MICHIGAN DEPARTMENT OF NATURAL RESOURCES

TECHNICAL SUPPORT DOCUMENT
10 CFR 40 LICENSE APPLICATION
(NRC Docket No. 40-9015)

For the

TOBICO MARSH STATE GAME AREA SITE

located at

2301 Two Mile and Beaver Roads
Bay County
Kawkawlin, Michigan 48631

Ms. Denise Gruben
Radiation Safety Officer
Michigan Department of Natural Resources
Office of Equal Opportunity, Litigation and Program Services
Ottawa Building
611 Ottawa Street
Lansing, MI 48933

September 5,1997

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MICHIGAN DEPARTMENT OF NATURAL RESOURCES

TOBICO MARSH STATE GAME AREA SITE
LICENSE APPLICATION
PARTS I & II

Michigan Department of Natural Resources
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MICHIGAN DEPARTMENT OF NATURAL RESOURCES

TOBICO MARSH STATE GAME AREA SITE
LICENSE APPLICATION

PART I - LICENSE CONDITIONS

1.0 LICENSE INFORMATION

(Item 1 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

The following application is a request for a new NRC license. Part I of this application contains the license requirements that the Michigan Department of Natural Resources (MDNR) shall maintain in order to comply with NRC license application requirements. Part II (Section 13.0) describes how the MDNR will demonstrate adherence to Part I.

2.0 NAME AND MAILING ADDRESS OF APPLICANT

(Item 2 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

'ichigan Department of Natural Resources
Attn: Denise Gruben
Office of Equal Opportunity, Litigation, and Program Services
Ottawa Building
611 Ottawa Street
Lansing, MI 48933

3.0 LOCATION OF USE

(Item 3 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

The Tobico Marsh site, formerly referred to as the "Hartley and Hartley Landfill, State-Owned Portion," is located on State of Michigan property in the Tobico Marsh State Game Area at:

2301 Two Mile and Beaver Roads
Bay County
Kawkawlin, Michigan 48631

The site occupies an area of approximately 3 acres.

4.0 PERSON TO BE CONTACTED ABOUT APPLICATION

(Item 4 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

Ms. Denise Gruben
Radiation Safety Officer (RSO)
(517) 335-4036

5.0 MATERIAL TO BE POSSESSED

(Item 5 - U.S. NRC Regulatory Guide 10.2, Revision 2.0)

The principal radioactive contaminant is thorium-232 and associated decay products from scattered deposits of slag from a magnesium-thorium alloy. Lesser quantities of uranium-238 and associated decay products are also present.

MDNR requests authorization for possession of the following quantities of radioactive materials at its Tobico Marsh site:

	Material	Form	Quantity	Location
(1)	Thorium[(1)]	Any	2.6 Ci	Tobico Marsh Site
(2)	Uranium[(1)]	Any	0.26 Ci	Tobico Marsh Site
(3)	Th-232[(2)]	Any	10.0 μCi	Tobico Marsh Site

(1) Contaminated soil, sludge, sediment, trash, building rubble, structures, and any other material contaminated in excess of background levels.

(2) Includes check sources and calibration standards for use in radiation protection applications and instrument calibrations.

6.0 PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED

(Item 6 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

The activities carried out with licensed material at the Tobico Marsh site involve characterization, control, and remediation of residual contamination, which includes but is not limited to the following:

- Possession and transfer of licensed material for the purpose of site characterization. Intrusive site characterization activities such as removal of residue source materials and decay products assumed to be in the form of magnesium-thorium alloy contained in soils, sediments, sludge, slag, building rubble, structures, and any other material contaminated in excess of background levels.

- Source material in the form of check sources and calibration standards for use in radiation protection applications and instrument calibrations.

- The Leachate Collection and Treatment System (LCTS) is designed to remove water from the waste cell, treat it for non-radioactive contaminants, and discharge it to a sanitary sewer system.

7.0 INDIVIDUALS RESPONSIBLE FOR RADIATION SAFETY

(Item 7 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

The Michigan Department of Natural Resources (MDNR) is committed to implement and manage a radiation safety program for the Tobico Marsh Site in accordance with applicable Nuclear Regulatory Commission (NRC) regulations and requirements. The radiation safety program will be managed by the Radiation Safety Officer.

7.1 RADIATION SAFETY OFFICER (RSO)

The RSO, or duly authorized representative, is responsible for defining and implementing procedures, related to radiological safety. Procedures address safety criteria, monitoring, and training necessary to ensure the protection of employees, the public, and the environment. As part of this responsibility, the RSO, or duly authorized representative, will review the radiation safety program annually and document the review in a report (See Section 10.7). Also, the RSO, or duly authorized representative, will ensure that the As Low As Reasonably Achievable (ALARA) commitment is addressed.

The RSO or duly authorized representative, is also responsible for directing the radiological staff. The radiological staff performs radiological surveys, air sampling, and radiological safety job coverage. If the RSO or duly authorized representative believes an operation to be unsafe, he or she has the authority to halt that operation, and to restart such operation after the operation has been deemed to be safe by the proper individuals (i.e., Health & Safety Engineer, Field Engineer, etc.).

The RSO has overall responsibility for assuring that radiological work is conducted in accordance with the radiation safety program. The RSO is responsible for communication and information exchange with U.S. NRC. The RSO has primary responsibility for the technical adequacy and correctness of the radiation safety program and ALARA program.

7.2 SAFETY COMMITTEE

At a minimum, the Safety Committee will be comprised of the RSO, the Chief of Office of Equal Opportunity, Litigation, and Program Services (OEOLPS), and a Field Engineer. Additional members of the Safety Committee may be appointed as needed by the Field Engineer, who chairs the committee. The Safety Committee will review abnormal occurrences, review the annual report of the RSO, and ensure that adverse results are resolved. The Safety Committee will meet at least semi-annually, or more often if appropriate to review abnormal event occurrences in a timely manner. Records from the Safety Committee meetings and closures of the Safety Committee findings will be filed and maintained.

7.3 PERSONNEL EDUCATION AND EXPERIENCE REQUIREMENTS FOR KEY POSITIONS

(Item 7 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

7.3.1 Radiation Safety Officer

The minimum qualifications for this position is a bachelors degree in sciences or engineering, or its equivalent, and a 40-hour training course in radiation protection, or its equivalent.

7.3.2 Duly Authorized Representative RSO

The RSO may authorize a representative to perform some or all of the RSO functions described in this license application, however, the RSO retains primary responsibility for ensuring that these functions are implemented as required.

An Alternate RSO may be authorized to act in the same general capacity as the RSO, and a Field Engineer may be authorized to act in the same capacity as the RSO for onsite work involving sampling, invasive activities, and handling of radioactive material other than sealed sources. Such authorizations will be made by the RSO, in writing, and the RSO is responsible for ensuring that the Alternate RSO and Field Engineer have the requisite experience and training for working with radioactive materials. At a minimum, they shall posses the qualifications stated in Paragraph 7.3.1 and the training requirements delineated in Section 8.0 of this license application or its equivalent.

Authorization to perform other specific RSO functions may be given to qualified individuals at the discretion of the RSO.

8.0 TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

(Item 8 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

Training for personnel working with licensed material is provided commensurate with the hazards faced by the worker. The training program defines training requirements for MDNR employees, contractors, and visitors.

Topics that are included in personnel training programs for persons working with licensed material include:

1. Radiation Protection Regulations

   10 CFR 19
   10 CFR 20
   10 CFR 40
   10 CFR 71

2. Site Specific Controls

   Standard operating procedures
   Security and access control to designated areas
   Hazards specific to Thorium
   Radiation Safety program
   ALARA program

3. Health Physics Protection Measurements

   Measurement of airborne radioactive materials
   Bioassays to detect radioactive materials, if applicable
   Surveys to detect contamination of personnel and equipment
   Personnel dosimetry

4. Emergency Procedures

Personnel injury
Fire
Site evacuation
Emergency Responses

Training methods include as appropriate, lecture, classroom training, programmed instruction, challenge testing, on-the-job training, or other training methods as appropriate. The effectiveness of training shall be suitably demonstrated; e.g., by written, oral or practical examination, or other suitable means. The adequacy of each individual's training shall be evaluated on a biennial basis, and retraining shall be provided as appropriate.

8.1 VISITORS

Management, technical, and other personnel who require occasional access to the restricted areas for observation or similar purposes, or to perform work not involving radioactive materials shall have the radiation safety training necessary for the radiological conditions expected to be encountered or be escorted by appropriately qualified personnel at all times. A continuous escort is not required if the visitor is in continuous view of facility personnel. The presence of personnel normally assigned to these areas fulfills this function. The RSO or duly authorized representative determine the training and dosimetry requirements.

9.0 FACILITIES AND EQUIPMENT

(Item 9 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

Access to the Tobico Marsh site is gained via a road through an adjacent site, the SCA Landfill (NRC License No. SUC-1565), located to the south. The north, east, and west sides of the Tobico Marsh site are marsh lands and have no roads or other improvements. The SCA landfill boundary is secured by 6-foot high chain link fence topped with three-strand barbed wire which is locked 24 hours a day. The SCA Landfill is not in operation.

Six-foot high chain link fence topped with three-strand barbed wire surrounds the Tobico Marsh site. The southern boundary of the Tobico Marsh site shares a common fence with the SCA Landfill. The gates in the fence are locked 24 hours a day.

A clay cap, a slurry wall, a leachate collection system, a treatment building, and a force main have been installed on the Tobico Marsh site following the cessation of disposal activities. The leachate collection system consists of six leachate extraction wells and associated piping. The building houses equipment for the treatment of landfill leachate. The building is considered part of the LCTS.
The LCTS is designed to remove water from the waste cell, treat it for non-radioactive contaminants, and discharge it to a sanitary sewer system via a force main. In addition to the liquid discharge, the LCTS includes the vapor-phase treatment and discharge to the atmosphere.

The LCTS was installed to control the water level in the waste cell, but has never been operated. The LCTS will be able to operate in either a batch or continuous mode. When operational, air discharged from the vapor-phase treatment system will be sampled to ensure air discharges meet the concentration requirements specified in 10 CFR 20. During operation, representative samples of treated liquid discharge will be obtained to ensure that water discharges meet the concentration requirements specified in 10 CFR 20. Radioactive residuals generated during operation of the LCTS will be handled in accordance with Section 11.0 of the license application.

10.0 RADIATION SAFETY PROGRAM

(Item 10 - U.S. NRC Regulatory Guide 10.4, Revision 2.0)

To ensure safety to workers, public, and the environment, a Radiation Safety Program (RSP) will be used in accordance with:

- 10 CFR 19 "Notices, Instructions, and Reports to Worker; Inspections"
- 10 CFR 20 "Standards for Protection Against Radiation"

The RSP only applies to radiological maintenance of the site, operation of the LCTS, and activities leading up to the completion of the radiological characterization study of the MDNR portion of the Tobico Marsh site.

The purpose of the RSP is to summarize the project organization and responsibilities; establish standard operating procedures; discuss the personal protective equipment that may be used; identify personnel training requirements; summarize the monitoring techniques; establish radiation safety inspections; and provide for appropriate record keeping requirements.

It is also the purpose of the RSP to minimize radiation exposure to workers. It is the policy of the MDNR that worker exposure to ionizing radiation be kept as low as reasonably achievable. In addition to compliance with the RSP, the RSO or duly authorized representative is committed to further reducing personnel exposures to radiation to levels which are ALARA.

The RSP shall guide the activities of radiological work performed at the MDNR portion of the Tobico Marsh site. The RSO or duly authorized representative is responsible for ensuring the RSP is administered, implemented and maintained.

The content of the RSP may change or undergo revision based upon additional information made available by activities conducted at the site. Any changes proposed must be approved by the RSO or duly authorized representative and safety committee. The following Sub-Sections of 10.0 addresses key elements found in the RSP.

10.1 ALARA COMMITMENT

MDNR has a strong commitment to the ALARA philosophy. As such, a key objective is to minimize exposure to radioactive material for the public, for the environment, and for workers at the Tobico Marsh site. The following policies are implemented for work at the site:

1. ALARA targets will be set and data trends will be monitored in accordance with the RSP.

2. Effluent: In the interest of limiting exposures to the public, efforts are made to reduce effluent volumes to the minimum practicable level.

3. Engineering Controls: The preferred method of limiting intake is the use of engineering controls. In cases where engineering controls are not adequate or feasible to protect the workers, respiratory protection may be used in accordance with a respiratory protection program.

10.2 RADIATION WORK PERMIT

Work with licensed materials is controlled by use of Radiation Work Permits (RWP). The RSO, or duly authorized representative, approves RWPs. RWPs specify applicable radiological controls for the activity, such as radiological equipment, personnel monitoring devices, protective clothing or air sampling requirements. The RSO or duly authorized representative is responsible for ensuring the proper implementation of radiation work permits. RWPs which remain open for more than a month are reviewed on a monthly basis to ensure the controls are effective; RWPs which are no longer needed are closed by the RSO or duly authorized representative.

10.3 OPERATING PROCEDURES

Activities involving licensed materials are conducted in accordance with the approved RSP. Activities involving radioactive material shall be conducted in accordance with procedures approved by the RSO or duly authorized representative. Procedures will be reviewed for potential update on a biennial basis.

10.4 AUDITS AND INSPECTIONS

Audits and inspections are performed to determine if operations are being conducted in accordance with applicable license conditions, the RSP, and approved procedures. At a minimum, an audit of the RSP, based on a written plan, shall be performed annually. A qualified individual having no direct responsibility for the operation being audited is used to perform the annual audit in order to ensure unbiased and competent results. The annual audit for radiological safety shall be performed by an individual with at least two years experience in applied health physics. Items requiring corrective action are documented in a report distributed to the RSO. Follow-up actions will be documented.

Inspections shall be scheduled at a minimum, quarterly. Inspections can be performed by radiological staff members and will follow a written plan. Items requiring corrective

action are documented in a report distributed to the RSO. Follow-up actions will be documented.

All items found during performance of audits and inspections required by Part I of this application will be distributed to all members of the Radiation Safety Committee and reviewed during the next Radiation Safety Committee meeting.

10.5 INVESTIGATION AND REPORTING

Abnormal occurrences are reported to the RSO or duly authorized representative and investigated. Reports to the NRC are made in accordance with specific conditions of this application and the applicable 10 CFR Sections. The level of investigation and the need for corrective action are determined based on the severity of the incident.

10.6 RECORDS

Records pertaining to licensed health and safety materials concerning abnormal occurrences, inspections, ALARA, employee training, Safety Committee meeting, personnel exposures, instrumentation, and routine radiation and contamination surveys are retained to demonstrate compliance with the conditions of this application and applicable NRC regulations. Such records are retained for at least two years, unless otherwise specified in the governing regulations. Records are stored in the MDNR office, Lansing, Michigan.

10.7 ANNUAL REPORT

The Radiation Safety Officer shall prepare an annual report that reviews the radiation safety program. The report will review overall employee radiation exposure data to determine:

1. if there are any unexpected trends developing in personnel exposures;

2. if personnel exposures might be reduced under the concept of as low as reasonably achievable; and

3. if equipment for personnel exposure control is properly used, maintained, and inspected.

This report shall include a review of required audits and inspections performed during the past 12 months and review of the data from the following areas as applicable: overall employee exposures (internal and external), overall bioassay results, and unusual occurrences.

10.8 CONTROL OF LICENSED MATERIAL

Access to rooms or areas containing licensed material is controlled in accordance with the RSP, e.g., by locked door and fence when the room or area is unattended.

10.9 PROTECTIVE CLOTHING AND PERSONNEL MONITORING REQUIREMENTS

Protective clothing, when required, is prescribed by the applicable radiation work permit.

Personnel exiting contaminated areas are required to survey themselves after removing protective clothing to ensure that they are free of contamination. Emergency evacuations are an exception to the personnel survey requirement.

10.10 INSTRUMENTATION

Instrumentation used for radiation detection and measurement are discussed in the RSP and will have capabilities as follows (more than one instrument may be utilized to cover the specified range):

Alpha/Beta Counting Systems:	0.5 DPM to $1x10^5$ DPM
Alpha Survey Meters:	5 DPM to $1x10^5$ DPM
Beta Survey Meters:	100 DPM to $1x10^5$ DPM
Gamma Survey Meters:	1 μR/h to 50 mR/h

Radiation detection instruments are calibrated semiannually and after each repair that would affect accuracy.

10.11 INTERNAL EXPOSURE

The intake of radioactive material shall be monitored for individuals likely to receive in excess of 10% of the applicable Annual Limit on Intake (ALI). An investigation shall be performed by the RSO or duly authorized representative when an individual reaches 25% of the applicable limit. Work activity restrictions shall be imposed when an individual reaches 50% of the applicable limit; i.e., 0.5 ALI (1000 Derived Air Concentration (DAC) hours). A diagnostic study to evaluate the individual intakes shall be started at 25% action levels.

10.12 EXTERNAL EXPOSURE

Exposure to radiation shall be monitored for individuals likely to receive, in one year from sources external to the body, in excess of 10% of the occupational dose limits of 10 CFR 20. The personnel monitoring device will be a thermoluminescent dosimeter (TLD). TLDs shall be processed for dose reading on at least a quarterly basis by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited dosimetry program. The action level for investigation and possible work restrictions shall be 1 rem for deep dose equivalent (DDE) on an annual basis.

10.13 TOTAL EFFECTIVE DOSE EQUIVALENT

Total Effective Dose Equivalent for occupational exposures shall be calculated in accordance with 10 CFR 20 using a combination of personal lapel air sampling data, personal radiation exposure data and/or bioassay measurement data.

The primary method of calculating Committed Effective Dose Equivalent is by using personal lapel air sampling results.

10.14 BIOASSAY PROGRAM

Once intrusive work begins, inhalation is the most likely pathway by which radioactive material from the site can be taken into the body, and the need for routine or special bioassays will be determined on a case-by-case basis from the individuals' exposure to airborne hazards. Airborne radioactivity levels will be determined by air samples. The principal radionuclides are Th-228 and Th-232.

If a respiratory protection program is utilized or personnel are likely to receive greater than 10% ALI such that monitoring is required, then a bioassay program, in accordance with the RSP, shall be implemented for confirmation and evaluation of intakes. If a bioassay program is required, then bioassay assessments of intakes shall be performed on an annual basis.

10.15 CONTAMINATION SURVEYS

Contamination surveys are performed on a routine basis to monitor radioactive contamination. Routine contamination surveys are performed at a minimum of once per week in loose surface contaminated areas when work involving radioactive materials is in progress. Surveys in step-off pad areas in use are performed on a daily basis. Contamination surveys are performed on a quarterly basis in areas not posted as contamination areas. Surveys conducted in support of work performed under a radiation work permit may be used to meet the survey requirement.

The surface contamination levels in Table 10.1 will be used to determine uncontrolled releases from the Tobico Marsh site.

TABLE 10.1
ACCEPTABLE SURFACE CONTAMINATION LEVELS

Nuclides[a]	Average[b,c,d]	Maximum[b,d,e]	Removable[b,d,f]
U-nat, U-235, U-238 and associated decay products	5,000 α dpm/100 cm^2	15,000 α dpm/100 cm^2	1,000 α dpm/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta/gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 dpm/100 cm^2	15,000 dpm/100 cm^2	1,000 dpm/100 cm^2

[a] Where surface contamination by both alpha and beta/gamma emitting nuclides exists, the limits established for both alpha and beta/gamma emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations 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.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] 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.

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

[f] The amount of removable radioactive material per 100 cm2 of surface area should be determined by wiping that area with dry filter paper 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.

10.16 Radiation Surveys

Radiation surveys are performed to monitor radiation levels. Routine radiation surveys are performed at a minimum of once per month in posted radiation areas during intrusive activities. The radiation surveys will be performed during the monthly inspection of the Tobico Marsh site. During normal work days, routine radiation surveys are performed in restricted areas. Surveys conducted in support of work performed under a radiation work permit may be used to meet the survey requirement.

10.17 Respiratory Protection

The inhalation of airborne radioactive material is controlled under most circumstances by the application of engineering controls, including containment and ventilation equipment. When such controls are not feasible or cannot be applied, respiratory protection is used. When it becomes necessary for individuals to work in areas where airborne radioactive contamination is likely to exceed the levels given in 10 CFR 20, Appendix B, Table 1, Column 3, or for emergency situations, respiratory protection equipment is used pursuant to 10 CFR 20.1703

Any area where an individual could receive 50% of the DAC specified in Appendix B of Part 20 shall be evaluated to determine if respiratory protection is warranted. If the area is determined to exceed the 50% of the DAC limits within 20.1003 and engineering controls cannot reduce the airborne concentration, respiratory protection will be required for individuals entering the area.

10.18 Material and Equipment Released for Unrestricted Use

Release of equipment and materials from restricted areas to clean areas on-site or unrestricted areas shall be in accordance with Table 10.1 and the RSP.

10.19 Liquid Effluents

Liquid effluent generated from operations involving source material shall be controlled as necessary, in accordance with good health physics practices. Prior to liquid discharges, samples shall be submitted to NRC licensed radiochemistry laboratories for analysis. Only liquids that meet 10 CFR 20 discharge limits shall be released.

10.20 Airborne Effluents

Airborne effluents generated from operations involving source material shall be controlled as necessary, in accordance with good health physics practices. When ventilation systems are required, they are designed and maintained to limit the spread of contamination into the environment. Exhaust from systems will be sampled, monitored and controlled pursuant to 10 CFR 20.

10.21 SUMMARY OF COMMITMENTS

In order to ensure compliance with the Tobico Marsh Site license, the following table (Table 10.2) presents a summary of the commitments listed in Part I of this application.

Table 10.2
Summary of Part I Commitments
Tobico Marsh State Game Area Site
NRC License Application (Docket Number 40-9015)

Section	Commitment	Condition	Frequency
7.1	Review of Radiation Safety Program	none	Annually
7.2	Safety Committee Meeting	none	Semi-annually
8.0	Adequacy Evaluation of Individuals Training	none	Biennially
10.2	Review of Radiation Work Permits	When permits are open for more than a month	Monthly
10.3	Review of Operating Procedures	none	Biennially
10.4	Audit of Radiation Safety Program	none	Annually
10.5	Inspections of Radiation Safety Program	none	Quarterly
10.10	Calibration of Radiation Detection Instruments	none	Semi-annually[1]
10.12	Process Thermoluminescent Dosimeters (TLD)	none	Quarterly
10.15	Routine Contamination Surveys	When work involving radioactive materials is in progress	Weekly
10.15	Survey of Step-off Pad Areas	When work involving radioactive materials is in progress	Daily
10.15	Routine Contamination Surveys	When areas are not posted as contamination areas	Quarterly
10.16	Routine Radiation Surveys	During intrusive activities in posted areas	Monthly
10.16	Routine Radiation Surveys	During Site Inspections	Monthly
10.16	Routine Radiation Surveys in Restricted Areas	If Restricted Areas are present during periods of activity	Daily
11.1	Temp. Storage of LLRW	Stored on-site for one year	Quarterly
11.1	Integrity/Exterior Contamination Check of LLRW	If LLRW is stored at site	Quarterly
11.1	Interim Storage of LLRW	Stored on-site for five years	Quarterly

LLRW = Low-Level Radioactive Waste
Notes
1 = Or when instruments undergo repairs that could affect calibration.

11.0 WASTE MANAGEMENT

11.1 LOW-LEVEL RADIOACTIVE WASTE

Low level radioactive wastes (LLRW) will be packaged in accordance with applicable regulations. A LLRW package awaiting shipment to a processor or disposal facility may be temporarily stored for up to one year on site. LLRW packages in such temporary storage will be checked quarterly for integrity and exterior contamination. LLRW storage areas shall be appropriately posted as temporary storage areas and be secured from unauthorized removal. Prior to being placed in storage, packages will be checked for exterior contamination and labeled.

LLRW may also be stored for up to five years as interim storage provided that it is protected from the elements. Interim LLRW storage shall be in locked sea land containers or trailers or in other building(s) or enclosures on site.

Records will be maintained of the contents of LLRW packages. Packages will be stored on raised platforms (e.g., built in or portable pallets) or legs. Package stacking will be limited to two (2) high. When placed in storage, the packages shall be sealed in a manner which prevents casual entry (e.g., by the use of steel clips or strapping) prior to final sealing and shipment to the processor or disposal facility.

Packages containing liquid waste shall not be stored outside, shall be segregated from solid waste packages (e.g., stacked separately) and shall be appropriately labeled.

12.0 DECOMMISSIONING FUNDING PLAN

The Decommissioning Funding Plan is attached to this license application.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

TOBICO MARSH STATE GAME AREA SITE LICENSE APPLICATION

PART II - SAFETY DEMONSTRATION

13.0 OVERVIEW OF OPERATIONS

13.1 OPERATING OBJECTIVE

The operating objectives are as follows:

1. Conduct site characterization survey to determine the extent of radioactive material buried at the Tobico Marsh site.

2. Perform radiological maintenance of the site, operation of the Leachate Collection and Treatment System (LCTS), and monitoring of individuals and the environment to determine NRC license compliance while conducting the site characterization survey.

13.2 SITE DESCRIPTION

The Tobico Marsh site is located on State of Michigan property in the Tobico Marsh State Game Area at Two Mile and Beaver Roads in Kawkawlin Township, Bay County, Michigan. The site occupies an area of approximately 3 acres (Figure II-1).

13.3 SITE HISTORY

The 3-acres now comprising the Tobico Marsh site was once a portion of the Hartley and Hartley Landfill. The Hartley and Hartley landfill was acquired by SCA and is now referred to as the SCA Landfill (NRC License No. SUC-1565). The SCA Landfill, which is owned by Waste Management of North America, Incorporated, stopped operating in 1978. The Tobico Marsh site was formerly referred to as the "Hartley and Hartley Landfill, State-Owned Portion" and was acquired in trade by the State of Michigan in 1972.

The Tobico Marsh site consists of a former liquid industrial waste disposal area where an estimated 18,000 barrels of spent solvents, oils, and other liquid wastes were disposed of during the 1960s and 1970s. Low-level radioactive waste in the form of magnesium-thorium slag were also disposed of on the property.

Remedial response actions have been taken at the site. The site was encapsulated in 1984 with a 5-foot-thick clay cap and 3-foot-thick bentonite slurry walls. An investigation was performed by ABB Environmental Services, Inc. (formerly E.C. Jordan Company) from 1985 through 1986 to assess the nature and extent of environmental contamination around the encapsulation area. The investigation indicated that the level of leachate inside the encapsulation was approximately three feet higher than the level of the surrounding Tobico Marsh and volatile organic chemicals were detected in the soils and groundwater outside the encapsulation. Additional investigation to evaluate the horizontal and vertical extent of contamination outside the encapsulated area was conducted by ABB Environmental Services, Inc. in 1991. These investigations did not include sampling for radiological parameters.

A feasibility study was performed by GZA/Donohue in 1987 through 1988. The study recommended that site access be restricted by fencing, that monuments be installed stating the nature of the contaminants, that the clay cap be repaired where erosion had occurred, that hydraulic isolation be maintained by withdrawal of leachate from inside the encapsulated area, and that the leachate be treated and disposed. Final disposal of the leachate was to be conducted by either: 1) pumping and hauling the pretreated leachate to a facility appropriate for disposal; or 2) installation of a force main to the West Bay County Waste Treatment Plant for final treatment of the pretreated leachate.

Design of the leachate collection system and preliminary design of the pretreatment system was completed in 1991. The leachate collection system, treatment building, and the force main were installed in 1993 and 1994. The LCTS has not been started.

Radiological studies by Oak Ridge Institute for Science and Education were completed prior to and following the installation of the site's clay cap. These studies indicate the radiation exposures at the land surface following the encapsulation are at background levels.

14.0 LOCATION OF BUILDINGS ON SITE

The location of the building on the Tobico Marsh site is shown in Figure II-2.

15.0 FACILITY DESCRIPTION

15.1 USE OF BUILDING

The only building on the Tobico Marsh Site houses equipment for the treatment of landfill leachate. The building is considered part of the landfill's leachate collection system which consists of a leachate collection system, a pretreatment system, a treatment system, and a discharge system.

Leachate Collection System

The Leachate Collection System is designed to receive water pumped from six 16-inch diameter leachate collection wells. The individual wells are connected by a 2-inch diameter pipe inside a 6-inch diameter containment pipe. The east and west pipelines are connected together into one 2-inch diameter pipe before entering the pretreatment system.

Pretreatment System

The pretreatment system consists of an underground oil/water separator, the first compartment of an equalization tank; and a bag filter designed to remove particles down to 1 micron in diameter.

Treatment System

A stripper for liquid-phase treatment is located in the treatment building. Vapor from the stripper is treated by two vapor-phase activated carbon units and discharged to the atmosphere. Leachate from the stripper flows by gravity to the second compartment of the equalization tank.

Discharge System

Treated water from the second compartment of the equalization tank flows by gravity to a pumping station which directs the treated leachate to the sanitary sewer system and ultimately to the West Bay County waste water treatment facility.

16.0 ORGANIZATION AND PERSONNEL

The organizational structure for the Tobico Marsh site is depicted in Figure II-3.

16.1 FUNCTIONS OF KEY PERSONNEL

The function, responsibilities, and authorities of key personnel important to safety are described in Part I, Section 7.0 of this application. This section provides similar information for the remaining personnel holding management positions.

16.1.1 Radiation Safety Engineer

The Radiation Safety Engineer is responsible for assisting the Radiation Safety Officer (RSO) in the many facets of his/her duties. This includes procedure development, radiation work permit development, radiological control planning, etc. When deemed qualified, the Radiation Safety Engineer may be delegated functions of the RSO.

16.1.2 Health and Safety Officer

The Health and Safety Officer (HSO), or duly authorized representative, has overall responsibility for developing and implementing the site-specific Health and Safety Plan (HASP). The HSO investigates accidents, illnesses, and incidents occurring on-site. The HSO also conducts safety briefings and site-specific training for on-site personnel. As necessary, the HSO will accompany U.S. Environmental Protection Agency (USEPA), Occupational Safety and Health Administration (OSHA), NRC or other governmental agency personnel visiting the site in response to health and safety issues. The HSO, in consultation with the MDNR, is responsible for updating and modifying the HASP as site or environmental conditions change. Prior to changes in the HASP, the RSO or duly authorized representative is consulted for radiological concerns.

16.2 Resume of Key Personnel Important To Safety

The resumes of the RSO and other personnel important to safety are provided on the following pages.

DENISE SANDRA GRUBEN
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909
517-335-4036

EDUCATION

Michigan State University, East Lansing, Michigan
M.S. - Natural Resources Management, Minor - Limnology

University of Rhode Island, Kingston, Rhode Island
B.S. - Natural Resources/Wildlife Management, Minor - Zoology

PROFESSIONAL WORK EXPERIENCE

September 1992 - Present Environmental Quality Specialist 13/Analyst VII, Michigan Department of Natural Resources (MDNR), Office of Litigation and Program Services (OLPS). Duties include litigation assistance to the Department of Attorney General on cases involving the Resource Bureau of the MDNR; management of Department-owned remedial projects, including technical review, fund management, oversight of field operations, contractor management, oversight of contractor's work on thorium containing landfill site (one year).

April 1989 - September 1992 Environmental Quality Analyst VII, Lead Worker, MDNR, Environmental Response Division (ERD). Duties included providing guidance to journeyman level workers, management of Superfund remedial action projects.

October 1987 - April 1989 Environmental Quality Analyst, MDNR, ERD. Duties included management of Superfund remedial action projects, including financial tracking, environmental monitoring, oversight of cleanup operations, negotiations, community relations, technical reviews, securing EPA funding.

October 1984 - October 1987 Environmental Quality Analyst/Water Quality Specialist IV-VI, MDNR, ERD/Groundwater Quality Division (GQD), Site Assessment Unit. Duties included pre-remedial activities such as preparation of CERCLA/SARA Cooperative Agreements, CERCLA grant management, QAPP preparation, MERA and CERCLA site evaluations and prioritization, and MERA model analysis.

June 1984 - October 1984 Student Intern III, MDNR, GQD. Duties included MERA site prioritizations and CERCLA preliminary assessments.

ADDITIONAL WORK EXPERIENCE

Other work experience includes volunteer at U.S. Fish and Wildlife Service, research assistant for Rhode Island Department of Environmental Management, retail book sales, offset printer, billing clerk, and camp counselor.

PROFESSIONAL TRAINING

Radiation Safety at Superfund sites, 40 hour course, Columbus Ohio, October 23-27,1995, taught by Halliburton NUS Corporation.

Management, Expert Witness, Personnel Protection and Safety (updated annually), Risk Assessment, Computer Software and Hardware.

PUBLISHED WORKS

Co-authored, "Groundwater Contamination from Landfills, Underground Storage Tanks and Septic Systems", with G. Klepper and G. Carpenter. Published and presented.

REFERENCES AVAILABLE IMMEDIATELY UPON REQUEST

NRC Docket No. 40-9015

P:\TOB\RC009285-01\RPTS\702025.DOC

U.S. ENVIRONMENTAL PROTECTION AGENCY

This certifies that

DENISE S. GRUBEN

has completed the

RADIATION SAFETY AT SUPERFUND SITES (165.11)

Training Course

2.95 Continuing Education Units

Columbus, Ohio

October 23-27, 1995

Presented by the

OFFICE OF EMERGENCY AND REMEDIAL RESPONSE

Course Director
Halliburton NUS Corporation

Training Coordinator,
Environmental
Response Branch

STEVE MASCIULLI

Position

ABB Site Remediation Services - Radiological Service Leader/Senior Health Physicist

Education

- B.S., Radiological Health Physics, Lowell Technological Institute, Lowell, MA (1975)
- New York University; NY, NY. Completed all course requirements for MS in Applied Science (1983)
- University of Massachusetts, Lowell - (1/95 to present) completed 29 credits towards an MS in Industrial Hygiene

Registration

- Certified Health Physicist (Comprehensive and Power Reactor Specialty)
- Certified Safety Professional
- Inactive Department of Energy "Q" Clearance

Experience

Over 22 years of diverse technical and managerial experience in the areas of radiological engineering, health physics, radioactive waste, and environment, health and safety; with solid industry (Consultant and Utility) and government (Department of Energy and Naval Nuclear Reactors) experience.

ABB Support Services (6/95 - present) - Radiological Services Leader and Radiation Safety Officer, responsible for managing a groups that develops and implements radiation protection programs, to control residual radioactive material, and performs decontamination and decommissioning activities for ABB and its clients. The group also provide Environmental Health and Safety consulting services.

Vertechs Corporation (11/89 - 6/95) - Senior Technical Specialist responsible for business development and operation, and providing radiological engineering, management appraisal, and quality assurance consulting services for clients. Participated on DOE Tiger Teams and Audits including: Nevada Test Site, Lawrence Livermore National Laboratory (LLNL), Paducah Gaseous Diffusion Plant, Argonne National Laboratory, Sandia National Laboratory, Los Alamos National Laboratory (LANL) and EG&G/EM. Was a specialist in the following areas for these Tiger Teams: Environmental Radiation, Occupational Health Physics, Quality Assurance, Radioactive and Mixed Waste, and Environmental Management. Member of team that wrote the "ES&H Progress Assessment Guidance Manual." Member of DOE HQ Office of Health team reviewing radiological engineering practices within the DOE complex. Performed detailed reviews of radiological engineering at LANL, Savannah River Site, Oak Ridge and Idaho National Engineering Laboratory. Prepared a report and good practice documents based on these reviews, including a training course.

Designed and performed radiological engineering for two low-level radioactive waste storage facilities. Performed on-site and off-site dose calculations in support of Safety Analysis Reports and unreviewed safety questions. Performed analysis of unreviewed safety questions and critical reviews of safety analysis reports..

Cygna Energy Services (3/87 - 11/89) - Division manager with profit/loss responsibility for business development and operation of a division containing over 20 professionals. Also responsible for directing and/or performing projects and programs in the areas of Health Physics, Radioactive Waste, Computer Services, Quality Assurance, and Emergency Planning for Radiological and Hazardous Materials. Major specific projects included:

- o Performed numerous audits and appraisals of radiological programs, emergency plans and third party vendors, including participation on Department Of Energy Tiger Teams.
- o Performed a complete analysis to support increasing the allowable primary containment leak rate at a commercial nuclear reactor, which included a complete analysis of 10 CFR 100 doses, environmental qualification doses and control room doses.
- o Wrote emergency plan scenarios, including graded exercises, ingestion pathways, and branching scenarios. Also, was a controller/evaluator for numerous emergency plan drills.
- o Wrote a report for the Monitored Retrievable Storage Commission which evaluated worker and population doses from various spent fuel monitored retrievable storage options.

New York Power Authority (6/79 - 3/87) - Progressive career development from Staff Engineer to Senior Specialist as highlighted below:

- o Senior Radiological Appraisal Specialist (3/86 - 3/87) - Responsible for development and operation of the newly formed Operational Appraisal Division, in the area of Radiation Protection. Performed numerous management and technical appraisals in all areas of nuclear radiation protection. Program appraisal areas were designated by the Plant Managers, Officers of the company, and routine scheduling.

- o Supervisory Radiological Engineer (6/82 - 3/86) - Responsible for supervising a group of engineers to develop and implement all aspects of the corporate radiation protection program for two operating nuclear power plants. Also responsible for the preparation and expenditure of the group's operating budget (approximately $2 million per year) and the group's capital budget. Major capital Project management responsibilities were:

  - Interim Waste Storage Facilities for two plants.
  - Automated Steam Generator Manway Removal System.
  - Design and construction of an Emergency Operations Facility and a Radiological Environmental Analysis Laboratory.

- o Radiological Engineer(6/79 - 6/82) - Responsible for development and implementation of environmental, radiological monitoring, radiation protection and effluent monitoring programs, on an ongoing basis, for two nuclear power plants. Responsible for technical project management throughout their life, including cost and scheduling considerations. Participated in the coordination and development of site, county and State emergency plans. Developed scenarios and associated data for Emergency Plan exercises. Set up and ran computer codes to perform engineering analysis in the areas of shielding, radiological assessment, population dose, and probabilistic risk assessment and evaluations.

Consolidated Edison Company of New York Inc. (6/78 - 6/79) - Nuclear Environmental Monitoring Engineer responsible for operation of the nuclear environmental monitoring program at the company's Indian Point No. 2 nuclear plant. This included overseeing the actual field performance of the program by the supervisor and technicians stationed on-site. Other responsibilities included: data analysis, the preparation of radiological monitoring reports, calculation of population doses, and evaluation of a thermoluminescent dosimetry system for use in measuring low-level background radiation.

General Dynamics, Electric Boat Division (6/75 - 6/78)
Radiation Control Engineer with overall responsibility for operation of the environmental radiation monitoring programs at the Division, which included shipyard air monitoring, and environmental background radiation monitoring. Other responsibilities and duties included: develop emergency planning dose assessment techniques and portable sampling/analysis equipment for airborne radioiodines; provide engineering support for development of personnel dosimetry programs; aid in the development of emergency plans; and recommend solutions to Health Physics problems involving the overhaul of Naval Nuclear Reactors.

LORENZO CABRERA

Position

ABB Site Remediation Services - Radiological Safety Engineer/Project Manager

Education

University of Massachusetts-Lowell, Lowell, MA
- B.S., Radiological Health Physics, December 1993
- M.S., Radiological Sciences and Protection, December 1996
- M.S., Candidate, Industrial Hygiene (Completed 26 of a 45 credit program)

Certification
- National Registry of Radiation Protection Technologists
- ABB CENO Project Manager Certification Program (Completed 13 out of 14 courses)

Training
- 40-Hour HAZWOPER General Site Worker (Current)
- 8-Hour Hazardous Material Incident Commander/Supervisor (Current)

Languages
- Fluent in Spanish and English

Experience

Over 16 years of diverse technical and managerial experience in the areas of radiological engineering, health physics, radioactive waste, environment, and health and safety.

ABB Support Services (1993 - Present) - Radiological Safety Engineer/Project Manger responsible for developing, implementing, and maintaining several radiological programs and preparing associated procedures within the Site Remediation Service's Department.

Project Manager responsibilities include planning, scheduling, cost estimates, and overseeing projects ranging from the installation of a waste water processing system (evaporator), radiological assessment of a non-licensed 10,000 square foot building and a 20 acre parcel, the determination of radiological conditions for a post-Decommission & Decontamination (D&D) facility, and the D&D of a radiologically contaminated landfill listed as a SDMP site by the NRC. Specific responsibilities and achievements include:

- Design and development, of a NRC license and Decommissioning Funding Plan for both a Source Materials and By-Product license

- Design, development, and implementation of a Radiation Safety, ALARA, and training program and associated procedures for a SDMP listed landfill.

- Overall radiological responsibilities for the design, development, and implementation of a program to conduct a D&D of the listed SDMP landfill. Those responsibilities include: the development of the site Derived Concentration Guideline Limits using the computer code RESRAD, the design and development of the historical site assessment report, scoping survey, and background assessment plan.

- Performing inspections and audits of radiological buildings to ensure compliance with internal programmatic procedures, 10 CFR and 49 CFR.

- Providing technical support on radiological issues relating to a 600 acre DOE Formerly Utilized Sites Remedial Action Program (FUSRAP) site. The support includes technical oversight of radiological compliance issues dealing with Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and NUREG/CR-5849.

- Radiological Project Manager for a radiological assessment of a Naval site once was used to stored nuclear weapons. The assessment is being conducted using MARSSIM and NUREG/CR-5849.

- Providing technical support on a site which contains Natural Occurring Radioactive Material (NORM). The support includes interfacing with the state radiological group on release criteria for the site.

Senior Health Physics Technician/Consultant (1981 - 1993) - Provided health physics coverage in all aspects of nuclear plant operations and technical support, including ALARA review, general employee training, environmental sampling and radwaste shipments, for eighteen nuclear power plants across the country.

DAVID J. WATTERS

Position

ABB Site Remediation Services - Radiological Safety Engineer/Health Physicist

Education

University of Massachusetts-Lowell, Lowell, MA
- B.S., Radiological Health Physics, December 1993
- M.S., Radiological Sciences and Protection, December 1994

Training
- 40-Hour HAZWOPER General Site Worker (Current)
- US Department of Energy RESRAD training

Experience

Over 4 years of diverse technical and project experience in the areas of radiological engineering and health physics.

ABB Support Services (1993 - Present) - Radiological Safety Engineer/Health Physicist responsible for providing engineering support to a wide range of radiological issues relating to a 600 acre DOE DOE Formerly Utilized Sites Remedial Action Program (FUSRAP) site and other NRC and EPA regulated decommissioning sites. Routine duties include: radiation shielding design, dose modeling, and risk assessment using RESRAD, MicroShield, and INDOS computer codes; evaluation and data reduction of vendor analytical sample results including data validation and review of QA programs and interlaboratory cross-check performance; and technical oversight of a staff of technicians performing radiological surveys in support of operational and decommissioning activities. Specific responsibilities and achievements include:

- Development and implementation of a field and laboratory instrumentation program supporting operational and decommissioning activities
- Review and revision of a Final Status Survey Report to address NRC concerns, which ultimately secured the unrestricted release of a radioactive material storage building
- Management of small to intermediate jobs including the abandonment and environmental control of a large industrial/radiological waste drainage system
- Assisting in the design and implementation of a program to evaluate and decontaminate a sanitary sewer system contaminated with uranium
- Derivation of a mathematical model to separate mixtures of natural, low, and high enriched uranium into individual components using sample results
- Design and implementation of a waste drum gamma spectroscopy assay unit for quantification of uranium

University of Massachusetts-Lowell (1992 - 1994) - Radon Detection Program Administrator responsible for assisting in administering a $50K EPA grant for radon measurements in New England homes. Responsibilities included: training and supervising three laboratory technicians; designing and constructing radon detection system using activated charcoal samplers and NaI(Tl) gamma

spectroscopy system; designing and implementing radon in water analytical program using liquid scintillation; and developing and maintaining a quality assurance program to ensure accurate data reporting and compliance with EPA standards.

University of Massachusetts-Lowell (1993 - 1994) - Teaching Assistant responsible for working with professors as a teaching assistant for two graduate courses, *Radiation Safety and Control* and *Nuclear Instrumentation*. Responsibilities included assisting students, grading homework, designing laboratory exercises, and assembling laboratory instrumentation for use in classes.

University of Massachusetts-Lowell (1992 - 1993) - Assistant to Radiation Safety Officer responsible for assisting the University RSO as an intern. Responsibilities included: performing radiological surveys; analyzing waste for subsequent disposal using gamma spectroscopy; and calibrating field survey instruments, dosimeters, gas flow proportional counters, and liquid scintillation counters.

JAMES J. BLUTE

Position

ABB Site Remediation Services - Radiological Safety Engineer

Education

University of Massachusetts-Lowell, Lowell, MA
- B.S., Radiological Health Physics, December 1993
- M.S., Radiological Sciences and Protection, December 1994

Training
- 40-Hour HAZWOPER General Site Worker (Current)

Experience

Over 4 years of diverse technical and project experience in the areas of radiological engineering and health physics.

ABB Support Services (1993 - Present) - Radiological Safety Engineer responsible for support of the following projects:

Operational Control and DOE FUSRAP decommissioning
Responsible for calibration and maintenance of field survey, air sampling, and laboratory analysis instrumentation. Review, revise, and develop, health physics standard operating procedures. Provide support for oversight of DOE FUSRAP activities including review and evaluation of a site characterization survey plan.

SDMP Cleanup of a Three Acre Industrial Waste Landfill for State of Michigan
Development Radiation Safety Program, Training Program, Standard Operating Procedures, and other plans and documents to support preparation of an NRC Source Material (thorium) License application. Preparing for site scoping survey using Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). Identifying Data Quality Objectives for scoping survey. Deriving site concentration guideline limits using RESRAD computer code for pathway analysis.

University of Massachusetts-Lowell (1994 - 1996) - Teaching Assistant for Radiation Safety Officer responsible for setting up and supervising radiation detection ;laboratories. Graded howework assignments and laboratory reports.

University of Massachusetts-Lowell (1994 - 1996) - Reactor Outreach Program responsible for conducted reactor tours, radiation lectures, and activation experiments for area high school students.

Reynolds Electrical and Engineering (Summer 1994) - Conducted radioactivity analysis on state of the art counting systems including PIP's and Germanium spectroscopy systems, liquid scintillation detectors and proportional counters.

EPA Radon Outreach Program (1993 - 1994) - Maintained EPA listed NaI gamma counting system for analysis of charcoal canister radon samplers. Analyzed water samples using liquid scintillation. Performed over 2000 test on homes in New England. Prepared and performed radon public awareness and mitigation presentations.

Yankee Rowe, Maine Yankee Nuclear Power Plants (1991 - 1992) - Performed health Physics Control Point activities and plant surveys at Yankee Rowe during full power genaration, summer 1991. Performed surveys and job coverage in containment during the 1992 refueling outage at Yankee Rowe. Assisted the ALARA coordinator in the Health Physics office during the 1992 refueling outage at Maine Yankee.

17.0 RADIATION PROTECTION

This section describes items within the Radiological Safety Program (RSP) that will be used to support radiological maintenance of the site, operation of the leachate collection system, and activities leading up to the completion of the site characterization. The characterization survey typically includes: surveying or monitoring, analyses, and/or decontamination activities associated with equipment, earthen areas, and the environment.

Personnel associated with the characterization survey at the Site are instructed by the RSO or duly authorized representative in the requirements of the RSP on hazards associated with ongoing work.

17.1 AREA DESIGNATIONS

The four general work areas are the following: Restricted Area, Radiation Area, Airborne Radioactivity Area, and Contamination Area. These work areas will be established as needed for the purpose of controlling radiation exposure to individuals. Access to these areas shall be restricted to personnel approved by the RSO or duly authorized representative.

Restricted Areas

Restricted Areas are areas or enclosed spaces in which radioactive materials (excluding natural uranium and thorium) are used or stored in quantities whose activities exceed ten times the activity limits stipulated for that material in Appendix C of 10 CFR 20. Restricted Areas shall be conspicuously posted with one or more signs bearing the standard radiation caution symbol and at least the following warning:

Caution
Restricted Area
Notify Radiation Protection Staff Prior to Entry
Radioactive Materials

Radiation Areas

Radiation Areas are those areas accessible to personnel wherein there exists radiation at such levels as to expose a major portion of the body of an occupant to a dose in excess of 2 mrem over a period of 1 hour a dose in excess of 100 mrem over a period of 5 consecutive days. Radiation Areas shall be conspicuously posted with one or more signs bearing the standard radiation caution symbol and the following warning:

Caution
Radiation Area

Airborne-Radioactivity Area

Airborne radioactivity areas include any room, enclosure, or operating area wherein exist airborne radioactive materials in concentrations in excess of those specified in 10 CFR 20, Appendix B, Table 1, Column 1. Airborne radioactivity areas shall be

conspicuously posted with one or more signs bearing the standard radiation caution symbol and the following warning:

Caution
Airborne-Radioactivity Area

Contamination Area
Contamination areas are those areas accessible to personnel wherein there exists a level of removable radioactivity exceeding 200 dpm/100 cm^2 for beta-gamma and alpha. Contamination areas shall be conspicuously posted with one or more signs bearing the standard radiation caution symbol and the following warning:

Caution
Contamination Area

17.2 RADIATION EXPOSURE LIMITS

NRC exposure limits are established to control personnel exposure to ionizing radiation. Federal Regulations (10 CFR 20) outline the maximum exposure that a person may receive. These radiation protection regulations stress maintaining personnel exposure As Low As Reasonable Achievable (ALARA).

17.2.1 Administrative Dose Limits

Individuals who receive 500 mrem external dose in any one calendar quarter, are reviewed by the RSO or duly authorized representative. The RSO or duly authorized representative does have the authority to remove the individual from radiation areas until the review is completed.

17.2.2 Radiation Dose Limits for the Unborn Child

During the entire gestation period, the maximum permissible dose equivalent to the fetus from occupational exposure of the expectant mother shall not exceed 0.5 Rem. It is site policy that exposure of the unborn child to ionizing radiation with site activities be kept to the lowest practicable level.

Training shall include information on the radiation-related biological risk to the embryo and fetus from radiation in accordance with U.S. NRC Regulatory Guide 8.13.

17.2.3 Radiation Exposure to the Public

The RSO or duly authorized representative ensure that as a result of Site activities:

- No member of the public receives a whole body dose in one year exceeding 100 mrem.
- Radiation levels from external sources in unrestricted areas cannot cause an individual in the area to receive 2 mrem in any one hour.

MDNR is committed to the ALARA principle and will maintain all doses to the environment and the public ALARA.

17.3 Personnel External Radiation Monitoring

Thermoluminescent dosimeters (TLD) are worn on the area of the body expected to receive the highest radiation dose; under most circumstances the TLD are worn on the frontal area of the chest or waist. When exposure to extremities (hands and forearms below the elbow, feet and legs below the knees) is expected, or has the potential to exceed 100 mrem per calendar quarter, additional TLD's are worn on the exposed extremity. When additional TLD's are worn, results of TLD processing are included in individual exposure records. Care is taken to ensure separate recording of exposures for extremities or forearms and for the whole body radiation exposure.

In the event of a lost or damaged TLD device, the RSO or duly authorized representative investigates the work area to assign an external dose for the individual. During the investigation, the individual(s) is not allowed into any radiation area.

Individuals will be instructed to immediately notify the RSO or duly authorized representative if they lose or damage their TLD. Lost or damaged TLD's investigations are documented.

In the event that a situation occurs involving the suspected or known exposure of personnel in excess of the regulatory limits, the situation will be promptly investigated and personnel exposures evaluated. This may require special bioassays, radiation surveys, air samples, and TLD device analyses.

Individuals' exposure records are maintained by MDNR at their Lansing office. Reports of exposures are provided to individuals upon written request.

17.4 Personnel Internal Radiation Monitoring

Personnel internal monitoring is undertaken to characterize the personnel internal exposure to radiation (mr/hr), airborne concentrations (DAC-hrs), and surface contamination (dpm/100 cm^2). Information gathered is used to ensure the adequacy of the levels of protection being used at the site, and may be used as the base for upgrading or downgrading the levels of protection in conformance with action levels provided in the RSP and at the direction of the RSO or duly authorized representative.

Internal radiation exposure is maintained within the limits of 10 CFR 20 which specifies the DAC of radioactive materials in the air for controlled areas (occupational exposure) and general access to the public areas (non-occupational exposure).

17.5 Radiation Instrumentation

Radiological instruments used to detect radiation are inspected prior to use. At a minimum, the inspection consists of ensuring that the instrument has a current

calibration sticker, the batteries fall in the functional range of the instrument, and there is no physical damage to the instrument.

Radiological instruments are calibrated by the manufacturer or similar vendor annually using standards traceable to the National Institute of Standard and Technology (NIST). Certificates of the calibration are maintained at the MDNR office in Lansing, Michigan.

Verification response checks are performed daily, at a minimum, on days instruments are used and in accordance with the RSP.

Radiological instruments that fail daily verification tests, that have exceeded their calibration dates, or are physically damaged, are tagged out and removed from service. The RSO or duly authorized representative is notified of suspect instruments.

17.6 SURVEYS

Radiation Surveys

Radiation surveys are performed to ensure that individuals do not exceed administrative exposure limits and the work areas are properly posted. Surveys are performed to determine whether abnormal radiation levels exist and to determine the extent and magnitude of radiation levels. Surveys are documented and reviewed by the RSO or duly authorized representative.

Contamination Surveys

Contamination surveys are performed to ensure that individuals are not working in contaminated areas without proper protection. Contamination surveys are performed to determine whether contamination is present and the extent and magnitude of contamination levels. Contamination surveys are normally performed prior to the start of the job, during the job, and at the completion of the job. Surveys are documented and reviewed by the RSO or duly authorized representative.

Fixed Contamination Surveys

Fixed contamination surveys are performed to ensure individuals are protected while working in areas where contamination could be released. Fixed contamination surveys are performed to determine if fixed contamination is present and to the extent and magnitude. Surveys are documented and reviewed by the RSO or duly authorized representative.

APPENDIX A

FIGURES

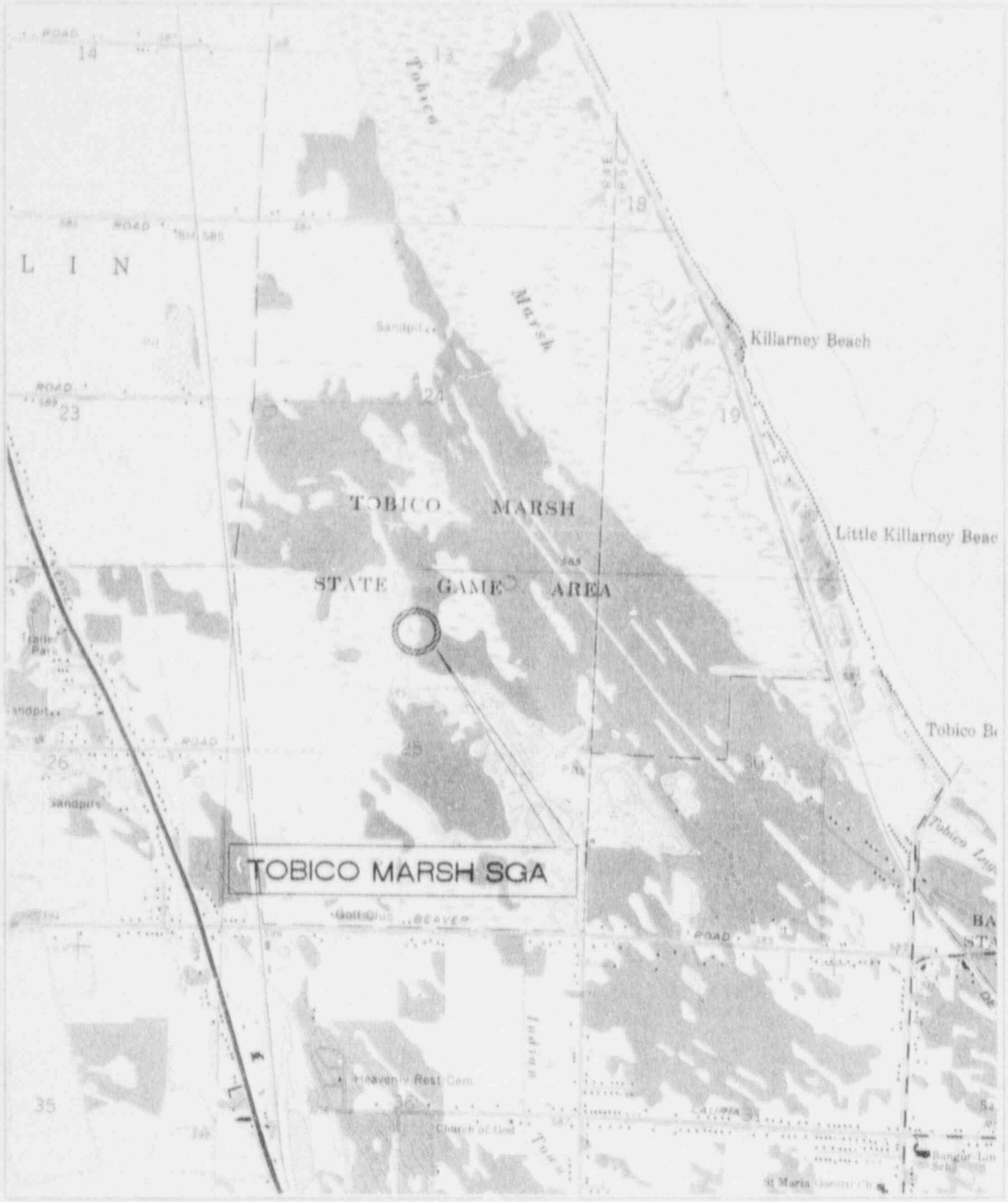

FIGURE II-1
SITE LOCATION MAP
TOBICO MARSH SGA
MICHIGAN DEPARTMENT OF NATURAL RESOURCES
BAY COUNTY, MICHIGAN

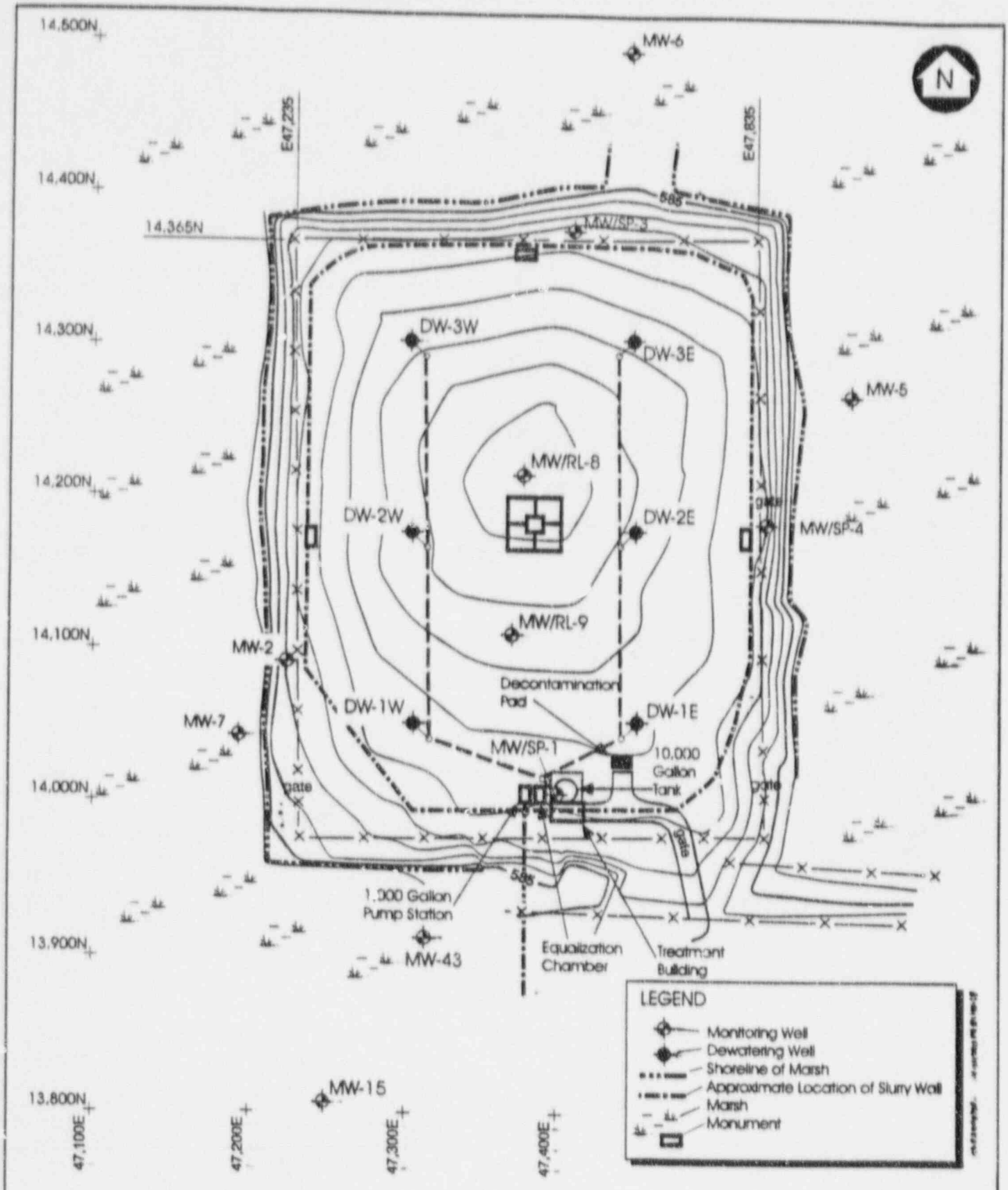

FIGURE II-2
TOBICO MARSH SGA SITE
MICHIGAN DEPARTMENT OF NATURAL RESOURCES
BAY COUNTY, MICHIGAN

P:\TOBICO\D9285-01\CWGP9605007D.CDR

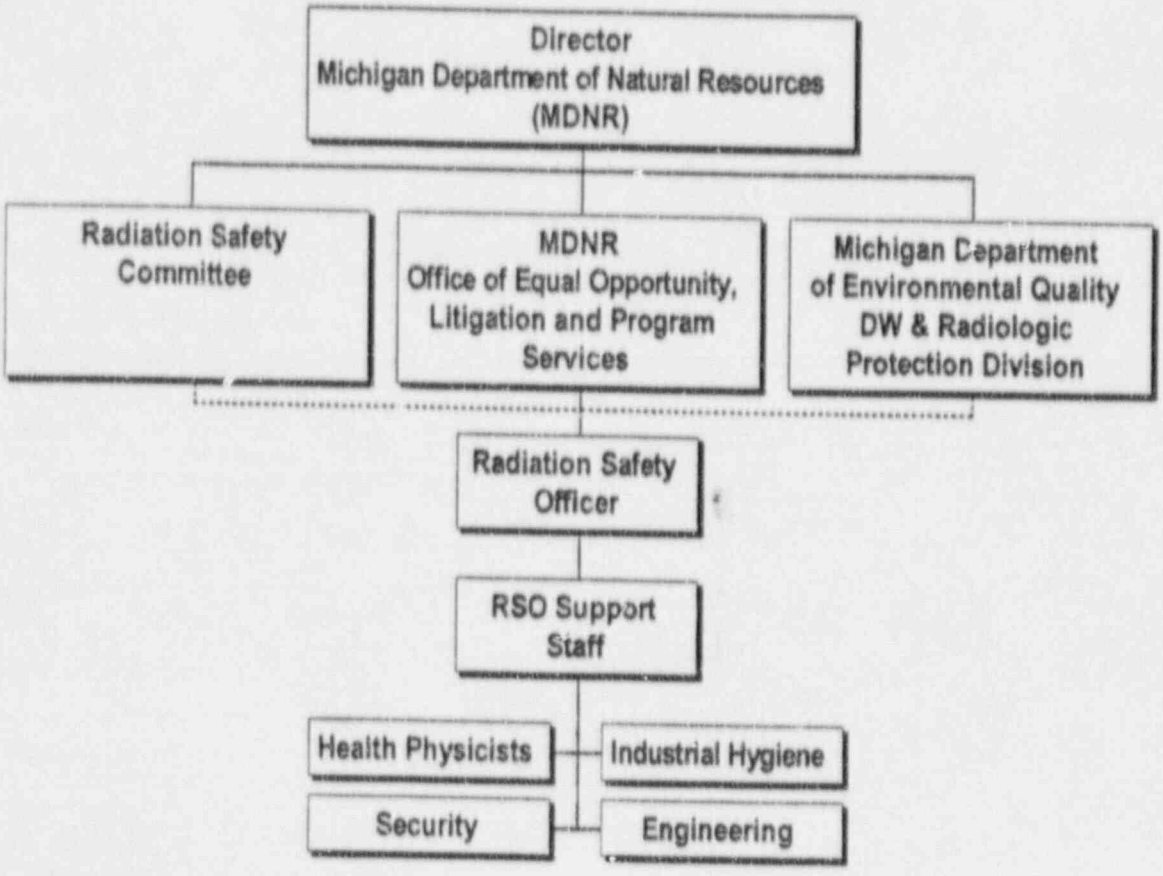

FIGURE II-3
ORGANIZATION
TOBICO MARSH STATE GAME AREA SITE