transformer location sampling.
- Radiological survey.

1.2 CONTAMINANT CHARACTERIZATION

The site investigation will consist of sampling at a variety of potentially contaminated sites, including:

- Landfills
- Former sewage treatment plants and sludge dumps
- Around neutralization pits
- Streambeds
- Firing range
- Former hazardous waste storage area
- Former location of PCB transformers.

The potential exists for contamination by volatile and nonvolatile organics, heavy metals, acids, PCBs, pesticides, and radionuclides. However, past sampling activities have identified significant levels of contamination at only two sites. The former pesticide storage building on Main Post (Site M-17) has chlordane in the soil to levels of 170 mg/kg. The pesticide storage area on Charles Wood (Site CW-6) has chlordane in the soil to concentrations of 595 mg/kg. High concentrations of VOCs (including trichloroethane, vinyl chloride, and toluene) were detected in material removed from the neutralization lime pit on Charles Wood (Site CW-1); however, there will be no sampling in the lime pits. There will only be sampling in the soil around the concrete pits.

Other organics and metals have been detected in analyses of groundwater from monitor wells and surface water samples around landfills; however, these contaminants were detected in low concentration. For example, all contaminant levels were below the New Jersey Surface Water Criteria but some were above the New Jersey Groundwater Quality Criteria.

In general, the landfill sites could potentially have a wide variety of contaminants such as oil, metals, and asbestos. Landfill degradation products such as methane and vinyl chloride may be present, but the landfills have not been used for at least 13 years, so it is unlikely that these contaminants will be present in large concentrations.

The sites of the sewage treatment plants, the sludge dumps, and the area around the plating shop (Building 9007, Site EA-3) may have heavy metals and the plating shop may have cyanide. The area around the former treatment plant at Evans Area may also have radionuclides because radioactive materials were used at Evans. These radionuclides may be primarily an external exposure hazard or they may, like uranium, be primarily a hazard if inhaled or ingested. PCBs may be present on the concrete pads and in the former location of PCB transformers.

SECTION 2

STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

Personnel should be aware of the site organization and the responsibilities, authorities, and qualifications of each organization member. The general responsibilities of each are discussed below.

In general, personnel will possess the necessary qualifications consisting of sufficient knowledge gained through experience and training to effectively execute the duties of their position.

2.1 CONTRACTING OFFICER

At the top of the site organizational structure is the Contracting Officer (CO). The CO is a representative of the U.S. Army Corps of Engineers (USACE) and the primary off-site contact. Responsibilities of the CO include defining project objectives, allocating resources, determining the chain of command, evaluating the program outcome, and ultimate responsibility for the implementation of the Site Safety and Health Program.

2.2 PROJECT TEAM LEADER

The Project Team Leader (PTL) is a contractor of USACE and represents the highest level of authority on-site. The PTL is responsible for reporting to the CO, directing response operations, controlling site activities, and acting as the authority behind the implementation of the Site Safety and Health Program.

2.3 PROJECT SAFETY OFFICER

The Project Safety Officer (PSO) is an industrial hygienist or safety engineer who will review and approve the SHERP. The PSO will be responsible for reviewing compliance with the SHERP and providing continued support for all health and safety activities.

2.4 SITE SAFETY AND HEALTH OFFICER

The Site Safety and Health Officer (SSHO) reports to the PTL and is responsible for implementing the on-site elements of the SHERP in the field. The SSHO carries out the air and sound monitoring program, implements/executes an upgrade or downgrade of the level of protection should occur, and advises the PTL to cease or change operations in the event that worker or public safety or health is threatened. The SSHO will meet the training requirements of 29 CFR 1910.120, be certified in first aid and adult cardiopulmonary resuscitation, and have 1 year of hazardous waste site operations experience.

2.5 FIELD TEAM LEADER

The Field Team Leader (FTL) reports directly to the PTL and serves as Site Manager in the absence of the PTL. As Site Manager, the FTL is responsible for the day-to-day field operations and communications.

2.6 WORK PARTY

The work party is responsible for completion of on-site tasks and for compliance with all aspects of the Site Safety and Health Program.

SECTION 3

HAZARD ASSESSMENT AND RISK ANALYSIS

Personnel should be aware of any hazards associated with each remediation task. Because of the distance between the site and the nearest potential off-site receptor, the nature of the contaminants, and the nature of the remediation, the risks to off-site personnel are considered negligible. Each task's potential hazards and their corresponding effects are discussed below. Protective measures, action levels, and proper personal protective equipment are discussed in later sections.

Certain hazards are common to every task. These include physical hazards such as:

- Operation of heavy equipment.
- Heavy manual lifting of supplies and other equipment.
- Heat and cold stress.

There are also biological hazards, such as:

- Insects — Lyme disease is prevalent in the area.
- Small Mammals — rabid racoons and other small mammals may be present.
- Poisonous plants — poison ivy and other similar plants may be present.

The protective measures against these hazards are discussed in Section 12 of this HSG.

The risk associate with these hazards is relatively low; however, certain tasks have additional hazards from potential chemical and radiological contaminants. The chemical or radiological hazards associated with each site for which sampling is required are summarized in Table 3-1. The risk from the hazards is low to moderate. The measures to protect against these hazards are personal protective equipment and monitoring equipment. These topics are discussed in Sections 6 and 8 of this HSG.

Table 3-1

Hazards Associated with Sampling at Each Site

Site Number	Activity	Unusual Hazards	Level of Protection	Monitoring
M-2	Install MW, sample SW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
M-3	Geophysics, install MW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
M-4	Install MW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
M-5	Install MW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
M-8	Install MW, SW sampling	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
M-12	Geophysics, install MW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
M-14	Install MW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini Ram
M-15	SS sampling	None	D	Mini-Ram
M-16	SS sampling, possible MW	Pesticides	D	Mini-Ram
M-17	Install MW	Pesticides	D	Mini Ram, HNu
M-18	[illegible]	Oil and diesel	D	HNu, CGI/O_2, colorimetric tubes for benzene
	[illegible]all SB, sediment sampling, possible MW	Heavy metals	D	Mini-Ram
CW-1, CW-2	Install SB, MW	Vinyl chloride, TCE	D	HNu, CGI/O_2, colorimetric tu[illegible] for vinyl chloride

Table 3-1

Hazards Associated with Sampling at Each Site (Continued)

Site Number	Activity	Unusual Hazards	Level of Protection	Monitoring
CW-3	Geophysics, install MW	Landfill chemicals such as vinyl chloride	D	HNu, CGI/O_2, colorimetric tubes for vinyl chloride, hydrogen sulfide, Mini-Ram
CW-4	SS sampling	Lead	D	Mini-Ram
CW-5	Install SB	Heavy metals	D	Mini-Ram
CW-6	Install MW	Pesticides, possible gasoline, oil	D	Mini Ram, HNu, CGI/O_2, colorimetric tubes for benzene
CW-9	Install MW, possible geophysics	Heavy metals	D	Mini-Ram
AOC-7	Install SB	Solvents, pesticides	D	HNu, CGI/O_2, colorimetric tubes for benzene, vinyl chloride, Mini-Ram
EA-1	Install SB, sediment sampling	Heavy metals, radionuclides	D	Mini Ram, HNu, Micro R
EA-2	Install SB, MW	Heavy metals, radionuclides	D	Mini-Ram, HNu, Micro-R
EA-3	Install SB, MW, sediment sampling	Heavy metals	D	HNu, Mini-Ram
EA-13	Possible geophysics, soil sampling	Landfill chemicals such as vinyl chloride	D	Initially none
PCB Transformers	Chip sampling	PCB	C	None
	Soil sampling	PCB	D	Mini-Ram

WESTON

SECTION 4

ACCIDENT PREVENTION

A vital element of the Safety and Health Program is the implementation of an accident prevention program. It is essential that the contents of the SHERP, as well as the contents of the accident prevention program, are communicated to all personnel who work on the site. There are four main approaches to preventing accidents:

- Education of personnel as to the requirements of the SHERP.
- Elimination of unsafe conditions. Efforts must be initiated to identify conditions that can contribute to an accident and to remove these conditions.
- Prevention of unsafe acts. Personnel will make a conscious effort to work safely. A high degree of safety awareness must be maintained for each task so that safety becomes an integral part of that task.
- Frequent inspections. Regular safety inspections of the work site, material, and equipment by qualified persons ensures early detection of unsafe conditions.

The following Accident Prevention Plan (APP) covers those specific measures personnel will take to minimize the occurrence of accidents. The APP has been specifically written to comply with EM 385-1-1 Appendix Y (USACE Safety and Health Requirements Manual).

4.1 ACCIDENT PREVENTION PLAN

4.1.1 Responsibilities

Effective implementation of the APP for remediation activities is ultimately the responsibility of each individual working on the site. Its introduction to site personnel and its day-to-day implementation will be the responsibility of the SSHO. As part of the SSHO's responsibility, the SSHO will conduct daily safety and health inspections to determine if site operations are conducted in accordance with the SHERP. In the administration of the APP, strict adherence will be maintained to EM 385-1-1. The PTL and SSHO will maintain a working knowledge of all aspects of this manual as they pertain to site activities.

4.1.2 Local Requirements

Remediation activities will be conducted in accordance with applicable local requirements, permits, and regulations. When necessary, Contractors will obtain local permits in accordance with local ordinances related to temporary construction facilities, the placing of temporary mobile offices, and temporary utility connections. Substantive requirements of environmental permits must be complied with.

4.1.3 Subcontractor Control

All subcontracted work performed at the site will be conducted under the expres[s] [d]irection of the P[M]. In this manner, subcontractor personnel will adhere to the same st[rict] safety provisions enforced for all on-site personnel. In addition, the SSHO will provide subcontractors with a complete introduction to the safety procedures established for site activities. This training is further outlined in Section 5 of this HSG.

4.1.4 Training

Initial safety and health indoctrination, Contractor safety and health training, visitor safety and health training, and any additional training will be the responsibility of the SSHO. The SSHO will maintain a record of training attendance in the safety and health logbook. Specific training requirements are included in Section 5.

4.1.5 Traffic Control

Vehicular traffic will be directed by the SSHO when in operation areas and by the Fort Monmouth police when operating on facility roads to avoid posing a danger to site personnel. Traffic control items (i.e., signs, cones, and barricades) will be of standard design and placed so as not to cause confusion. Site personnel will obey all Fort Monmouth road signs, posted speed limits, and access restrictions.

4.1.6 Maintenance/Site Housekeeping

Good housekeeping will be maintained on the site at all times to ensure safe access to all site areas, as well as safe egress from the site. The SSHO will assign individuals to the task of housekeeping to ensure cleanup at the end of each workshift.

4.1.7 Emergencies

Section 11 of the HSG details the procedure for handling emergencies that the SSHO decides cannot be safely handled by site personnel. Emergency telephone numbers of response personnel will be posted by each phone and can be found in Section 11 of this HSG.

4.1.8 J[ob] Site Inspection

A job[-]site inspection will be the responsibility of the SSHO. The inspection will be conducted on a daily basis to ensure that site conditions are in compliance with SHEF. The SSHO will maintain a record of the inspection and findings in the site health and [safety] logbook.

4.[1].[9] Accident Investigation

All accidents and near misses associated with site activities will be immediately reported to the CO and will be investigated by the SSHO. Accidents in which personnel require

hospitalization will be investigated by the SSHO and PTL. All accidents will be reported to Fort Monmouth.

An accident investigation will consist of reviewing the accident/incident report, questioning the injured employee(s) as well as questioning all other personnel witnessing the occurrence, identifying all contributing acts and conditions, determining underlying reasons for their existence or occurrence, and implementing corrective actions. At the end of this process, an Accident Investigation Report (ENG 3394) will be prepared for submission to the CO within 2 working days in accordance with AR 385-40 and USACE Supplement 1. In addition to maintaining copies of the accident investigation, the SSHO will communicate the findings of the accident investigation to all site personnel during a health and safety briefing convened for that purpose.

4.1.10 Fall Protection Systems

In the event that work is conducted in unguarded work areas, over water, with machinery, or more than 4 ft above the ground surface, compliance will be maintained with applicable sections of EM 385-1-1 for fall protection.

4.1.11 Temporary Power Systems

All temporary wiring will be secured overhead with adequate clearances to prevent accidental contact by personnel or equipment.

Temporary electrical distribution systems and devices will be installed and certified as operational by a licensed electrician. Certification will be performed prior to use and should include an evaluation of polarity, ground continuity, and ground resistance in accordance with OSHA 1926 Subpart K.

The SSHO will be responsible for ensuring that:

- All electrical systems are equipped with ground-fault circuit interrupters as required by all applicable codes/regulations.
- Flexible cord sets are of a type UL-listed and contain the number of conductors required for the service plus an equipment ground wire.
- Portable electric lighting used in hazardous locations are operated at a maximum of 12 volts and that there are no exposed empty light sockets and broken bulbs.
- All power systems are approved by Fort Monmouth's Fire Protection Division.

4.1.12 Safe Clearance Procedures (Lock-Out/Tag-Out)

Procedures for safe clearance that will be followed are taken from the EM 385-1-1. ctions 28.4.03. 04. and 05. and are as follows:

> The safe clearance procedure shall be followed in securing electrical ems. machinery. pressure systems. and rotating equipment. Power will be t i off. tagged. and locked in the open position at the master switch or main breake Gears. agitators. or transmissions shall be mechanically locked out or dis nected. Padlocks shall be used wherever possible with the person working on th uipment in possession of the key.
>
> A safe clearance procedure shall be required on all systems and equipment if unauthorized removal or return to service could result in injury. damage, loss of content. loss of protection. or loss of operating capability.

Additionally. requirements of OSHA's Lock-Out/Tag-Out Standard (29 CFR 1910.147) will be met. Where the two documents are inconsistent. the requirements of the more stringent will be followed.

4.1.13 Office Trailer Anchoring System

All trailers or other temporary structures will be anchored with rods and cables in accordance with EM 385-1-1.

4.1.14 Weather-Related Contingency Plan

Weather will be considered in safety planning. The SSHO will decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms. tornado warnings. strong winds. and heavy rainfall are examples of conditions that would call for the discontinuance of work and evacuation of the site.

4.1.15 Activity Hazards Analysis

Section 3 presents an activity hazard analysis for each task.

WESTON

SECTION 5

TRAINING

On-site personnel engaged in remediation activities will be trained in accordance with the requirements of 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response) as these requirements pertain to their role, function, and activities. Personnel engaging in construction activities will also receive training pursuant to 29 CFR 1926.21 (Construction Industry-Safety Training and Education). Personnel will provide written certification to the Contracting Officer that the required training has been received prior to engaging in on- site activities. Specific training requirements are discussed below.

5.1 PREASSIGNMENT TRAINING

5.1.1 Off-Site Training

All personnel assigned to or regularly entering areas of the site other than the Support Zone for the purpose of performing or supervising work; for health, safety, security, or administrative purposes; or for maintenance, or for any other site-related function, will be trained in accordance with requirements of 29 CFR 1910.120 (e). A summary of the training requirements is as follows:

- Training for general site workers (equipment operators, general laborers, and supervisory personnel) will consist of a minimum of 40 hours instruction covering the specific subjects outlined in 29 CFR 1910.120 (e) and 3 days of on-site experience under the direct supervision of a trained, experienced supervisor. Supervisory personnel of such workers, in addition to having the 40-hour training and 3 days of on-site experience, will have a minimum of 8 hours of additional specialized training on managing such personnel during hazardous waste operations.

- Training for workers who are on-site only occasionally for a specific limited task (i.e., drillers, surveyors) and who are unlikely to be exposed over published occupational exposure limits will receive a minimum of 24 hours of training off-site and 1 day of actual field experience under the direct supervision of a trained, experienced supervisor. Supervisory personnel of such workers, in addition to having the 24-hour training and 1 day of on-site experience, will have a minimum of 8 hours of additional specialized training on managing such personnel during hazardous waste operations.

- Training for workers regularly on-site but who work in areas fully characterized as having exposures below published occupational exposure limits, no health hazards, and no potential for emergency conditions, will receive a minimum of 24 hours of training off-site and 1 day of actual field experience under the direct supervision of a trained, experienced supervisor.

- Supervisory personnel of such workers, in addition to having the 24-hour training and 1 day of on-site experience, will have a minimum of 8 hours of additional specialized training on managing such personnel during hazardous waste operations.

All workers and supervisors will receive a minimum of 8 hours of refresher training each year.

Additionally, any worker involved in construction, demolition, and excavation activity will be trained in compliance with the safety and health training requirements of 29 CFR 1926.21. Training will cover the subjects outlined in 29 CFR 1926.21 (b) (2) through (6).

5.1.2 Site-Specific Training

All personnel assigned to the site will complete one site-specific training session conducted by the SSHO. The training will review the SHERP and place particular emphasis on the following topics:

- Evacuation routes.
- Warning signals.
- Maintaining line-of-sight and communications.
- Hospital routes.
- Locations of safety equipment.
- Cold and heat stress provisions.
- Work zones.
- Spill control procedures.
- Decontamination procedures.
- Compounds of concern.

At the completion of the site-specific training session, each employee will be required to sign a statement of understanding and agreement to comply with the provisions of the SHERP.

5.2 PERIODIC TRAINING

Following the initial training, weekly health and safety briefings will be conducted by the SSHO. Topics to be discussed during the follow-up training sessions will consist of the following:

- Health and safety considerations for the current task(s).
- Operational problems.
- Observed health and safety violations.

In the event of an operational change affecting on-site fieldwork or in the event that air quality readings indicate that an upgrade in the level of protection is warranted, the SSHO will convene a meeting to discuss the change prior to implementation. All health and

safety meetings will be documented in the site safety and health logbook. Meeting participants will be required to sign an attendance sheet.

5.3 VISITORS

Authorized visitors to the site will be briefed by the SSHO concerning on-site health and safety issues. These visitors will not be permitted in the Exclusion Zone unless they have been trained in accordance with Subsection 5.1.1, fit-tested (if required), medically approved, and can provide written certification of required training to the SSHO. Additionally, all authorized visitors will be informed of the requirements contained in the approved SHERP and will sign the SHERP before site entry is allowed.

SECTION 6

PERSONAL PROTECTIVE EQUIPMENT

Personnel engaged in remediation activities will use personal protective equipment (PPE) to protect against site hazards. Selection of PPE is dependent upon the types of hazards present and the operations to be performed by the wearer. The following sections discuss the minimum level of protection required for each remediation task, the justification for selection, and the action levels that will be used for modifying the levels of protection.

6.1 WRITTEN PPE PROGRAM

A written PPE program will be established prior to engaging in remediation activities. This PPE program will address all the elements of 29 CFR 1910.120 (g) (5) and 29 CFR 1910.134.

6.2 INITIAL LEVELS OF PROTECTION

Levels of protection, as defined in the Four Agency Document (*Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*), have been designated for each task based on the types of contaminants and operations to be performed during remedial activities. Table 3-1 lists the initial level of protection for each task. The specific equipment providing each level of protection is included in Tables 6-1 through 6-3.

While the recommendations presented are appropriate for the conditions known to be present at the time this document was being prepared, new information or site discoveries may necessitate alternate selections. The SSHO will determine when alternate chemical protective equipment should be selected. Decisions of the SSHO to alter the type of chemical protective equipment will be subject to review by the PSO prior to implementation.

6.2.1 Selection of Respirators

The concentrations of chemical or radiological contaminants at Fort Monmouth are not believed to be significant; therefore, initially Level D protection, with constant monitoring, has been specified for activities at most sites. Chip sampling with a jackhammer is an activity that may generate a large amount of dust that may contain PCB. Since PCB cannot easily be monitored for in the field, an air-purifying respirator will be worn.

6.2.2 Other Respiratory Requirements

Site participants qualified for respirator use will demonstrate to the SSHO that they have been fit-tested in the past year. The fit test protocol will include exposure to isoamyl acetate (banana oil) or stannous chloride smoke (an irritant). Fit-testing will be performed as outlined in OSHA's General Industry Standard (for example: 29 CFR 1910.1025, lead; and 1910.1028, benzene).

Table 6-1

Level B Ensemble

Full-face, positive-pressure, self-contained breathing apparatus ( ) or airline respirator (MSHA/NIOSH approved)

Work clothing as dictated by weather

Disposable chemical protective clothing

Disposable outer gloves

Latex inner gloves

Hardhat

Steel toe/shank chemical-resistant workshoes

Vinyl overboots

Seals between the coverall and the outer gloves and boots will be secured with several wraps of duct tape to ensure adequate overlap of the protective equipment.

Table 6-2

Level C Ensemble

Full-face, air-purifying respirator (MSHA, NIOSH approved) with NIOSH-approved cartridges (high-efficiency particulate filter/charcoal) for organic vapors, particulates, dusts, mists, and radionuclides

Work clothing as dictated by weather

Disposable chemical protective clothing

Disposable outer gloves

Latex inner gloves

Hardhat

Steel toe/shank chemical-resistant workshoes

Vinyl overboots

Seals between the coverall and the outer gloves and boots will be secured with several wraps of duct tape to ensure adequate overlap of the protective equipment.

Table 6-3

Level D Ensemble

Disposable protective clothing

Disposable outer gloves

Latex inner gloves

Hardhat*

Steel toe/shank chemical-resistant workshoes

Safety glasses (with splash shield during decontamination)

*Hardhat will be worn when working around heavy equipment or when directed by SSHO.

As required by 29 CFR 1910 Subpart I, the use of a respirator by personnel with facial hair that obstructs the seal between the respirator and the face will not be permitted. Personnel who must use or could potentially use respirators on-site will be clean-shaven.

6.3 ACTION LEVELS

Action levels (AL) are used to identify site conditions when a particular action needs to be taken. A summary of AL relevant to the remediation activities is provided in Table 6-4. These AL will be used by the SSHO in determining when a modification to the site level of protection should occur. The SSHO will have the authority to make decisions regarding the upgrading or downgrading of the site level of protection based on the results of direct-reading instrument measurements. The SSHO will record any modifications to the level of protection in the site safety and health logbook. Furthermore, the SSHO will prepare and submit a memorandum explaining the modification to the PSO and CO.

Prior to the startup of each task and periodically thereafter, the SSHO will evaluate site conditions using the instruments specified in Table 3-1.

The measurements obtained using these instruments will be compared to the AL presented in Table 6-6, and the appropriate measure will be taken. The specifics of the direct-reading instrument monitoring are discussed in Section 8.

6.3.1 Explosive Atmospheres

The CGI/O_2 will be used to evaluate potentially explosive and oxygen-deficient/enriched atmospheres during the excavation process and whenever such atmospheres are suspected. A value of 10 to 19% lower explosive limit (LEL) or greater or oxygen levels outside of the 19.5 to 21.5% range will result in the immediate cessation of work and evacuation of the worksite. Activities will proceed only after the explosive/oxygen-enriched/deficient atmosphere has satisfactorily dissipated or the cause has been determined and mitigated.

6.3.2 Volatile Organic Compounds

An HNu equipped with an 11.7 eV probe will be used to evaluate contaminant levels. Because of the limited specificity of the HNu and information from the manufacturer that indicates that the HNu equipped with an 11.7 eV probe exhibits a high response to chlorinated hydrocarbons, the instrument response will be initially assumed to represent vinyl chloride. Because vinyl chloride and benzene have the lowest permissible exposure limit of potential contaminants, they will drive any decisions regarding the selection of appropriate PPE.

Volatile organics are not expected to be present, but an HNu response may indicate benzene or vinyl chloride. Therefore, an HNu response of one unit will trigger the use of colorimetric tubes for vinyl chloride or benzene (as specified in Table 3-1) and an upgrade to Level C. Because air-purifying respirators are not effective against benzene or vinyl chloride, concentrations of these chemicals greater than 1 ppm will require upgrade to Level B.

Table 6-4

Action Levels

Instrument	Response	Action
CGI/O_2	10 to 19% LEL	Caution
CGI/O_2	20% or Greater LEL	Evacuate
CGI/O_2	< 19.5% O_2	Evacuate
CGI/O_2	> 21.5% O_2	Evacuate
HNu	< 1.0 Units	Level D
HNu	> 1.0 Units	Level C. Perform colorimetric sampling for vinyl chloride or benzene as specified in Table 3-1
HNu	> 5.0 Units	Level B
Mini-Ram	< 1.0 mg/m^3	Level D
Mini-Ram	> 1.0 mg/m^3	Level C
Colorimetric Tubes, Vinyl Chloride or Benzene	> 1.0 ppm	Level B
Micro-R Radiation Meter	3 x background	Caution - have health physicist evaluate
Micro-R Radiation Meter	1 mR/hr	Stop activity

6.3.3 Hazardous Dust

A Mini-Ram will be used to monitor for hazardous concentrations of nonvolatile compounds in dust. Certain organic compounds, such as PCBs, and all toxic metals have very low volatility and will not be detected by an HNu. Use of the Mini-Ram will prevent exposure to excessive levels of dust that may contain PCBs or toxic metals.

6.3.4 Radiation

A micro-R radiation meter will be used on the sites specified in Table 3-1. These sites, all on the Evans Area, have the potential for having radiological contamination. The micro-R meter detects gamma radiation only. Some radionuclides, such as uranium and its daughter, emit low levels of gamma radiation, but are a significant health risk because they emit alpha radiation. Therefore, if during sampling activities, a micro-R meter reads greater than three times background, intrusive activities should cease until a health physicist evaluates the source of the elevated reading. Other instruments, such as pancake G-M detector, which detects beta and gamma radiation, or a ZnS scintillation detector, which detects alpha radiation, may be used by a qualified person to obtain additional information about the source of the elevated radiation levels.

SECTION 7

MEDICAL SURVEILLANCE

Because personnel involved in hazardous waste activities are often exposed to a variety of hazards that can potentially result in adverse health effects, personnel will participate in an ongoing medical surveillance program. The objectives of the medical surveillance program are:

- To assess and monitor worker health and fitness both prior to employment and during the course of work.
- To provide emergency and other treatment as needed.
- To keep accurate records for future reference.

The medical surveillance program will meet the requirements specified in 29 CFR 1910.120 (f) and American National Standards Institute (ANSI) Z-88.6.

7.1 MEDICAL EXAMINATION

Personnel will have a baseline medical examination prior to engaging in remediation work. Subsequent medical examinations will be repeated at least annually and at the termination of employment. Elements of the examination will include, at a minimum:

- Complete medical and work histories.
- Physical examination.
- Pulmonary function tests (FVC and FEV1).
- Chest X-ray (every 2 years).
- EKG.
- Visual acuity.
- Audiometry.
- Urinalysis.
- Blood chemistry, including hematology, serum analyses, and heavy metals toxicology.

The examination protocols and the evaluation of results will be overseen by a licensed physician certified in Occupational Medicine by the American Board of Prevention Medicine

or a licensed physician who by necessary training and experience is board-eligible. A written medical opinion from the examining physician as to fitness to perform the required work will be made available to the CO upon request for any site employee. Records of the examinations will be retained by the employer for at least 30 years after the end of the employment period.

Visitors entering the Exclusion Zone will be required to provide written documentation to the SSHO that required medical examinations have been performed (baseline and annual).

A medical examination will be given to any individual who experiences any illness or injury while on the job. Tests will be administered at the discretion of the attending (board-eligible) physician. This examination will take place as soon as possible after the illness or injury, and in no case will personnel be allowed to return to work at the site without first obtaining authorization from the examining physician to resume full work duties.

WESTON

SECTION 8

ENVIRONMENTAL EXPOSURE AND PERSONAL MONITORING

This section explains the general concepts of the environmental exposure and personal monitoring program and specifies the surveillance activities to be performed during the tasks. In all cases, personnel performing monitoring activities will be trained in the use of monitoring equipment as part of the off-site training.

The SSHO will conduct monitoring using the following direct-reading instruments, as specified in Table 3-1:

- CGI/O_2 for explosive atmospheres and oxygen-deficient/enriched atmospheres.
- HNu for volatile organic contaminants.
- Portable total dust monitor for dust containing toxic components.
- Colorimetric-indicating tubes.
- Micro-R meter for gamma radiation.

The SSHO will initially determine concentrations of airborne hazards in the work areas. Based on the task and work area, sampling may be required to determine the presence of any explosive/oxygen-deficient/enriched atmospheres using the CGI/O_2. After a CGI/O_2 determination has been made, volatile organic and dust containing toxic components will be evaluated using the HNu and dust monitor, respectively. The results of these evaluations will be compared to the action levels and appropriate measures will be taken.

Once activities are underway, the SSHO will conduct periodic area monitoring using the CGI/O_2 and breathing zone monitoring using the HNu and total dust monitor throughout the shift. In addition, certain tasks in the Evans Area will require monitoring with a Micro-R gamma radiation meter. The specific frequency of monitoring will vary, with monitoring performed more frequently during operations having a greater potential to produce toxic conditions (i.e., drilling). The information will be used to identify and to verify that the selected PPE adequately protects workers from site-associated hazards.

The direct-reading units will be calibrated according to manufacturer's instructions prior to field use. Calibration of the units will be performed pre- and post-monitoring each day that the instrument is used. The initial calibration will be recorded on a tag attached to the instrument. Daily calibration checks, areas where used, instrument settings, and readings obtained will be recorded in the site safety and health logbook. The battery in each unit will be recharged after use to maintain a good charge.

WESTON

SECTION 9

SITE CONTROL

Personnel will be aware of site control measures to minimize contamination of personnel and spread of contamination outside the Exclusion Zone. These measures attempt to control contamination through defining the work zones and establishing decontamination procedures. The following discussion defines the different work zones in general and describes their purpose.

- Exclusion Zone (EZ) — the area known or suspected of being contaminated or containing uncontrolled hazardous materials.

- Contamination Reduction Zone (CRZ) — the area where personnel and equipment exiting the EZ are decontaminated. Also serves as a buffer between the EZ and SZ.

- Support Zone (SZ) — the area outside the EZ and CRZ used for project management and coordination, and storage of equipment and vehicles.

The EZ will be established around every sampling point while sampling activities are being conducted. The EZ will be surrounded with temporary fencing (at a minimum, safety barricade or safety grid fencing) to preclude unauthorized access and to restrict personnel passage to the CRZ.

The CRZ will be located and sized to provide for easy but controlled site access and egress by personnel, vehicles, and equipment. The CRZ will consist of an area to drop equipment, plastic bags to dispose of protective clothing, adequate water for equipment decontamination, and a means of capturing wash water resulting from decontamination. A first-aid kit, fire extinguisher (ABC-type), and portable eyewash will be located on the clean side of the CRZ.

During working hours, the Contractor will be responsible for site security and access control. After hours, Fort Monmouth Security will be relied upon. Signs reading "Danger—Hazardous Area—Unauthorized Persons Keep Out" will be posted around any fenced area.

SECTION 10

PERSONNEL AND EQUIPMENT DECONTAMINATION

Personnel will be aware of procedures used to decontaminate EZ personnel, equipment, and sampling containers. Disposable personal protective equipment and other items will be placed in heavy-duty plastic bags and properly disposed of. In no case will work clothing be worn off-site. Specific decontamination procedures are presented below.

10.1 PERSONNEL PROCEDURES

10.1.1 Level B Personnel Decontamination

- Step 1: Equipment drop (if any used).
- Step 2: Wash and rinse outer boots and outer gloves.
- Step 3: Remove outer boots; place in disposable containers.
- Step 4: Remove outer gloves; place in disposable containers.
- Step 5: Remove SCBA tank/harness; while still on air, remove protective clothing; place in disposable container.
- Step 6: Disconnect facepiece hose from SCBA regulator.
- Step 7: Wash inner surgical gloves.
- Step 8: Remove facepiece; sanitize prior to reuse.
- Step 9: Remove inner gloves; place in disposable container.
- Step 10: Wash and rinse hands.

10.1.2 Level C Personnel Decontamination

- Step 1: Wash and rinse outer gloves.
- Step 2: Remove outer boots; place in disposable container.
- Step 3: Remove outer gloves; place in disposable container.
- Step 4: Remove protective clothing; place in disposable container.
- Step 5: Wash inner surgical gloves.
- Step 6: Remove respirator; sanitize prior to reuse.

- Step 7: Remove inner gloves; place in disposable container.
- Step 8: Wash and rinse hands.

10.1.3 Modified Level C Personnel Decontamination

- Step 1: Equipment drop (if any used).
- Step 2: Remove outer boots; place in disposable container.
- Step 3: Remove work gloves; place in disposable container.
- Step 4: Remove protective clothing; place in disposable container.
- Step 5: Remove respirator; sanitize prior to reuse.
- Step 6: Wash and rinse hands.

10.1.4 Level D Personnel Decontamination

- Step 1: Equipment drop (if any used).
- Step 3: Remove work gloves; place in disposable container.
- Step 4: Remove coverall (if worn); place in disposable container.
- Step 5: Wash and rinse hands.

10.2 EQUIPMENT DECONTAMINATION

Should decontamination be necessary, suitable decontamination techniques such as steam cleaning or washing with detergent and water will be used. Care should be exercised to thoroughly decontaminate equipment surfaces contacting materials in the EZ (i.e., tires, equipment bases, shovels). Electrically powered equipment will be de-energized prior contacting water.

If necessary, decontamination of large equipment will require the construction of a decontamination pad. The pad will be large enough to accommodate the largest piece of equipment requiring decontamination. The base of the pad will be constructed of impermeable material and be designed to capture overspray and to channel any resulting wastewater to a sump for collection. Because the wastewater generated during decontamination may be hazardous, the water will be containerized and sampled to determine the proper method of disposal.

10.3 SAMPLE CONTAINER DECONTAMINATION

Sample containers will be laboratory cleaned prior to use. Following sample collection and closure of the container, the outside of the container will be wiped clean. The sample container will then be placed into shipping containers located in the CRZ. Once filled, the shipping containers will be retrieved from the clean side and sealed for shipment. A warning to laboratory personnel of potential container contamination will be included with the chain-of-custody sheets.

SECTION 11

FIRST AID AND EMERGENCY RESPONSE EQUIPMENT AND PROCEDURES

Although accidents can be minimized through safe work practices, there is always a potential for their occurrence. Site personnel will be familiar with the various contingency measures should an accident occur.

For purposes of the following discussion, three terms require definition:

- Emergencies are defined as situations such as chemical spills, explosions, fires, or accidents involving injury to personnel that require immediate action. All such incidents will be reported to the CO and Fort Monmouth.

- Large emergencies are defined as emergencies that cannot be effectively controlled by on-site personnel due to inadequate numbers, training, or equipment. During large emergencies, on-site personnel are required to evacuate the site and to contact the appropriate Fort Monmouth response unit.

- Small emergencies are defined as emergencies that can be effectively controlled by on-site personnel. During small emergencies, on-site personnel will act to mitigate the situation and report the incident to the SSHO, who will address the relevant reporting requirements.

In all cases, the determination of whether to classify an emergency as large or small will be the responsibility of the SSHO.

The following is a list of emergency telephone numbers, directions to the local hospital, and an Emergency Response Plan (ERP) conforming to the requirements of 29 CFR 1910.120.

11.1 EMERGENCY TELEPHONE NUMBERS

Table 11-1 lists important emergency telephone numbers. The four-digit numbers represent extensions that can be directly dialed from any Fort Monmouth telephone. These numbers will be posted near telephones close to the site.

All accidents/injuries/illnesses will be immediately reported to the CO and to Fort Monmouth's Fire Protection Division and Safety Office. Accidents involving spills will be reported to the CO and Fort Monmouth's Fire Protection Division.

11.2 ROUTE TO HOSPITAL

For activities on the Main Post and Charles Wood:

The Paterson Army Hospital is located on the Main Post (see Figure 11- From the Charles Wood Area, exit onto Tinton Avenue and go east about 1 r to the Main Post, follow signs to the hospital.

For activities on Evans Area:

Exit post at Monmouth Boulevard.

- Go right (north) 800 ft to Marconi Road.
- Go left (west) 1,000 ft to Brighton Avenue.
- Go right (north) a short distance to entrance on Route 18N.
- Go 1 mile on Route 18N to Route 33.
- Go east on 33, 0.5 miles.
- Jersey Shore Hospital on left.

See Figure 11-2 for a map to the Jersey Shore Hospital.

11.3 EMERGENCY RESPONSE PLAN

11.3.1 Pre-Emergency Planning and Coordination

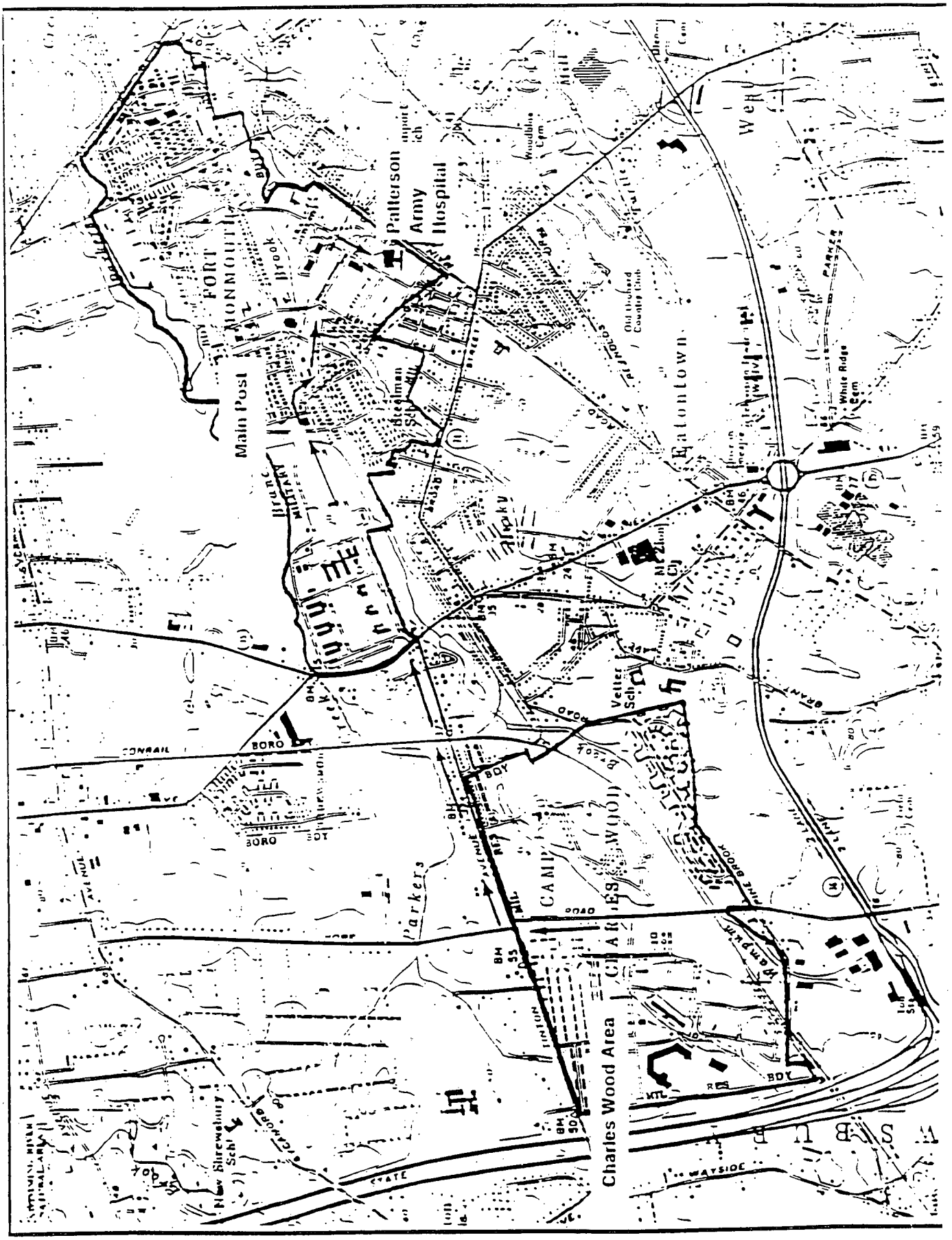
Prior to beginning site investigation activities, the following individual will be made aware of site activities:

- Joseph Fallon, Environmental Protection Specialist, 908-532-6223.

Site personnel will be made fully aware of the provisions of the ERP. This awareness training will be conducted by the SSHO during the site-specific training, prior to commencing site activities. Emergency telephone numbers will be posted at all telephone locations surrounding the closure sites. A list of emergency telephone numbers is included in Table 11-1.

11.3.2 Personnel Roles, Lines of Authority, and Communication

Personnel witnessing an accident become the first step in the emergency re se process. These individuals will find the nearest telephone, and from the posted emerge telephone list, contact the appropriate responding Fort Monmouth element. Once con t is made, the individual personnel will stay on the telephone to provide the resp ing Fort Monmouth elements with additional data. In no case will witnessing personn tempt to fight a major fire, conduct a rescue in an unsafe environment, or conduct a c nup of a major spill.


FORT MONMOUTH
Main Post
Patterson Army Hospital
Brook
Eatontown
Charles Wood Area
CAMP
CONRAIL
BORO
Parkers
New Shrewsbury Sch
WATSIDE
Old Orchard Country Club
White Ridge Farm
Woodbine Farm
Velter Sch
Bleiman Sch

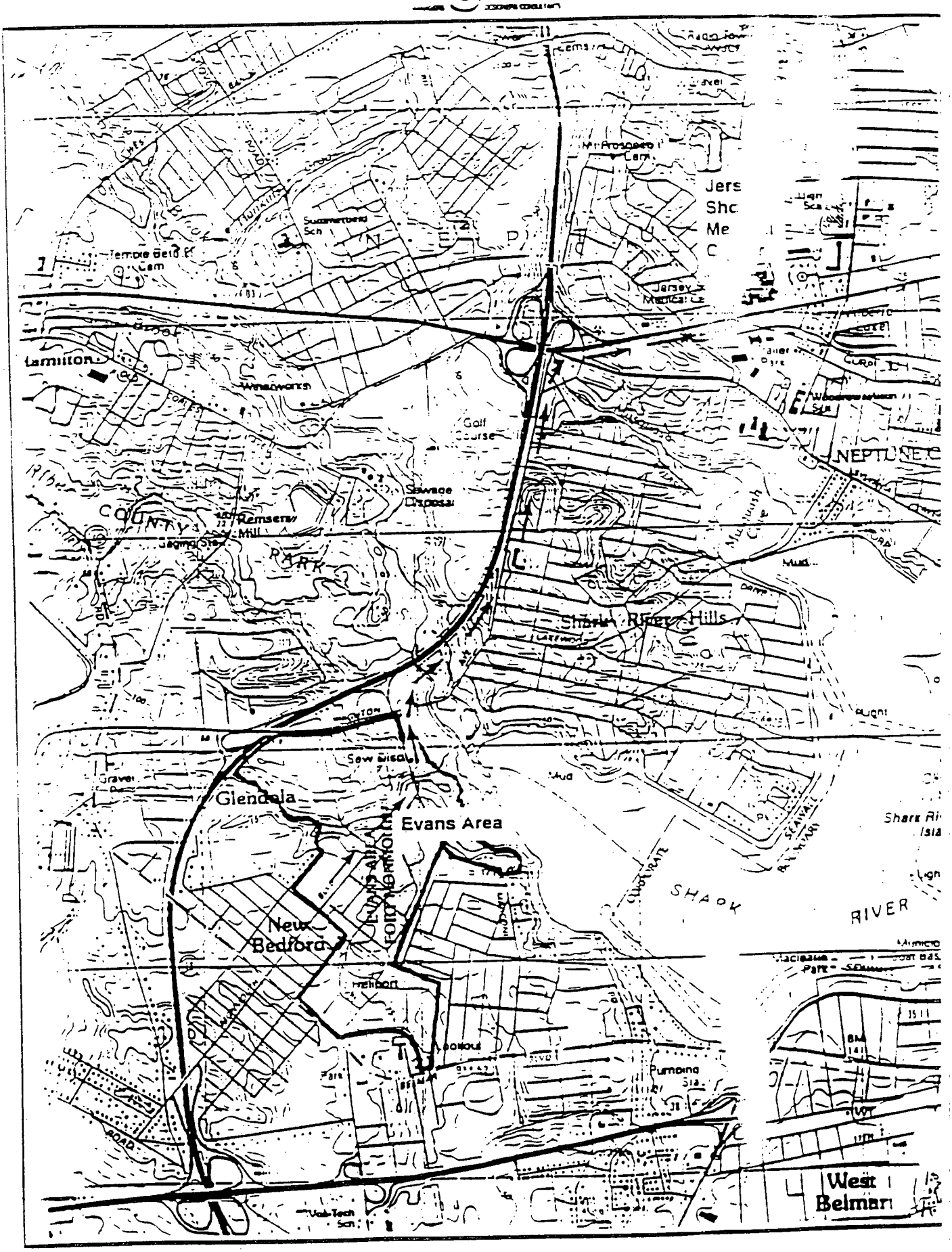


FIGURE 11-2 ROUTE TO HOSPITAL. EVANS AREA

Table 11-1

Emergency Telephone Numbers

Incident	Contact	Phone Number
Fire/Explosion	Fire Department	908-532-9911
	Paterson Army Hospital	908-522-9911
	Jersey Shore Hospital (Evans)	908-776-4203
Spill/Accidental Release	Installation On-Scene Coordinator (IOSC) Fire Chief	908-532-1365
	IOSC Alternate Asst. Fire Chief	908-532-5814
	Environmental Coordinator Joseph Fallon	908-532-6223

Additional Phone Numbers (to be completed by contractor)

Contracting Officer (CO)	_____	_____
Project Team Leader (PTL)	_____	_____
Field Team Leader FTL)	_____	_____
Site Safety and Health Officer (SSHO)	_____	_____

11.3.3 Emergency Recognition and Prevention

Recognition and prevention of emergency conditions are duties of every ind du... on-site. While the objective of the SHERP is to provide site personnel with e... cessary information to prevent emergencies from arising, the basic principles ... rgency recognition will be initially covered during the 40-hour training requir... CFR 1910.120 and reviewed during the off-site training, site-specific training, d... ch and safety briefings.

11.3.4 Safe Distances and Places of Refuge

Prior to the commencement of site activities, the SSHO will select a location at an appropriate distance from the site where personnel can gather in the event of an emergency requiring evacuation of the site. This location will be pointed out to site personnel during the site-specific training.

During accidents involving a fire, spill or potentially explosive materials, site personnel will turn off any running equipment and evacuate the site by the nearest means of egress. Since in emergency situations, speed is often of greatest importance, personnel in the EZ need not pass through the CRZ and go through a formal decontamination using a kit prepared by the Contractor. Once they arrive at a safe location, a formal decontamination can then be undertaken. During these instances, care should also be taken to contain the decontamination water.

11.3.5 Site Security and Control

In the event of a fire, explosion, or major chemical spill, physical control of the site will be assumed by Fort Monmouth's responding elements.

11.3.6 Evacuation Routes and Procedures

As discussed in Subsection 11.1, during accidents requiring site evacuation, personnel will exit the site by the nearest means of egress. Once off the site, personnel will assemble at a location designated by the SSHO and be counted. Any missing personnel will be identified and brought to the attention of the responding Fort Monmouth e... ents.

11.3.7 Decontamination Procedures

During accidents involving injury to personnel inside the EZ, a decision will ... by the SSHO as to whether or not an individual's injury allows for formal decon... ion as outlined in Section 10. If the injury is minor, the individual will be brough... th the CRZ and undergo formal decontamination. If the injury is major or life-thr... the individual will be wrapped in impervious material (i.e., plastic) and transp... to the hospital. Hospital and ambulance personnel will be informed in advance that t... individual may be potentially contaminated so that appropriate measures can be take... to ...ver cross-contamination.

11.3.8 Emergency Medical Treatment and First Aid

During site activities, at least two individuals certified in first aid/adult CPR will be present. During an accident involving injury to site personnel, these individuals will not attempt emergency medical procedures other than first aid unless specifically directed by a licensed physician.

11.3.9 Emergency Alerting and Response Procedures

As discussed in Subsection 11.1, emergency telephone numbers will be located at all telephones surrounding the site. In the event of an emergency, witnessing personnel will contact the appropriate Fort Monmouth responding element. Fort Monmouth responding elements will then assume control of the incident and institute response procedures. In no case will site personnel attempt to assist in the response by fighting a major fire, conducting a rescue in an unsafe environment, or conducting a cleanup of a major spill.

11.3.10 Critique of Response and Follow-Up

Following an incident requiring a response by on-site or Fort Monmouth personnel, the SSHO will conduct an accident investigation and prepare an Accident Investigation Report (ENG3394) for submission to Fort Monmouth and the CO within 2 working days of the accident in accordance with AR 385-40 and USACE Supplement 1. A copy will be kept in the project file. The findings of the accident investigation will be communicated to site personnel by the SSHO during a health and safety briefing specifically convened for that purpose.

11.3.11 Personal Protective and Emergency Equipment

Site emergency equipment will consist of fire extinguisher (ABC-type), a first-aid kit, portable eyewash station, and inert absorbent for small spills. Site PPE is discussed in Section 6. This equipment will be easily accessible by site personnel and inspected regularly. Fort Monmouth's responding elements will provide their own equipment for handling large-scale emergencies.

SECTION 12

STANDARD OPERATING PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

Personnel will be aware of the proper procedures and work practices to follow in order to protect themselves from the specific chemical, safety, and/or biological hazards associated with the site activities. Specific "safe-work" procedures are discussed below.

12.1 BUDDY SYSTEM

The "buddy system" ensures that no individual may enter the EZ without another individual being present. The logic behind the buddy system is that if one individual has an accident, another individual is always present to render assistance or request emergency assistance. During Level C and D activities, the minimum number of personnel in the EZ will be two. During Level B activities, the minimum number of personnel in the EZ will be three (i.e., two in the work party and one as a safety/standby).

12.2 EATING, DRINKING, AND SMOKING PRECAUTIONS

Since ingestion is a potential contaminant exposure pathway, eating, drinking, and smoking will be prohibited in the EZ and CRZ. Site personnel working in the EZ will complete the required personnel decontamination upon exiting and prior to eating, drinking,or smoking.

12.3 IGNITION SOURCES

Fires and explosions require fuel, air (oxygen), and an ignition source (heat). The first two are not easily controlled. Consequently, while working on-site where a fire hazard may be present, potential ignition sources must be kept out of the area.

Open flames, lit cigarettes, hot surfaces, or other potential ignition sources will be excluded from the EZ. Whenever the potential for flammable or explosive atmospheres exists, the equipment used in the EZ will be certified by the manufacturer as being "explosion-proof" or "intrinsically safe" (designed for Class 1, Division 1 use). Equipment used to handle waste containers and to clean up spills will be constructed of nonsparking materials. Portable fire extinguishers (ABC-type) will be readily accessible to extinguish small fires and will be mounted on vehicles. For fires, Fort Monmouth emergency response personnel will be contacted.

Prior to initiating activities involving potential ignition sources (i.e., welding or operating a fork lift, etc.), personnel will request a "hot work" permit from the SSHO. The SSHO will issue such a permit only after it has been verified that conditions are safe for such activities to commence (i.e., no explosive or flammable conditions exist). In addition to the hot work permit from the SSHO, a welding permit will be obtained from the Fort Monmouth Fire Department prior to performing any welding work.

12.4 POTENTIALLY HAZARDOUS NOISE

Certain equipment used at the site may generate potentially hazardous noise. Hearing protective devices, such as ear plugs or muffs, will be available when noise may be a problem. Any sound-level surveys indicating noise levels of 85 dBA or above, or in the absence of sound-level-measuring instrumentation, any noise/sound preventing normal vocal discussion between two individuals at arms-length distance will dictate the need for hearing protection.

12.5 EXPLOSIVE ATMOSPHERES

Although potentially explosive atmospheres are unlikely to be encountered at the site due to adequate dilution ventilation, potentially explosive atmospheres may exist in freshly excavated areas. However, risks of explosions can be reduced if proper procedures are followed.

Prior to initiating site operations and at the beginning of each workshift and periodically during the shift, a CGI/O_2 will be used to determine the presence of potentially explosive atmospheres. A reading of 20% or greater lower explosive limit (LEL) will result in evacuation of the site and suspension of further activities pending stabilization of the site. CGI/O_2 measurements will also be taken prior to initiating any "hot-work" (i.e., welding, vehicle operation, etc.) as part of the hot work permit, and at any time potentially explosive atmospheres or conditions are identified.

In the event that excavation uncovers abandoned drums, gas cylinders, ordnance, or other containers, all activities will cease pending notification of the CO by the SSHO and determination that conditions are safe to proceed.

12.6 ILLUMINATION

Illumination provided by sunlight will be adequate for work activities conducted during daylight hours. However, some work activities may be performed at night because of the short daylight hours. In this case, explosion-proof auxiliary lighting will be used that provides not less than 5 foot candles in general site areas as required by 29 CFR Part 1910.120.

12.7 COLD STRESS

Persons working outdoors in low temperatures, especially at or below freezing, are potentially subject to cold stress. Exposure to extreme cold for a short time causes severe injury to exposed surfaces of the body (frostbite) or results in profound generalized cooling (hypothermia) that can potentially lead to death.

Early frostbite is characterized by slight flushing of the skin. The color of the skin may then change to white or grayish-yellow and finally grayish-blue. Pain is sometimes felt early in the freezing process, but goes away as frostbite progresses.

Hypothermia is characterized by shivering, dizziness, numbness, confusion, weakness, impaired judgement, impaired vision, and drowsiness. Symptoms progress from shivering and apathy, to loss of consciousness, decreasing pulse and breathing rates, and finally death.

To prevent such effects, personnel working in the cold will wear adequate clothing and reduce the time spent in the cold area by taking periodic breaks in warm locations. The SSHO will check clothing and monitor these symptoms to determine whether more frequent clothing changes or reduced exposure time are appropriate.

Should personnel experience hypothermia and/or frostbite, the victim should be removed to a warm area and first aid administered. Injured personnel should be removed from the site and transported to a medical facility for additional treatment and/or observation.

12.8 HEAT STRESS

Persons working in chemical protective clothing and environments where high temperatures and humidity may be encountered are potentially subject to heat stress. Exposure to such conditions may result in heat cramps, heat exhaustion, and heat stroke. Determination of ambient conditions and the potential for heat stress will be made using approved techniques.

Heat cramps are muscular pains and spasms caused by heavy exertion. They usually involve the abdominal muscles or legs.

Heat exhaustion occurs as a result of excessive sweating. Blood flow to vital organs is reduced causing the body to go into shock. Signs and symptoms are cool, moist skin, heavy sweating, dilated pupils, headache, nausea, dizziness, and vomiting. Body temperature should be nearly normal.

Heat stroke is a life threatening condition resulting from a shutdown of the body temperature control system. Signs and symptoms are hot, red skin, and very small pupils. Body temperature may be elevated sometimes as high as 105 °F.

To prevent such effects, a number of procedures will be implemented. Should activities commence during hot weather, workers will be initially allowed to acclimatize. Acclimatization usually consists of working for only a portion of the first workday followed by gradual increases in the duration of work on subsequent days. Whenever possible, activities associated with the greatest potential for heat stress will be scheduled for the early morning, evening, or night to avoid the hottest portion of the day.

Personnel will be required to preload with fluids (preferably water) and to take fluids periodically prior to and throughout the workday. Personnel will also take frequent rest breaks in a cool area.

The SSHO will be familiar with the signs and symptoms of heat stress. Periodic checks of the heat stress status of personnel will be conducted by the SSHO. Techniques for evaluating the heat stress status of personnel include measuring oral temperature, pulse-rate.

and body weight, and comparing these measurements with baseline measurements obtained prior to commencement of the day's activities. Significant differences would signal a potential heat-stress condition.

Should an individual present with any symptoms of heat stress, the victim will be removed to a cool area and administered first aid. This will be followed by removal of the victim to a medical facility for further treatment or observation.

12.9 EYE WASH

A portable eye-wash meeting the requirements of ANSI Z358.1 will be readily accessible to site personnel. Personnel will be instructed as to how to properly use the eyewash by the SSHO. The SSHO will inspect the eyewash daily to ensure that it is adequately charged. A record of the inspection will be kept in the site safety and health logbook.

12.10 FIRE EXTINGUISHERS

Portable fire extinguishers (ABC-type) will be readily accessible to site personnel. The SSHO will train the site personnel as to their proper use. Daily inspections of the fire extinguishers will be conducted by the SSHO to ensure that they are adequately charged. A record of the inspection will be kept in the site safety and health logbook.

12.11 ROUTINE SAFETY INSPECTIONS

The SSHO will conduct daily health and safety inspections of the site. Excavations and the travel paths of heavy equipment will be visually inspected on a daily basis for signs of collapse or sinkhole formation. Hazardous conditions will be noted, transmitted to all site personnel, and mitigated, if possible. A record of the safety inspection will be documented in the site safety and health logbook.

12.12 CONTROL OF SPILLS

All spills, regardless of size, will be immediately reported to the CO and Fort Monmouth's Fire Protection Division. A written report detailing the date and time of the spill, location of the spill, material involved, quantity spilled, reason for the spill, health measures taken during the spill response, remedial measures taken to clean up the spill, and number of Contractor personnel required for cleanup will be submitted to Fort Monmouth within 2 working days of the spill.

Minor spills will be controlled by site personnel by initially surveying the site to ensure it is safe to act using the appropriate personal protective equipment, stopping the leak and cleaning up the spilled material. Spilled liquid material may be absorbed and disposed of using an inert commercially available absorbent (e.g., kitty litter). Care will be exercised to prevent transit of spilled material to sewer or stormwater drains.

If large spills are possible, the Contractor will prepare and submit a Spill Prevention and Contingency Plan (SPCP) to the CO prior to initiating site activities. Cleanup of large spills

will not be conducted by site personnel. Where site personnel can safely contain the spill, initial measures to isolate and contain the material will be attempted. Following these initial efforts, site personnel will evacuate the site and contact the appropriate Fort Monmouth responding elements. Refer to Section 11, First Aid and Emergency Response Equipment and Procedures, for telephone numbers. Regardless of the size of the spill, the Contractor will be responsible for proper containerization, storage, labelling, removal, treatment, and disposal of the spill residue.

12.13 USE OF HEAVY EQUIPMENT

Contractors using heavy equipment will conform with the contents of OSHA's Safety and Health Standards for the Construction Industry (29 CFR 1926) and USACE Safety and Health Requirements Manual (EM 385-1-1). Where the requirements conflict, the more conservative requirement will be implemented.

Of particular importance are the following work practices:

- Heavy machinery, equipment, or parts thereof, which are suspended or held apart by slings, hoists, or jacks also will be substantially blocked or cribbed before personnel are permitted to work underneath or between them.

- Heavy equipment will be inspected and maintained at regular intervals by qualified individuals to ensure safe and proper operation.

12.14 CONFINED SPACE ENTRY

A confined space is defined in OSHA's Confined Space Entry Standard (29 CFR 1910.146) as a space that by design has limited openings for entry and exit; unfavorable natural ventilation that could contain or produce dangerous air contaminants; and that is not intended for continuous employee occupancy. The requirements of the OSHA Standard shall be followed when work is performed in a confined space.

Whenever possible, entry of confined spaces will be avoided. Work practices should be modified to make entry of confined spaces unnecessary (e.g., entry to the kiln for inspection purposes). Should entry of an excavation be necessary, the following procedures will be employed:

- The SSHO will be designated as the individual in charge of the confined space entry. The SSHO will be responsible for training the safety watch and entry workers on the proper procedures for a confined space entry, evaluating the confined space for the pre-entry requirements, and issuing the confined space entry permit.

- The SSHO will ensure that for excavations deeper than 4 ft, the excavations are shored, laid back to a stable slope, or otherwise secured in accordance with Subpart P of 29 CFR Part 1926. Furthermore, the SSHO will ensure

that ladders are placed into the excavation at a minimum spacing of 25 ft to ensure adequate ingress and egress.

- The SSHO will remotely evaluate the trench atmosphere using a CGI/O_2 to identify explosive and oxygen-deficient/enriched atmospheres. Testing will be performed prior to any entry of the trench and continuously during activities inside the trench. The results of the pre-entry testing will be compared to the AL listed in Table 6-6 and the appropriate action taken.

- The SSHO will issue a confined space entry permit that documents the date and conditions for which the permit is applicable, the CGI/ measurements, and certification that all pre-entry requirements have been met. New entry permits will be issued at the start of each shift.

- The SSHO will identify the individual to act as a safety watch. The safety watch will be an individual trained in the confined space entry procedures who will wear the same level of protection as the entry worker and be responsible for maintaining continuous communication with the entry workers (e.g., voice, radio, or line-of-sight), directing the entry workers during "top-side" emergencies, and summoning help prior to attempting a rescue should one or more of the entry workers require assistance.

12.15 LYME DISEASE

Lyme Disease is known to be present on Fort Monmouth. Lyme Disease is spread by the deer tick. Tick season is May through October. Ticks must be attached for several hours before Lyme Disease can be transmitted.

Ticks can be protected against by wearing light-colored long pants and long-sleeved shirts. Pant legs should be tucked into shoes or boots. Insect repellents, such as DEET on skin and Permethrim on clothing, should be used. Personnel should inspect themselves for ticks after being in grassy or woody areas.

LOGS, REPORTS, AND RECORDKEEPING

Recordkeeping is an important facet of maintaining an accurate account of site activities. Recordkeeping will be a regular and orderly process. The types of records to be m maintained during closure activities are discussed below. In general, recordkeeping should be performed as indicated in the referenced documents.

13.1 HEALTH AND SAFETY LOGBOOK

The SSHO will maintain a health and safety logbook (H&S log) into which safety and health-related notations, including daily inspection records and health and safety briefing attendees, will be made. All monitoring data conducted for health and safety purposes will also be included. The H&S log will be signed at the completion of each day's activities by the SSHO. At the completion of closure activities, the H&S log will be placed into the project file to become part of the project record.

13.2 MEDICAL MONITORING AND TRAINING CERTIFICATES

Copies of personnel certification of medical fitness and training completion will be retained in the project files. Any injury reports, monthly personal exposure records, and results of job-termination physicals will be retained in the project file and the personnel file for a period of 30 years.

13.3 VISITOR LOG

All visitors to the site will be required to sign an attendance sheet maintained by the SSHO. The attendance sheets will be retained in the project file.

13.4 INCIDENT REPORTS

Whenever an accident/illness/injury effects a site worker, the SSHO will complete an Accident Investigation Report (ENG 3394) for submission to Fort Monmouth and the CO within 2 working days of the incident in accordance with AR 385-40 and USACE Supplement 1. A copy of the completed form will also be included in the project file.

In addition, an OSHA 200 Log will be maintained on-site by the SSHO.

13.5 USACE AND FORT MONMOUTH ACCESS

USACE and Fort Monmouth will have access to the project records, including those pertaining to site safety and health, during normal working hours. Other interested parties will request this information through USACE.

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03511
STATUS CODE: 0
FEE CATEGORY: EX 3F
EXP. DATE: 20021031
FEE COMMENTS: 170.11(A)(5)
DECOM FIN ASSUR REQD: N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: ARMY, DEPARTMENT OF THE
RECEIVED DATE: 961022
DOCKET NO: 3006989
CONTROL NO.: 123815
LICENSE NO.: 29-01022-07
ACTION TYPE: TERMINATION

2. FEE ATTACHED
AMOUNT: ---/---
CHECK NO.: ---/---

3. COMMENTS
Reference 123816, 123817, & 123818

SIGNED Rebecca J. Brown
DATE 10/29/96

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED /__/)

1. FEE CATEGORY AND AMOUNT: _____

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT _____
RENEWAL _____
LICENSE _____

3. OTHER _____
_____

SIGNED _____
DATE _____