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September 15, 2005

Mr. David Nelson
Program Manager
Materials Decommissioning Section
Decommissioning Directorate
Division of Waste Management and Environmental Protection
U.S. Nuclear Regulatory Commission
Mail Stop: P-7E18
Washington, DC 20555-0001

Subject: Submittal of the QAPP and the Health and Safety Plan for Site Decommissioning
SCA Hartley & Hartley Landfill Site, Kawkawlin Township, Michigan
NRC Source Material License No. SUC-1565

Dear Mr. Nelson:

As requested by the USNRC in their October 14, 2004, letter requesting additional information with regard to the Decommissioning Plan for the SCA Hartley & Hartley Landfill, RMT is providing four copies each of the Quality Assurance Project Plan (QAPP) and the Health and Safety Plan. With the exceptions of the QAPP and the HSP, Waste Management's May 9, 2005, letter had provided all of the other information requested in the USNRC's October 14, 2004, letter. Submittal of the fully developed QAPP and HSP completes Waste Management's response to the USNRC's request for additional information to complete its review of the Decommissioning Plan (RMT, November 2003).

The enclosed documents were developed on the basis of the scope of the decommissioning activities described in Section 8 of the Decommissioning Plan. Upon formal approval of the Decommissioning Plan by the USNRC, and upon the development of supporting design documents for site decommissioning and remediation, the QAPP and the HSP will be reviewed and modified as necessary, to ensure the appropriateness and adequacy of the quality assurance and health and safety procedures.

Please call either Phil Mazor, at (616) 688-5777, extension 17, or me, at (608) 662-5307, if you have any questions concerning the QAPP or the Health and Safety Plan.

Sincerely,

RMT, Inc.

Linda Hicken

Linda E. Hicken, P.E.
Senior Project Manager

cc: Gene Bonano - USNRC Region III
Phil Mazor - Waste Management, Inc.
Jim Forney - Waste Management, Inc.
Rachel Schneider - Quarles & Brady
Bill Thomas - Integrated Environmental Management, Inc.
Gene McLinn - RMT, Inc.

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Health and Safety Plan for Site Decommissioning Activities

SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

September 2005

Prepared For
S.C. Holdings, Inc.

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Section 1
Introduction

1.1 Background

This Health and Safety Plan (HSP) for field decommissioning activities at the SCA Hartley & Hartley Landfill Site (the site) was developed to support the USNRC's review of the Decommissioning Plan for this site (RMT, 2003). At present, the USNRC has not formally approved the scope of the site decommissioning activities; however, on the basis of an April 19, 2005, telephone conversation with Mr. David Nelson, the USNRC project manager for this site, it is S. C. Holdings, Inc.'s understanding that the USNRC is in agreement with S. C. Holdings' planned decommissioning activities.

This HSP was developed on the basis of the decommissioning activities described in Section 8 of the Decommissioning Plan, which includes conceptual designs for an engineered cover over the Northwest Landfill and for a leachate collection system in the Northwest Landfill (the field decommissioning activities are summarized in Subsection 1.4 of this HSP). Engineering plans and specifications will be developed as part of a future submittal. Upon formal approval of the Decommissioning Plan by the USNRC, including the Quality Assurance Project Plan (RMT, 2005), and the development of supporting design documents, this HSP will be reviewed and modified as necessary, to ensure the appropriateness and adequacy of the health and safety procedures.

In addition to the decommissioning activities required by the USNRC, S.C. Holdings is also conducting environmental response activities to address chemical contamination at the site under the State of Michigan's Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended. The state response activities are being conducted pursuant to the November 7, 1980, Stipulation and Consent Order for Closure ("Order"), as modified by the September 25-28, 1984, Amendment to the November 7, 1980, Stipulation and Consent Order for Closure ("Amendment"), both of which were augmented and modified by the December 2, 2002, Addendum by Consent for Payment of Past Response Activity Costs, Future Oversight Costs, and Performance of Response Activities ("Addendum"), all of which were entered into with the Michigan Department of Environmental Quality (MDEQ).

At present, the MDEQ is reviewing the Remedial Investigation (RI) Report, which also includes an Ecological Risk Assessment (Earth Tech, 2003). Upon approval of the RI Report by the

MDEQ, S. C. Holdings will submit a combined Feasibility Study/Remedial Action Plan (FS/RAP) to evaluate alternatives for addressing chemical concerns and to select a remedy to address chemical contamination at the site. The RAP is the State's decision document for a site, analogous to the USNRC's Decommissioning Plan. Ultimately, a single remedy for the site, including, in this instance, the Northwest Landfill, the East Landfill, the MDNR Landfill (to address chemical concerns only), and nonlandfilled areas, will address the radiological and chemical concerns, and will meet the more stringent of the applicable requirements established by USNRC and the MDEQ.

In addition to consolidating the thorium-bearing slag in Slag Piles A and B into the Northwest Landfill, improving the cover over the Northwest Landfill, and installing a leachate collection system (wells and header piping) in the Northwest Landfill, S.C. Holdings anticipates that, as part of the Part 201 response action, soil/sediment containing chemicals of concern above State-approved criteria will be excavated from certain areas at the site and placed on the East Landfill, after which an improved cover will be constructed over the East Landfill. Long-term monitoring and maintenance activities required by the State are expected to be conducted for a period of at least 30 years following completion of the Part 201 response activities.

If the field activities for both site decommissioning and remedial response programs are conducted during the same mobilization, this HSP will need to be modified to also address potential chemical exposures and physical hazards associated with the remedial response actions.

1.2 Scope of the Decommissioning Health and Safety Plan

This HSP contains an assessment of the hazards at the site based on existing information and knowledge of the conditions at the site (Section 2). It also contains a site-specific Health and Safety Plan to address potential physical hazards associated with the construction of the cover over the Northwest Landfill and the installation of the leachate collection system in the Northwest Landfill (Section 3), and provides the radiation safety requirements for the field decommissioning activities (Section 4).

1.3 Overview of the Health and Safety Program

On-site health and safety will be monitored by the Health and Safety Officer (HSO), operating under the direction of the Radiation Safety Officer (RSO), and pursuant to the requirements of the license. As necessary, the HSO will conduct tailgate safety training, implement the surveillance and individual monitoring programs, perform release surveys for personnel and equipment during decommissioning operations, and maintain all health and safety records generated during the decommissioning efforts.

The Decommissioning Contractor's operations, and those of all subcontractors, will be governed by procedures that meet the requirements of 10 CFR 19 and 20, and License No. SUC-1565. The procedures described in the Radiation Safety Program (Waste Management, 1993) were reviewed by the USNRC as part of the license application process. At a minimum, the Decommissioning Contractor will maintain copies of the following procedures, along with their technical basis, at the site for regulatory inspection:

- Radiation Safety Program
- Training and qualifications of radiation protection and safety personnel
- Training requirements in radiation, chemical, and industrial safety
- Medical surveillance and radiation exposure monitoring
- Instrumentation

Copies of these procedures, as applicable, are present at the site, and will be updated as appropriate. Deviations from the procedures will be approved by the RSO. In addition, copies of the USNRC-approved Decommissioning Plan and the Quality Assurance Project Plan will be present at the site.

Each member of the project team will assume certain health and safety responsibilities. These will include, but are not limited to, the following:

- The RSO will be responsible for overseeing implementation of the Radiation Safety Program and making changes to reflect field conditions that were not anticipated during that program's development. Changes to the Radiation Safety Program will be made only with the approval of the RSO.
- The HSO will be responsible for implementing this HSP, and for recommending to the RSO any changes to the HSP.
- The designated health and safety contact for each subcontractor will be responsible for verifying field implementation of the HSP's provisions. This will include communicating site requirements to all personnel on the job, supervising field activities, and consulting with the HSO regarding appropriate changes to the USNRC-approved Decommissioning Plan.
- All on-site project team members will be responsible for understanding and complying with all site health and safety requirements, including proper maintenance of health and safety equipment and facilities. This understanding will be documented by signature prior to any team member being authorized to work on decommissioning operations.

S.C. Holdings will provide a workplace in which employees, visitors, and contractors are adequately protected from hazards, including the hazards associated with exposure to radiation

and radioactive material. While the exposures associated with the planned decommissioning operations are low, all exposures are assumed to entail some risk to employees, visitors, and contractors. As stated in Section 10 of the Decommissioning Plan (RMT, 2003), S.C. Holdings has adopted the following three principles to govern decommissioning work activities with the potential for exposure to radiation or radioactive materials:

- No activity or operation will be conducted unless its performance will produce a net positive benefit.
- Radiation exposures will be kept As Low As Reasonably Achievable (ALARA), considering economic and societal costs.
- No individual will receive radiation doses in excess of federal limits.

The ALARA requirement will be communicated to all subcontractors at the outset of this project. All individuals must understand their responsibilities to reduce their radiation exposure. Methods to be used to reduce exposure will be reviewed during general employee training and tailgate safety training. Monitoring and surveillance information will be summarized and reviewed by the workforce on a planned and periodic basis. Requirements to implement the ALARA program at the SCA Hartley & Hartley Landfill Site are described in the Radiation Safety Program (Waste Management, 1993).

1.4 Summary of the Field Decommissioning Activities

The conceptual design for the site decommissioning activities was presented in Subsection 8.3.2 of the Decommissioning Plan (RMT, 2003). The delineation of survey units is shown on Figure 1. Engineering plans and specifications will be prepared in a future submittal. In general, the field decommissioning activities will involve the following tasks for which the health and safety procedures described in this Plan will be applicable:

- Site mobilization
- Installation of erosion control and sediment control systems
- Excavation of the regulated materials in Slag Piles A and B (Survey Units 1A and 1B) and placement of these materials in suitable areas in the Northwest Landfill (Survey Unit 1C).
- Installation of a leachate collection system in the Northwest Landfill (Survey Unit 1C), which will include the installation of approximately four leachate extraction wells in the Northwest Landfill, the installation of leachate transfer piping within the Northwest Landfill, and the below-grade connection of the transfer piping to the existing leachate header pipe that was previously installed by the MDNR on the SCA Hartley & Hartley Landfill to transport leachate from the MDNR Landfill to a load-out facility in the southeastern corner of the SCA Hartley & Hartley Landfill site property.

- Construction of an engineered barrier over the Northwest Landfill (Survey Unit 1C) will involve removing the surface vegetation (grass), placing a minimum of 10 inches of imported low-permeability soil and a minimum of 6 inches of imported topsoil, and seeding the topsoil layer.
- Collection of surface soil samples in the Class 2 survey unit surrounding the Northwest Landfill (Survey Unit 2C), and in the Class 3 survey areas, except for the East Landfill (soil samples will not be collected in the East Landfill because the historical data for the East Landfill are sufficient for the final status survey).
- Collection of residual surface soil in the areas where Slag Piles A and B (Survey Units 1A and 1B) were excavated, and collection of surface soil samples in the haul roads used to transport material from Slag Piles A and B to the Northwest Landfill (Survey Units 2A and 2B).
- Site demobilization.

Health and safety concerns associated with the startup, operation, and maintenance of the leachate collection system in the Northwest Landfill will be addressed in a future health and safety plan(s).

Descriptions of the engineered cover over the Northwest Landfill and the leachate collection system in the Northwest Landfill, which were presented in the Decommissioning Plan, are provided below.

Engineered Cover Over the Northwest Landfill

Construction of the cover will be initiated through preparation of the final subgrade for cover construction. Surface drainage systems will be constructed that will direct surface runoff from the cover away from the landfilled material. Cover preparation may involve the physical movement of slag and other materials using standard construction equipment (front-end loaders, bulldozers, dump trucks), such that effective consolidation and compaction are achieved.

Water and/or other appropriate dust-control media will be used during all material movement activities. Monitoring and appropriate dust control activities will be performed to minimize vehicle-induced fugitive dust generation. Material loading and unloading activities will also be monitored and controlled in a similar fashion.

The final cover will be constructed over a prepared subgrade. The barrier layer in the final cover will consist of a compacted soil that is 0.9 meter (34 inches) thick. The 34-inch–thick barrier layer will be comprised of existing clay (estimated to be approximately 24 inches thick) and imported low-permeability soil (a minimum of

10 inches), which will be overlain by 6 inches of topsoil that will be seeded with low maintenance, drought-resistant grass. The total thickness of the earthen cover materials (clay and topsoil) will be 40 inches.

Surface water drainage features, such as diversion berms, will be constructed, as necessary, to control surface water runoff and the erosion that can result.

Leachate Extraction System in the Northwest Landfill

The leachate extraction system will consist of four wells approximately 15 feet deep, and piping that will transfer the leachate from the Northwest Landfill to the leachate storage and load-out facilities for the East Landfill.

The leachate extraction wells and piping in the Northwest Landfill will be installed during the field mobilization for consolidating Slag Piles A and B into the Northwest Landfill and upgrading the cover over the Northwest Landfill.

The appropriateness and adequacy of the health and safety procedures contained in this Plan will be reviewed and modified as necessary, after the engineering plans and specifications for the cover and leachate collection system for the Northwest Landfill are developed.

Section 2
Hazard Assessment

Section 2
Hazard Assessment

2.1 General Information

Project:	SCA Hartley & Hartley Landfill Site	**Project Number:**	6115.31
Site Address:	Kawkawlin Township, Michigan	**Project Manager:**	Linda Hicken
Prepared By:	Gene McLinn/Linda Hicken	**Date:**	August 2005

Approved By: _____ (PM) _____ (HSO)

Linda Hicken — Bill Thomas, CHP, CIH-Integrated Environmental Management, Inc.

Date: _____ _____

Proposed Scope of Work and Specific Tasks: Implement the site decommissioning activities described in the Decommissioning Plan (RMT, 2003), which are summarized in Section 8 of the Decommissioning Plan.

RMT Role On-site:
- ☐ Resident Project Representative (*e.g.*, "Observe and Document")
- ☐ Construction Manager (*e.g.*, Managing Contractor/General Contractor)
- ☐ Representative for Client (*e.g.*, "Agent for Owner")
- ☒ Other (describe) Decommissioning Contractor (as defined in the Decommissioning Plan [RMT, 2003] and Quality Assurance Project Plan [RMT, 2005]).

Proposed Dates of On-site Work: To be determined.

Background Information Review: ☐ Preliminary ☐ Moderate ☒ Substantial

Documentation/Summary Overall Hazard: ☐ Serious ☒ Moderate ☐ Low ☐ Unknown

2.2 Site Characterization

Facility Description: State Natural Area

Status: ☐ Active ☒ Inactive ☐ Unknown

Operations (current and past): No operations in the vicinity of the planned work.

Unusual Features (utilities, terrain, etc.): Wetlands, with seasonal standing water.

History (worker or nonworker injury, complaints from public, previous agency action): **The landfill is a former waste disposal facility that accepted municipal and industrial waste from the 1950s until 1978. There are two main disposal areas on the site—the Northwest Landfill and the East Landfill. During the period from 1970 to 1972, foundry slag containing radioactive thorium and progeny was disposed in the Northwest Landfill, and in two small slag piles outside of the Northwest Landfill (Slag Piles A and B). There are no records of disposal of thorium-bearing slag outside the Northwest Landfill and the two slag piles. In 1995, the USNRC issued Source Materials License No. SUC-1565 to S. C. Holdings, Inc., for storage of radioactive thorium and uranium in slag/waste at the SCA Hartley & Hartley Landfill Site.**

The Decommissioning Plan and this associated Health and Safety Plan are being prepared in order to describe the activities to support decommissioning and document the method used by the USNRC to terminate the license. The site decommissioning activities must be approved in advance by the U. S . Nuclear Regulatory Commission (USNRC). The Michigan Department of Environmental Quality (MDEQ) provides oversight to remedial response activities pursuant to the Michigan Part 201 program.

2.3 Site Classification:

Site Type Allocated: ☐ 1 Known or controlled hazards ☒ 2 Known and/or controlled hazards, but with invasive or hazardous activities ☐ 3 Regulated by 29 CFR 1910.120

Comments:

2.4 Hazard Evaluation

Potential Chemical Hazards:

SUBSTANCE NAME (1)	PHYSICAL STATE	KNOWN CONCENTRATION LEVELS PRESENT (2)	POTENTIAL ROUTES OF EXPOSURE	ACGIH TLV	OSHA PEL
Thorium-232	Solid	< 20 picocuries per gram (pCi/gm)	Ingestion, skin contamination	11 pCi/gm in solids	The USNRC Derived Air Concentration (DAC) is $5x10^{-13}$ microcuries per cubic centimeter of air (µCi/cc)
Uranium-238	Solid	< 3 picocuries per gram (pCi/gm)	Ingestion, skin contamination	7 pCi/gm in solids	DAC is $1x10^{-12}$ µCi/cc
Radium-226	Solid	< 1 picocuries per gram (pCi/gm)	Ingestion, skin contamination	5 pCi/gm in solids	DAC is $9x10^{-13}$ µCi/cc
Fuel-related VOCs	Water	Benzene: 630 µg/L Ethylbenzene: 440 µg/L Xylenes: 1,200 µg/L	Inhalation, skin, ingestion	Benzene: 0.5 ppm Ethylbenzene: 100 ppm Xylenes: 100 ppm	Benzene: 1.0 ppm Ethylbenzene: 100 ppm Xylenes: 100 ppm

(1) Attach MSDS if available.

(2) Specific data are provided in the Decommissioning Plan, Subsection 4.4 and Tables 4-6 and 4-7.

Ionizing Radiation:

Did the "client" use radioactive materials on site, past or present: ☒ Yes (complete table below) ☐ No

Possibility of contamination or exposure due to past or present use of radioactive materials: ☒ Yes (complete table below) ☐ No

SOURCE	QUANTITY	PHYSICAL STATE	POTENTIAL OF EXPOSURE	CONTROL MEASURE
Potential fallout from incinerator	< 1 pCi/gram of Thorium 232 in surface soil, downwind of the incinerator	Particulates in soil	Low	Restricted areas, engineering controls (*e.g.*, water and/or other appropriate dust control media), personal protective equipment, and monitoring instruments
Disposal of thorium-magnesium slag from Wellmann Dynamics	< 20 pCi/gram of Thorium 232 in the slag buried in the Northwest Landfill. Complete characterization of slag and surrounding soil in Table 5-4 of the Decommissioning Plan (RMT, 2003)	Slag	Low	Restricted areas, personal protective equipment, and monitoring instruments

If the answers to the above questions are both No, this table will remain blank.

Will a nuclear moisture/density or XRF gauge be used on site? ☒ Yes (see below) ☐ No

If yes, will it be a RMT gauge? ☒ Yes (see below) ☐ No (see Subcontractor H&S Qualifications/ Performance Form)

If the answer to any questions in this section is "Yes," send a copy of the Hazard Assessment and Health & Safety Plan to the RMT Radiation Safety Officer (RSO).

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Bending/Stooping	To help prevent injury to back or leg joints, avoid excessive bending or stooping, especially while lifting or moving objects.
Chemicals – as Physical Hazards	In addition to the potential exposure to chemicals through inhalation, ingestion, or dermal contact, many chemicals also pose a physical hazard. Some general physical hazard examples to consider for chemicals found on-site might be: ■ liquid combustibility ■ gases under high pressure ■ extremely high or low pH (corrosivity) ■ explosiveness (LEL and UEL) ■ flammability (LFL and UFL) ■ organic peroxides ■ oxidizers ■ pyrophoric materials ■ reactive (unstable) materials ■ water-reactive materials ■ shock-sensitive materials. If any chemicals on site are characteristic for one of these physical hazards, the chemical and hazard should specifically be addressed in the HSP under site control measures, PPE, etc.
Cold Stress	Work schedules may be modified when temperatures are below 20° F as measured by the wind chill factor. Take frequent breaks to warm up. Drink plenty of fluids. Wear appropriate clothing, and monitor for cold stress symptoms (frostbite, hypothermia, etc.).
Confined Spaces (storage tanks, underground utility vaults, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, tunnels, pipelines, manholes, and some open top spaces more than 4 feet in depth, such as trenches, excavations, pits, tubs, vaults, and vessels, etc.)	Confined spaces will not be entered unless a confined space entry permit has been completed, signed, and approved, and all participating personnel are trained in confined space entry procedures, including safety, and rescue procedures. If required, attach and implement the requirements of RMT's confined space entry program (Confined Space Program). Contact your HSC for assistance with implementing the program.
Drum Handling	If drums are used or encountered on-site, they should be clearly labeled with the name of the contents. Drums should only be handled with the appropriate equipment.

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Dust	For general dust, work should be performed up-wind if possible. ***If conditions warrant it,*** monitoring should be done with a particulate/aerosol monitor (mini-ram). Monitoring should occur at least 3 times per day, and every time re-entering the site. Readings should be taken downwind from the work area or inside the equipment work area as indicated by the conditions on site. If the OSHA PEL is exceeded, or is likely to be exceeded, engineering or administrative controls should be used, or a dust respirator must be worn. For hazardous dusts, a detailed air monitoring plan and a respiratory protection plan should be developed for the site activities.
Energized Sources (electrical equipment or hookups, lines, etc.) (lockout/tagout)	Lockout/tagout will not be performed unless all participating personnel are trained in lockout/tagout procedures, and the requirements of RMT's lockout/tagout program are fully implemented. Contractors for all electrical activities, and any facility equipment with moving parts should follow proper lockout/tagout procedures, and only properly trained employees will perform the work. Employees will not perform any lockout/tagout activities unless personnel are properly trained in lockout/tagout procedures. Heed any caution signs or labels. If required, attach RMT's lockout/tagout program (Lockout/Tagout). Contact your HSC for assistance with implementing the program.
Equipment Exhaust	Equipment exhaust should be ventilated away from the work area while drilling inside structures. Industrial fans can be used to move exhaust out of the area.
Evening or Early Morning Work	If work is performed during the evening or early morning hours, work should be limited by the availability and the quality of artificial lighting. Care should also be taken to avoid slip, trip, and fall hazards that are not as easy to identify during low light conditions.
Excavations/Trenches	Each project must provide a competent person on site, if one is required by the planned activities. Where required, all requirements of RMT's excavation program (Trenching and Excavation) shall be implemented which includes completion of the excavation permit form (Form F158). Side cuts should conform to 29 CFR 1926 Subpart P "Excavations" requirements, or shoring should be used. All open excavations should be secured using traffic cones, barrier tape, or barricade signs stating "Do Not Enter Excavations," especially if left open overnight. Be aware that some excavations and trenching may result in a confined space condition. If possible, stay clear of excavations and trenches because of fall hazards.
Field Equipment	If field equipment is heavy or awkward to carry, get assistance or use carts, etc. to help move around the site.

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Fire Sources	Eliminate sources of ignition in work areas that have ignitable sources. Provide an ABC fire extinguisher in close proximity to the support zone.
Hand Tools	Use only the appropriate tool for the task at hand. Use the tool(s) as designed, described, and intended by the manufacturer. Do not use screwdrivers as hammers, or chisels as screwdrivers, etc. Misuse of hand tools is a common cause of injuries.
Heat Stress	The work schedule may be modified if the ambient temperature is higher than 80°F. Take breaks as necessary, and drink plenty of fluids. If necessary, wear sunscreen and sunglasses on bright days. Monitor site personnel for signs of heat stress (heat rash, heat cramps, heat exhaustion, or heat stroke).
Heavy/Contractor Equipment (drill rigs, trucks, trackhoes, backhoes, scrapers, dozers, fork lifts, etc.)	Contractor is responsible for the safe operation of equipment. All mobile heavy equipment must have a functioning backup alarm and other safety features, and operators must comply with equipment manufacturers' instructions. Equipment must be maintained in good working condition. Any loads being carried by equipment must be balanced and stable before moving. Equipment must maintain a safe working distance from utilities, buildings, excavations, and slopes. Maintain proper distance, and remain in line of sight of operator and out of reach of equipment. Isolate equipment swings, if possible. Make eye contact with the equipment operator before approaching the equipment. Understand and review hand signals, and wear an orange safety vest, if necessary. RMT employees will not operate heavy equipment on-site unless they are properly trained, and RMT has been contracted by the client to perform such activities.
Heavy Lifting	Use proper lifting procedures and equipment when handling heavy objects such as drums, bags of bentonite, manhole covers, tank covers, etc.
Housekeeping	All field vehicles, job trailers, and field offices will be properly cleaned and organized to prevent cluttered work and storage areas.
Hunters	Be aware of surrounding activities that may involve hunting, firearms, etc., that may not be in your immediate area, but could create an unsafe work environment.

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Ice (thin)	When project activities include either crossing ice or working directly on the ice, a detailed plan should be developed that will be used to continually evaluate the ice conditions, and to determine when work should be terminated due to unsafe conditions. All staff working on the ice will wear an appropriate and approved personal floatation device. Other emergency equipment such as ropes, a throwable floatation device, a means to warm a wet and cold worker, etc. A buddy system should also be used for this type of work, such that one person is always on shore or at least on previously determined safe ice.
Illumination	Do not enter areas where visibility is inadequate to allow safe movement and work. Wear reflective clothing or vests if working in low light conditions and there are traffic concerns. Adequate lighting should be provided prior to work beginning.
Insects	Site workers with known allergies to insect bites should carry their own medication. It is also a good idea to inform fellow workers of the allergy, in case of emergencies. Use insect repellant as necessary, and as specifically allowed on site. If possible, wear long-sleeved shirts and pants. If appropriate, check for ticks at the end of each day. Have other appropriate first aid supplies handy for bites. Some insects such as the African Bee (commonly known as the killer bee) are highly irritable and may chase a victim for more than a half mile with the intent to sting. If chased by a swarm of attacking bees, run as fast as possible and in a straight line away from the nest. Batting them away will only agitate them further. Common areas for nests are hollow trees; in the ground; in walls; in dense vegetation; under building overhangs; in piles of debris; in well casings; etc. If you must work near a bee's nest wear protective clothing (thick and light colored), and avoid attracting the bees with scented lotions, deodorants, or perfumes. Noise can also disturb bees from as far away as 100 feet. Plan an escape route prior to beginning work.
Landfill Gas (methane, CO_2, hydrogen sulfide)	Avoid breathing gas, especially in low oxygen areas (simple asphyxiate). Potentially flammable and explosive, so keep ignition sources away from gas. Explosive conditions of LEL >5% in a work area should be ventilated as soon as possible, or the area should be evacuated.
Leachate (MSW)	MSW leachate may contain hazardous biological substances, so avoid physical contact with leachate, and if possible, stay up-wind. If contact is made with leachate, wash affected areas thoroughly with soap and water. If boots contact leachate, they should be thoroughly washed with soap and water also.

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Long Work Hours	Long work hours can lead to fatigue, and fatigue can lead to the physical inability to perform the work in a safe manner, or travel to, or from, a work site in a safe manner. If long work hours are scheduled, or if the scheduled work takes longer than planned, field staff should determine if fatigue is, or will be, an issue. Field staff should evaluate whether they are able to complete the work in a safe manner, or whether they are able to travel in a safe manner. If fatigue is an issue, appropriate breaks should be planned or taken, including overnight stays when necessary.
Material Storage and Handling	Move containers and heavy material only with the proper equipment, and secure them to prevent dropping, falling, or loss of control during transport. Stay clear of material handling operations, especially near slopes. Do not stand down the slope from equipment, supplies or materials being moved above on the slope, or being deployed onto the slope. Stored material may be a falling hazard, or a crush hazard. Do not stand adjacent to materials stacked up, such as pipes, geosynthetic rolls, etc., or in the area of deployment.
Municipal Solid Waste (MSW)	MSW may contain hazardous biological substances, so avoid physical contact, and if possible, stay up-wind. Wear appropriate PPE, such as gloves, safety shoes, and safety glasses. Wash hands, arms, and face after working near MSW. Reusable PPE and equipment should be thoroughly decontaminated after exposure to MSW. MSW may also contain sharp objects with the potential to puncture PPE.
Noise	Hearing protection must be worn when noise levels exceed 85 dBA in the work area. If you need to raise your voice to be heard at the work site, then hearing protection should be worn. Hearing protection will be worn near drill rigs.
Overexertion	Avoid overexerting yourself by planning your work to include adequate breaks or rest periods. Overexertion can lead to fatigue or physical injury, or contribute to the development of other hazards such as heat stress.
Power Tools	Power tools should only be used by experienced individuals, and power tools should only be used for their intended use. Power tools should be inspected prior to use, especially the electrical cord, and all safety devices should be intact and functioning properly. If the power tool generates significant vibrations, padded anti-vibration gloves should be worn, if possible. Power tools with cords that are used outdoors should have proper cords and be connected to a circuit protected by a GCFI.
Sample Preservative Chemicals	Wear safety glasses and nitrile gloves when adding preservative chemicals to sample bottles or vials. Have clean wash water near by.

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Severe Weather	Work may be suspended if dangerous weather conditions (lightning, tornadoes, high winds, heavy rain, freezing rain, etc.) occur. Be aware of changing weather conditions, and be prepared to take shelter as necessary. Potential shelters should be identified prior to beginning work.
Sharp Objects	Wear appropriate gloves when handling sharp objects, or use appropriate equipment to move objects.
Slips, Trips, and Falls	Maintain clear walkways for work areas. Exercise caution, especially on slopes, and field trailer floors and stairs, after a precipitation event. Use slip resistant boots, or implement surface preparations to eliminate the slippery nature of the surface prior to accessing the area. Spill control measures and general housekeeping should be utilized to help prevent slipping on wet floors, wet pavement, and general work areas. Uneven or steep terrain can cause hazardous conditions for walking and transporting equipment around the site. Site personnel should use caution when working on uneven surfaces, and they should avoid working down-slope from heavy equipment, or materials being moved or stored.
Steep Slopes and Banks	Pay attention to footing and walking. Stay a safe distance from unstable or extremely steep slopes. Wear appropriate footwear. Be aware of potential slope or bank failures. Heavy equipment should not be operated on or near unstable slopes of banks.
Strong Nuisance Odor	Strong odors should be ventilated before entering a work area, or a respirator shall be worn as needed.
Surface Water	Working next to or on, bodies of water shall be done using the buddy system. Staff shall wear USCG-approved personal floatation devices .
Terrain	Uneven or steep terrain can cause hazardous conditions for walking and transporting equipment around the site. Site personnel should use captain when working on uneven surfaces, and they should avoid working down-slope from heavy equipment or materials being moved or stored.
Traffic	Obey all posted speed limits. Park in designated areas only. Be aware of traffic patterns on site, and access to the site. Use orange traffic cones and barrier warning tape, as needed, or if within 25 feet of the right-of-way. RMT personnel must wear orange safety vests when working in or near traffic areas.
Trenching	RMT personnel will not enter trenches not in accordance with 1926 Subpart P. Be aware that some trenching conditions may results in a confined space condition.

PHYSICAL HAZARD	GENERAL CONTROL MEASURE
Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)	Temporary wires, cords, hoses, etc., should be properly located, marked, and protected to help prevent tripping and disruption to work activities. Trip hazards are particularly a problem early in the morning, late in the day, or under other poor lighting conditions.
Utilities – Underground (electric, gas, telephone, water, storm sewer, sanitary sewer, cable-TV, etc.)	Subcontractor, client, or RMT will call Digger's Hotline to locate all underground utilities. The owner or client will be responsible for marking all applicable on-site underground utilities, product lines, pipes, and tanks.

Section 3
Site Health and Safety Plan

3.1 General Information

Project:	SCA Hartley & Hartley Landfill Site	**Project Number:**	6115.31
Site Address:	Kawkawlin Township, Michigan	**Project Manager:**	Linda Hicken
Prepared By:	Gene McLinn/Linda Hicken	**Date:**	August 2005

Approved By: _____ (PM) _____ (HSO)

Linda Hicken — Bill Thomas, CHP, CIH-Integrated Environmental Management, Inc.

Date: _____ _____

An organizational chart for the decommissioning activities is presented on Figure 2. The key roles and personnel assigned to them are listed below.

TEAM MEMBER	RESPONSIBILITIES
Phillip Mazor	Owner's Representative
Linda Hicken	Decommissioning Contractor's Project Manager
Phillip Mazor	Radiation Safety Officer (RSO) for the SCA Hartley & Hartley Landfill Site
Bill Thomas	Project Health and Safety Officer (HSO)
To be determined	RMT Site Health and Safety Representative

3.2 Training and Medical Surveillance

Training Level Required:

☒ HAZWOPER 40/8 hour, First Aid, CPR (for all Type 3 sites)

☒ Specialty

List: Radiation safety training topics defined by the USNRC License SUC-1565, Section 5.0 of the radiation safety program. Training will be provided before each task begins and presented by the RSO or the HSO, if directed by the RSO (refer to Subsection 4.4 for additional information regarding radiation training).

Medical Surveillance Level Required:

☒ HAZWOPER physical

☒ Special medical tests

List: Not expected to be needed unless exposures exceed 500 millirem/yr (see Subsection 4.2 of this Plan).

Exceptions/Modifications to training or medical surveillance required: None

3.3 Personal Protection

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

LOCATION	JOB FUNCTION	LEVEL OF PROTECTION
Northwest Landfill	Placement of excavated slag and engineered cover	☒ D ☐ C ☐ B ☐ A
Northwest Landfill	Installation of leachate extraction wells and transfer piping[1]	☐ D ☒ C ☐ B ☐ A
Northwest Landfill	Collection of soil samples for the final status survey	☒ D ☐ C ☐ B ☐ A
Slag Pile A	Excavation of thorium-bearing slag waste	☒ D ☐ C ☐ B ☐ A
Slag Pile B	Excavation of thorium-bearing slag waste	☒ D ☐ C ☐ B ☐ A

[1] Personal protection necessary to address potential chemical exposures will be evaluated more fully upon finalization of all field remediation activities.

Specific protective equipment for each level is as follows:

Level A

Respiratory:
- ☐ SCBA
- ☐ Air-Line Supplied Air Respirator
- ☐ Other (describe)

Level B

Respiratory:
- ☐ SCBA
- ☐ Air-Line Supplied Air Respirator
- ☐ Other - Level C-D plus the following exceptions/modifications -

Level C

Respiratory - Air-purifying respirator with cartridge/canister type:
- ☒ HEPA, acid gas, organic vapors (*e.g.*, MSA GMC-H)
- ☐ HEPA only
- ☐ Other - Level D plus the following exceptions/modifications -

Level D

Respiratory - None

Other:
- ☐ Safety glasses
- ☒ Hard hat
- ☐ Safety shoes
- ☐ Ear plugs/muffs
- ☐ Snake chaps/Gaiters
- ☒ Protective clothing and gloves required when handling contaminated soil modified Level D). Protective clothing not required when collecting soil samples.
- ☒ Other (describe) Blaze orange

Other skin, eyes, and fall protection required:

Gloves:
- ☒ Butyl rubber (Level C)
- ☐ PVC-coated
- ☐ Neoprene
- ☐ Nitrile
- ☒ Other (describe) Surgical Gloves (Levels C and D)

Protective clothing:
- ☒ Tyvek® or equivalent (Level D)
- ☒ Tyvek® polyethylene-coated or equivalent (Level C)
- ☐ Tyvek® Saranex® or equivalent
- ☐ Other (describe)

Radiation Safety:

☐ Dosimeter Badge

☒ Other (describe) A radiation dosimeter is not required to monitor external exposure. Potential for exposure is less than 100 millirem. Potential for airborne radioactive materials is minimized by wet conditions.

The action levels for changing protection levels are as follows:

Action Levels

INSTRUMENT	ACTION LEVEL	ACTION
PID	10 ppm above background	Upgrade to Level C. The need for additional action levels to address potential chemical exposures will be evaluated upon MDEQ approval of a Remedial Action Plan. As necessary, this Health and Safety Plan will be modified to address potential chemical exposures.
Geiger Mueller (GM) detector	< 100 cpm/15 cm^2 above background	Release criterion for personnel and equipment (no action required).
Geiger Mueller (GM) detector	> 100 cpm/15 cm^2 above background	Notify the RSO. Decontaminate the area.
Geiger Mueller (GM) detector	> 1,000 cpm on contact with sample	Upgrade to Level C PPE. Implement the Indirect Bioassay Program (see Subsection 10.1.3 of the Decommissioning Plan). Implement Air Sampling Program (see Subsection 10.1.1 of the Decommissioning Plan).
Gamma Scintillator	> 0.25 millirem/hr on contact with sample	Notify the RSO. Verify whole body exposures are less than 0.02 mrem/hr.
Gamma Scintillator	> 0.5 millirem/hr on contact with sample	Stop work. Notify the RSO. Evaluate source of radiation exposure. Implement bioassay monitoring program. Implement air monitoring program.
Gamma Scintillator	> 2 millirem/hr whole body exposure	Assign whole body dosimeters.

Note:
cpm = counts per minute:

Changes to the level of protection shall not be made without the written approval of the RSO or his/her designee. All changes shall be recorded in the field log. (The Respiratory Protection Program is described in additional detail in Subsection 10.1.2 of the Decommissioning Plan.)

3.4 Air Monitoring

The following monitoring instruments shall be used on-site to measure airborne contaminant concentrations in the breathing zone:

		FREQUENCY OF MONITORING
☐	Combustible Gas Indicator	NA
☐	O_2 Monitor	NA
☐	Colorimetric Tubes (type)	NA
☐	PID	NA
☐	FID	NA
☒	Other (specify) Gamma scintillator Geiger Mueller detector	Measurements are representative of whole body exposures. Survey when excavating soil. Verify that surface contamination is acceptable. Survey when leaving the restricted area and removing personal protective equipment.

3.5 Site Control

Work Zones:

Support Zone: Access road

Contamination Reduction Zone (area used for decontamination): On-site building. Exit the road leading into the marsh.

Exclusion Zone (area considered contaminated): Northwest Landfill and Slag Piles A and B.

Site Entry Procedures:

☒ Notify Site Health and Safety Representative.

☒ Read Health & Safety Plan and sign Acknowledgment Statement

☐ Check in with facility security guard.

☒ Wear proper personal protective equipment.

☒ Attend facility orientation.

☒ Conduct "Toolbox" safety meeting.

☒ Other (specify): Notify the Waste Management, Inc., RSO for the site (Phill Mazor [telephone: 616/688-5777, extension 17, cell phone: 616/822-3031]).

Decontamination Procedures:

Personnel: Remove gloves. Complete contamination survey for radioactive materials on skin, clothing, and/or personal equipment. Verify that contamination is not detectable at levels more than 100 cpm per 15 cm^2 above background. Refer to Section 4 for details.

Equipment: Remove visual contamination. Complete contamination survey for radioactive materials on sampling equipment. Verify that contamination is not detectable at levels more than 100 cpm per 15 cm^2 above background. Refer to Section 4 for details.

Investigation-derived Material Disposal:

☐ *Leave on site for disposal.*

☒ *Other (describe)* As directed by the Decommissioning Contractor's on-site construction manager, place potentially contaminated soil/waste slag on the Northwest Landfill prior to placement of the final cover over the Northwest Landfill. As directed by the Waste Management, Inc., representative, place investigation-derived waste in labeled and dated containers for eventual off-site disposal by Waste Management, Inc.

Work Limitations (time of day, buddy system, etc.): Work will be initiated no earlier than 30 minutes after sunrise and terminate no later than 30 minutes before sunset. Employees will use a buddy system, especially when in the restricted area. Personnel working on the ground will alert equipment operators before approaching operating equipment.

3.6 Health Physics Audits, Inspections, and Record Keeping

At least once per year during the implementation of this Plan, the RSO or his/her designee will perform an assessment of site personnel's compliance with the Health and Safety Plan. Informal compliance assessments and inspections will be completed by the HSO on a daily basis, with unexpected, nonconforming, and unusual items and situations documented, along with their resolution. During the course of construction at the site, at least one assessment will include a review of each element of the Radiation Safety Program, including but not limited to: occupational radiation exposure, radiation surveys, training, and release of equipment for unrestricted use.

3.7 Contingency Planning

In the event of an accident or other emergency situation, appropriate measures will be taken to reduce the affect on worker health and safety. Minor accidents will be investigated by the subcontractor and reported to the HSO. The actions necessary to correct the situation will be documented. A first aid kit will be available in the work area for handling minor incidents. Should there be an incident that cannot be handled by the subcontractor in conjunction with the HSO (*e.g.*, a major accident, fire, or chemical release), the HSO will notify the RSO of the

location and the nature of the incident, and what type of assistance is needed. In addition, the HSO will notify the RSO of all first aid incidents, so that the potential for radionuclide uptake through wounds can be assessed.

LOCAL EMERGENCY RESOURCES:	
Ambulance 911	Hospital Emergency Room 911
Police 911	Fire Department 911
USEPA Contact Not applicable	Poison Control Center 800/222-1222
Other USNRC Region III: 800/522-3025 or 630/829-9500	Michigan Department of Environmental Quality Pollution Emergency Alerting System (PEAS) 800/292-4706

SITE RESOURCES:	
Water Supply: In the field office	Radio
Telephone (land line in the field office: TBD) Cell phones - by individuals	Other
EMERGENCY CONTACTS:	
Project Radiation Safety Officer (RSO):	Phillip Mazor Waste Management, Inc. 616/688-5777 ext. 17 (work) 616/822-3031 (cell) 616/844-0347 (home)
Project Health and Safety Officer (HSO):	Bill Thomas Integrated Environmental Management, Inc. 419/423-0471 419/957-0363 (cell)
RMT Project Manager (PM):	Linda Hicken 608/662-5307 (work) 608/358-1768 (cell) 608/833-5007 (home)
RMT Regional Health & Safety Coordinator (HSC):	John Hanson RMT, Inc. ("RMT") 744 Heartland Trail (53717-1934) P.O. Box 8923 (53708-8923) Madison, Wisconsin 608/831-4444 (work) 608/831-3334 (fax)

SITE RESOURCES:	
RMT Corporate Health & Safety Manager (CHSM):	Jason Chevallard 864/281-0030 (work) 864/525-8357 (cell)
RMT Field Contact	To be determined.
Client Contact:	Phillip Mazor Waste Management, Inc. 616/688-5777 ext. 17 (work) 616/822-3031 (cell) 616/844-0347 (home)

Emergency Routes (give directions AND attach map):

Hospital: The driving directions and map from the site to the Bay Regional Medical Center are provided in Attachment 1.

Other:

Emergency Procedures:

If an emergency develops at the site, the discoverer will take the following course of action:

- Notify the proper emergency services (fire, police, ambulance, etc.) for assistance.
- Notify other affected personnel at the site.
- Contact RMT and the client representative to inform them of the incident as soon as possible.
- Prepare a summary report of the incident for RMT and the client representative.

Emergency Equipment Required On-site:

☒	First Aid/Bloodborne Pathogens Kit	☒	Fire Extinguisher
☒	Eye Wash	☐	Spill Control Media
☐	Shower	☐	Other: (describe)
☐	Other: (describe)	☐	Other: (describe)

Section 4
Radiation Safety Requirements

The radiation exposure limits established in this section were developed on the basis of the Radiation Safety Program (Waste Management, 1993), which was approved by the USNRC as part of the license for the SCA Hartley & Hartley Landfill Site (License No. SUC-1565).

4.1 External Exposure Determination

Radiation measurements collected over the surface of the SCA Hartley & Hartley Landfill Site were found to be less than 0.01 millirem per hour (less than 10 microrem per hour) whole body exposure, above background. Personnel monitoring for external radiation levels will be performed using a calibrated radiation survey instrument, such as a Ludlum Model 44-10, or equivalent. The scintillation detector can detect changes in ambient gamma levels, in excess of 10 microrem per hour (μrem/hr) above background. Whole body monitoring for individuals (*i.e.*, thermoluminescent dosimeters) is not required; the potential for radiation exposures is less than 100 millirem (less than 2 percent of the permissible exposure) for any individual.

Thermoluminescent dosimeters (TLDs) will be used to measure whole body exposures in the event that personnel encounter radiation levels in excess of 2 millirem (2,000 microrem) per hour whole body exposure or there is a potential for personnel exposure to exceed 100 millirem during the course of the project. In the event that external dosimeters are assigned, a vendor certified by the National Voluntary Laboratory Accreditation Program (NVLAP) will provide the dosimeters and complete the analysis. Each individual being monitored will be issued a TLD, assigned specifically to them by TLD number.

External exposure determination is described in additional detail in Subsection 10.1.4 of the Decommissioning Plan.

4.2 Internal Exposure Determination

Measurement of personal radiation doses from internal deposition of radioactive material is not required for this project because the potential for internal exposures is less than 100 millirem for the duration of the project.

Title 10, Code of Federal Regulations (CFR), Section 20.1502 (a)(1), states, in part, that the occupational exposure of workers (internal and/or external) shall be monitored if there is the potential to receive, in one calendar year, a radiation dose in excess of 10 percent of the limits

prescribed in 10 CFR §20.1201(a). The prescribed limit in 10 CFR §20.1201(a) is 5,000 mRem/yr, which translates to an annual exposure limit under 10 CFR §20.1502(a)(1) of 500 mRem/yr. Because the radiological dose potential for the decontamination worker is less than 4 percent of the occupational dose limits, neither internal nor external radiation monitoring is required.

Internal exposure determination is described in additional detail in Subsection 10.1.3 of the Decommissioning Plan.

4.3 Action Levels and Follow-up Actions

In order to validate the assessment of dose potential described herein, external exposure rates in the vicinity of all work will be monitored on a periodic basis. If the ambient rate is found to exceed 0.5 millirem per hour, the Radiation Safety Officer will stop work until such time as the reason for the elevated exposure rate is determined. If deemed necessary by the RSO, or the RSO's designee, personnel monitoring devices will be deployed prior to the restart of work. Deployment will continue for the duration of the activities described in this Health and Safety Plan.

The Air Sampling Program is described in additional detail in Subsection 10.1.1 of the Decommissioning Plan.

4.4 Radiation Safety Training

An orientation will be provided to describe the types of radioactive material likely to be encountered in the landfill and the methods to measure exposures. The briefings will also describe the potential for radiation exposure and the methods to limit one's exposure. The nature of the radiation monitoring and the radioactive contamination control will be described.

Additional training will be provided in the event that personnel encounter radioactive contamination such that personal protective equipment is required to reduce the spread of contamination. Workers will review the correct procedures to don and doff disposable protective equipment, and the method to use to survey for radioactive contamination. Each participant will practice the correct use of the radiation survey instrument to measure contamination (thin-window GM detector) and the steps to follow in the event contamination is detected. The limits of exposure that apply to this task and the manner in which to reduce one's exposure will be explained for each specific task where radioactive contamination is likely to be encountered. The requirements of the USNRC license will be summarized as described in Section 5.0 of the radiation safety program for the SCA Hartley & Hartley Landfill Site.

4.5 Radiation Measurements

Radiation measurements will be made using a calibrated scintillation detector, such as a Ludlum Model 44-10, or equivalent. The instrument will be used during any intrusive work and will survey samples of excavated soil. Measurements will be collected as necessary to characterize changing conditions, such as a visual indication of a change in soil type. Soil samples will be screened for the presence of gamma radiation using the scintillation detector (*i.e.*, Ludlum Model 44-10 or equivalent) by slowly passing the detector directly (1 inch or less) above the sample. The scintillation detector can be used to measure the whole body exposures near the personnel and equipment used to sample soil.

Additional information about the calibrated radiation survey instruments is provided in Subsection 10.1.7 of the Decommissioning Plan.

Gamma background has been measured on the surface of the landfill, ranging from 6 to 10 µrem/hr, whole body exposures. Readings that exceed 20 µrem/hr (above background) indicate a change in the concentration of radioactive material and reflect the potential for contamination of personnel and equipment. In the event that radiation levels are measured greater than 250 µrem/hr on contact with a soil sample, additional measurements should be recorded to verify that whole body exposures are less than 20 µrem/hr (above background). Personnel should leave the immediate area until the source of the radiation can be verified and the effective precautions can be implemented.

4.6 Radioactive Contamination Control

Persons using modified Level D protection should monitor their person (*i.e.*, hands, feet, chest, etc.) for the presence of surface contamination when leaving the exclusion zone. Monitoring should be performed with a calibrated Geiger Mueller detector (GM, thin window) equipped with a rate meter, equivalent to a Ludlum Model 3 and detector Model 44-9. Readings in excess of 100 counts per minute (100 cpm) above background (estimated to be approximately 30 cpm) require decontamination before leaving the contamination reduction zone. A gamma scintillation probe will also be used on-site to screen radiation levels of samples. This instrument is not intended for use for personnel protection. However, background for this instrument will be approximately 0.01 mrem/hr (10 µrem/hr).

Any sampling equipment used during the proposed activity (*e.g.*, stainless-steel trowels and spoons) will be cleaned at an off-site location prior to mobilization, and wrapped and dedicated for each sample location. A surface will be considered to be contaminated if the total (fixed and removable) beta/gamma activity exceeds 100 counts per minute (above background) or produces a dose equivalent rate in excess of 0.25 mrem/hour at 1 centimeter from the surface.

Additional information about the Contamination Control Program is provided in Subsection 10.1.6 of the Decommissioning Plan.

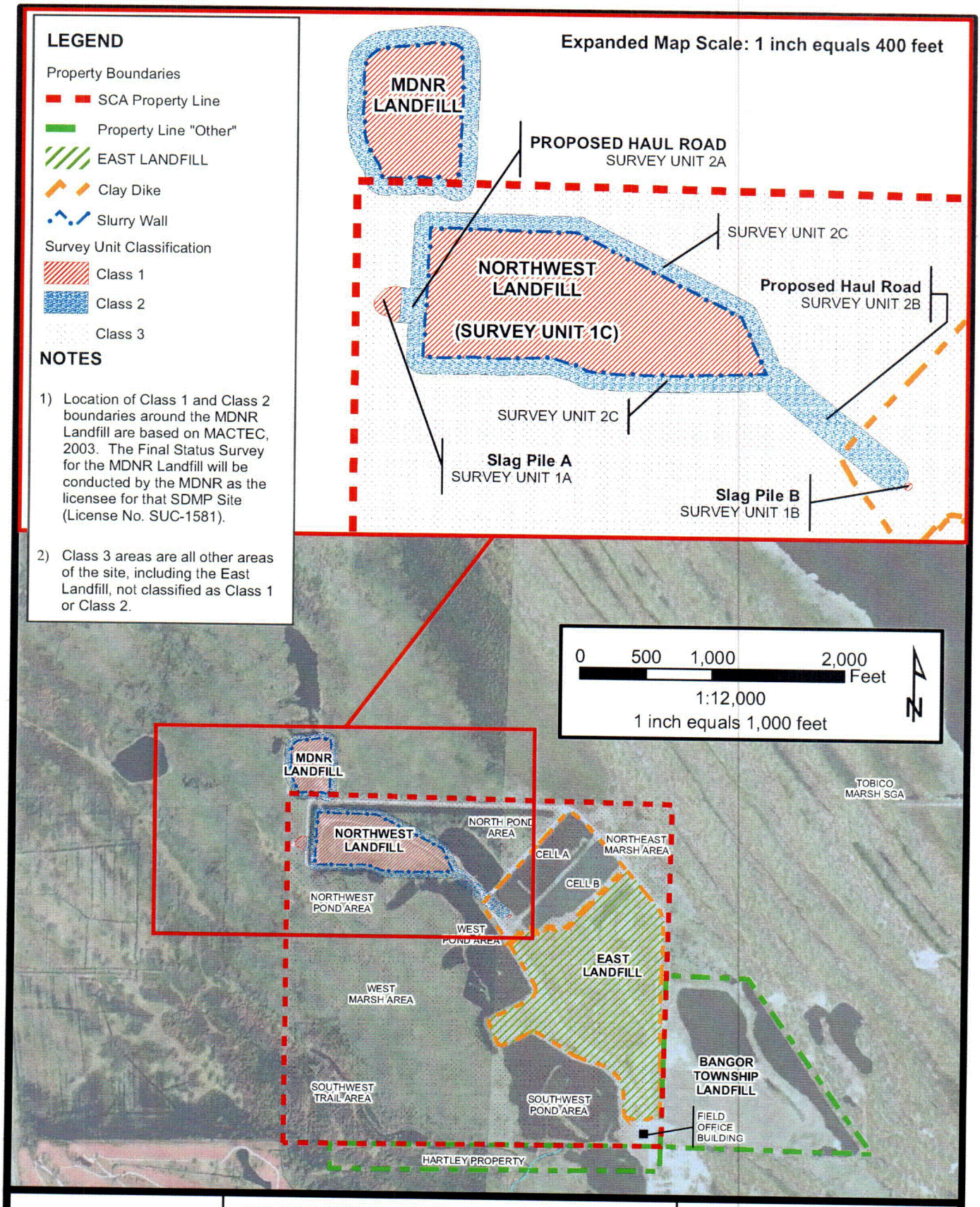
Section 5
References Cited

Earth Tech, Inc., 2003. Remedial investigation report. SCA Hartley & Hartley Landfill, Bay County, Michigan. March 2003.

RMT, Inc., 2003. Decommissioning plan. SCA Hartley & Hartley Landfill site, Kawkawlin Township, Michigan. November 2003.

RMT, Inc., 2005. Quality assurance project plan for site decommissioning activities. SCA Hartley & Hartley Landfill site, Kawkawlin Township, Michigan. September 2005.

Waste Management, 1993. Radiation safety program. 2370 Two Mile Road, Kawkawlin, Michigan. Revision 2. July 1993.



RMT

FIGURE 1 PRELIMINARY DELINEATION OF SURVEY UNITS

Source: 1998 series USGS digital orthophoto quadrangles. 2001. Michigan Department of Natural Resources (MDNR), Forestry, Mineral and Fire Management Division, Resource Mapping and Aerial Photography (RMAP).

SCA HARTLEY & HARTLEY LANDFILL SITE
KAWKAWLIN TOWNSHIP, MICHIGAN

DRAWN BY:	C. HANKLEY
APPROVED BY:	L. HICKEN
PROJECT NO.	6115.29
FILE NO.	disposalClasses.MXD
DATE:	SEPTEMBER 2005

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C01

Decommissioning Project Organization

SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

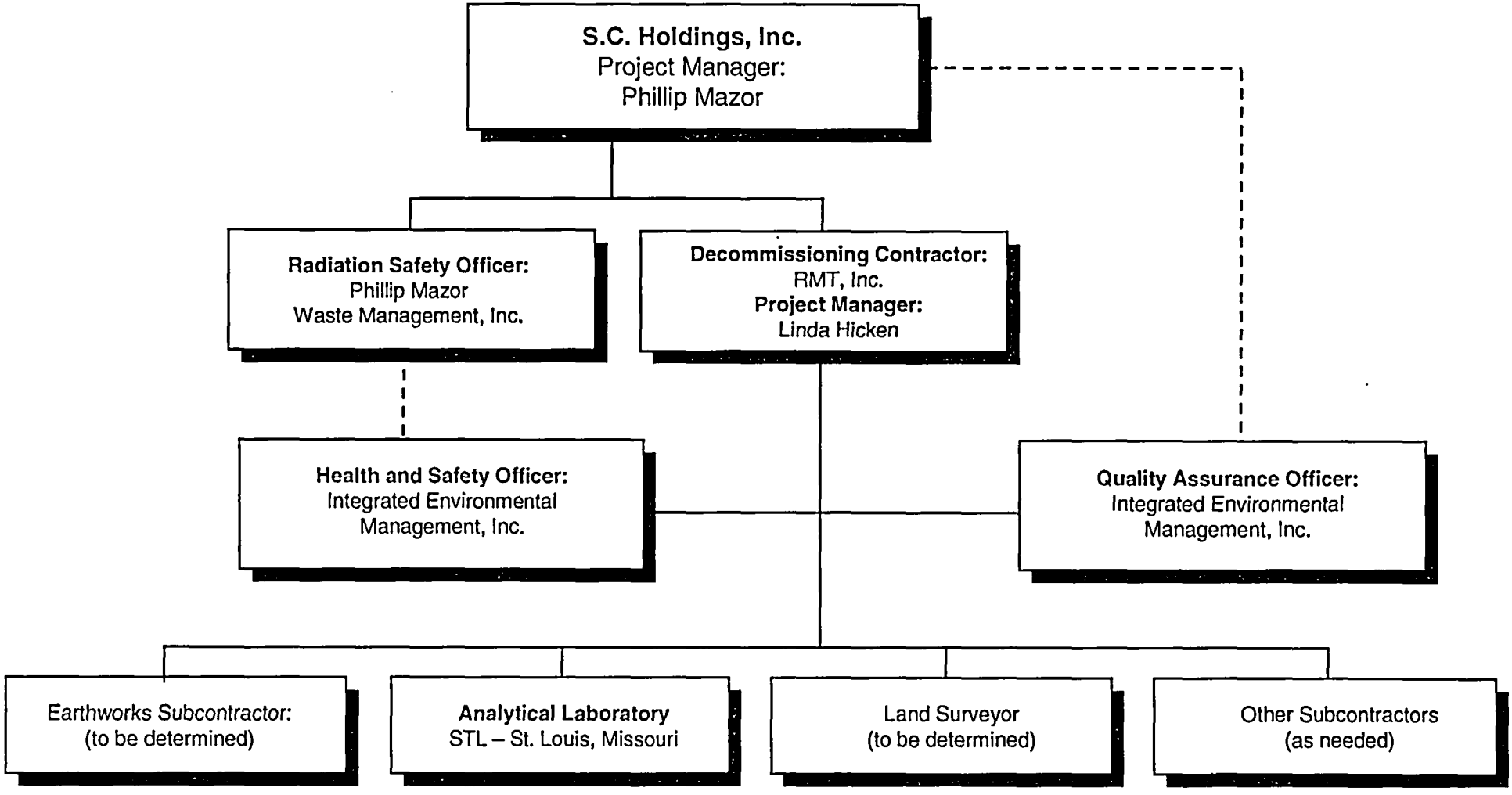

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Figure 2

Attachment 1
Driving Route from Site to the Bay Regional Medical Center

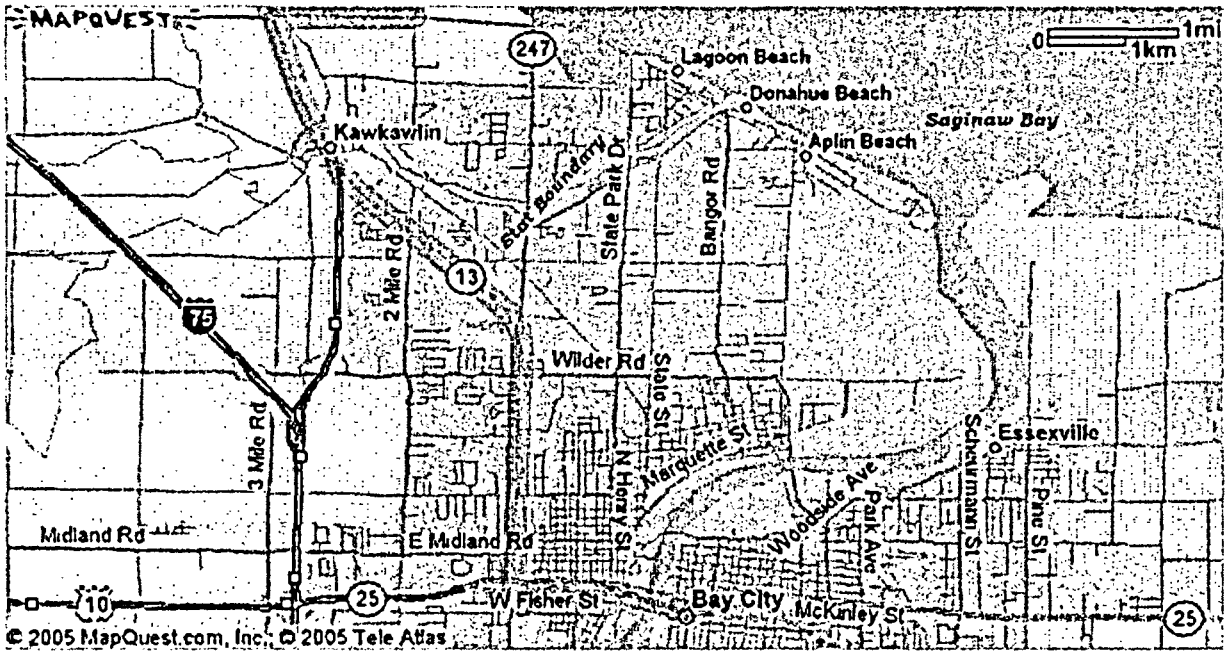
MAPQUEST.

SCA HARTLEY & HARTLEY LANDFILL

Start: **2370 2 Mile Rd**
Bay City, MI 48706-1155, US

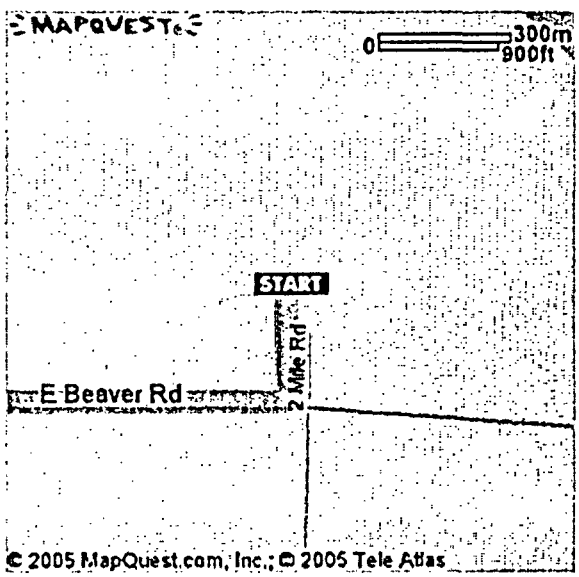
End: **Bay Regional Medical Ctr:** 989-894-3000
1900 Columbus Ave, Bay City, MI 48708, US

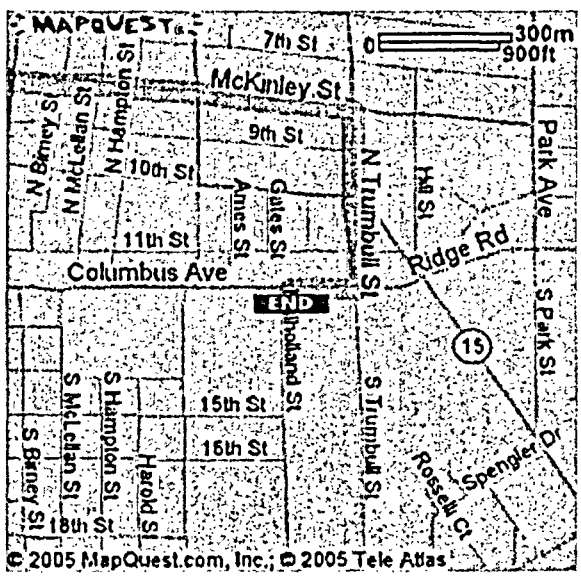
Directions	Distance
START **1:** Start out going SOUTH on 2 MILE RD toward E BEAVER RD.	0.1 miles
2: Turn RIGHT onto E BEAVER RD.	1.0 miles
SOUTH 13 **3:** Turn LEFT onto S HURON RD / MI-13 S. Continue to follow MI-13 S.	5.5 miles
EAST 25 **4:** Turn LEFT onto W THOMAS ST / I-75 BR E / MI-25 E. Continue to follow MI-25 E.	1.5 miles
5: MI-25 E becomes MCKINLEY ST.	0.8 miles
6: Turn RIGHT onto MI-15 / N TRUMBULL ST. Continue to follow N TRUMBULL ST.	0.2 miles
7: Turn RIGHT onto COLUMBUS AVE.	<0.1 miles
END **8:** End at **Bay Regional Medical Ctr** 1900 Columbus Ave, Bay City, MI 48708, US	
Total Est. Time: 19 minutes	**Total Est. Distance: 9.58 miles**



Start:
2370 2 Mile Rd
Bay City, MI 48706-1155, US

End:
Bay Regional Medical Ctr: 989-894-3000
1900 Columbus Ave, Bay City, MI 48708, US





Notes:

The street address for the Hartley & Hartley Landfill is 2370 Two Mile Road.

NAVTEQ ON BOARD

744 Heartland Trail (53717-1934)
PO Box 8923 (53708-8923)
Madison, WI
Telephone (608) 831-4444
Fax (608) 831-3334

Quality Assurance Project Plan for Decommissioning Activities

SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

September 2005

Prepared For
S.C. Holdings, Inc.

Table of Contents

List of Tables

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List of Definitions and Acronyms

ANSI - American National Standards Institute.

background radiation - Radiation from cosmic sources; naturally occurring radioactive material, including radon (except as a decay product of source or special nuclear material); and global fallout as it exists in the environment from the testing of nuclear explosive devices or from nuclear accidents like Chernobyl, which contribute to background radiation and are not under the control of the cognizant organization. Background radiation does not include radiation from source, byproduct, or special nuclear materials regulated by the cognizant federal or state agency. Different definitions may exist for this term. The definition provided in regulations or the regulatory program being used for a site release should always be used if it differs from the definition provided here.

calibration - Comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

CAR - Corrective Action Request.

DQO - Data Quality Objective.

DCGL (derived concentration guideline level) - A derived, radionuclide-specific activity concentration within a survey unit corresponding to the release criterion. The DCGL is based on the spatial distribution of the contaminant, and hence is derived differently for the nonparametric statistical test ($DCGL_W$) and the Elevated Measurement Comparison ($DCGL_{EMC}$). DCGLs are derived from activity/dose relationships through various exposure pathway scenarios.

decay - See radioactive decay.

EMC-Elevated Measurement Comparison - This comparison is used in conjunction with the Wilcoxon test to determine if there are any measurements that exceed a specified value $DCGL_{EMC}$.

facility - As used in this Decommissioning Plan, "facility" carries the Webster's Dictionary definition, which is something that is built, installed, or established to serve a particular purpose. "Facility" does not carry the specific meaning defined in the Michigan Part 201 Statute.

final status survey - Measurements and sampling to describe the radiological conditions of a site, following completion of decontamination activities (if any) in preparation for release.

FS/RAP - Feasibility Study/Remedial Action Plan.

hot spot - Area in which radioactivity exceeds a site-specific $DCGL_{EMC}$.

HSO - Health and Safety Officer.

hypothesis - An assumption about a property or characteristic of a set of data under study. The goal of statistical inference is to decide which of two complementary hypotheses is likely to be true. The null hypothesis (H_0) describes what is assumed to be the true state of nature, and the alternative hypothesis (H_a) describes the opposite situation.

investigation level - A derived media-specific, radionuclide-specific concentration or activity level of radioactivity that (1) is based on the release criterion, and (2) triggers a response, such as further investigation or cleanup, if exceeded.

MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual.

MCL - Maximum Contaminant Level. A National Primary Drinking Water Standard, established by the USEPA pursuant to the Safe Drinking Water Act (SDWA, 1974, as amended).

MDC-minimum detectable concentration - The minimum detectable concentration (MDC) is the *a priori* activity level that a specific instrument and technique can be expected to detect 95 percent of the time. When stating the detection capability of an instrument, this value should be used. The MDC is the detection limit (DL) multiplied by an appropriate conversion factor to give units of activity.

MDEQ - Michigan Department of Environmental Quality.

MDL - Method Detection Limit.

MDNR - Michigan Department of Natural Resources.

M.S.L. - Mean sea level.

MS/MSD - Matrix spike/Matrix spike duplicate.

NIST - National Institute of Standards and Technology.

NREPA - (State of Michigan) Natural Resources and Environmental Protection Act.

OSHA - Occupational Safety and Health Administration.

Part 201 - (State of Michigan) Part 201 (Environmental Remediation) of the NREPA, 1994 PA 451, as amended.

PM - Project Manager (for the Decommissioning Contractor).

PQL - Practical Quantitation Limit.

QA - Quality assurance - An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

QAO - Quality Assurance Officer.

QAPP - Quality Assurance Project Plan.

QA/QC - Quality assurance/Quality control.

QC - Quality control.

QIP - Quality Implementing Procedure.

RESRAD - Computer code used to determine residual radioactivity in the environment.

RI - Remedial Investigation.

RL - Reporting Limit.

RPD - Relative Percent Difference.

RSO - Radiation Safety Officer.

site - As defined in the USNRC Source Material License No. SUC-1565, the site is the SCA Services property (now S.C. Holdings, Inc.), located at 2370 Two Mile Road, Bay County, Michigan 48706.

unrestricted release - Release of a site from regulatory control without requirements for future radiological restrictions. Also know as unrestricted use.

USEPA - United States Environmental Protection Agency.

USNRC - United States Nuclear Regulatory Commission.

WSR-Wilcoxon Rank Sum test - A nonparametric statistical test used to determine compliance with the release criterion when the radionuclide of concern is present in background.

Section 1
Introduction

1.1 Background

This Quality Assurance Project Plan (QAPP) for field decommissioning activities at the SCA Hartley & Hartley Landfill Site (the site) was developed to support the U.S. Nuclear Regulatory Commission's (USNRC's) review of the Decommissioning Plan for this site (RMT, 2003). At present, the USNRC has not formally approved the scope of the site decommissioning activities; however, on the basis of an April 19, 2005, telephone conversation with Mr. David Nelson, the USNRC Project Manager for this site, it is S. C. Holdings, Inc.'s understanding that the USNRC is in agreement with S. C. Holdings' planned decommissioning activities.

This QAPP was developed on the basis of the decommissioning activities described in Section 8 of the Decommissioning Plan, which includes conceptual designs for an engineered cover over the Northwest Landfill and for a leachate collection system in the Northwest Landfill (the field decommissioning activities are summarized in Subsection 3.3.2 of this QAPP). Engineering plans and specifications will be developed as part of a future submittal. Upon formal approval of the Decommissioning Plan by the USNRC, including the Health and Safety Plan (RMT, 2005), and the development of supporting design documents, this QAPP will be reviewed and modified as necessary, to ensure the appropriateness and adequacy of the quality assurance procedures.

In addition to the decommissioning activities required by the USNRC, S.C. Holdings is also conducting environmental response activities to address chemical contamination at the site under the State of Michigan's Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended. The state response activities are being conducted pursuant to the November 7, 1980, Stipulation and Consent Order for Closure ("Order"), as modified by the September 28, 1984, Amendment to the November 7, 1980, Stipulation and Consent Order for Closure ("Amendment"), both of which were augmented and modified by the December 2, 2002, Addendum by Consent for Payment of Past Response Activity Costs, Future Oversight Costs, and Performance of Response Activities

("Addendum"), all of which were entered into with the Michigan Department of Environmental Quality (MDEQ).[1]

At present, the MDEQ is reviewing the Remedial Investigation (RI) Report, which also includes an Ecological Risk Assessment (Earth Tech, 2003a). Upon approval of the RI Report by the MDEQ, S.C. Holdings will submit a combined Feasibility Study/Remedial Action Plan (FS/RAP) to evaluate alternatives for, and to select a remedy to address chemical concerns at the site. The RAP is the State's decision document for a site, analogous to the USNRC's Decommissioning Plan. Ultimately, a single remedy for the site, including, in this instance, the Northwest Landfill, the East Landfill, the MDNR Landfill[2] (to address chemical concerns only), and nonlandfilled areas, will address the radiological and chemical concerns, and will meet the more stringent of the applicable requirements established by USNRC and the MDEQ.

In addition to consolidating the thorium-bearing slag in Slag Piles A and B into the Northwest Landfill, improving the cover over the Northwest Landfill, and installing a leachate collection system (wells and header piping) in the Northwest Landfill, S.C. Holdings anticipates that, as part of the Part 201 response action, soil/sediment containing chemicals of concern above State-approved criteria will be excavated from certain areas at the site and placed on the East Landfill, after which an improved cover will be constructed over the East Landfill. Long-term monitoring and maintenance activities required by the State are expected to be conducted for a period of at least 30 years following completion of the Part 201 response activities.

If the field activities for both site decommissioning and remedial response programs are conducted during the same mobilization, this QAPP may need to be modified to also address chemical sampling associated with the remedial response actions.

1.2 Purpose and Scope

This QAPP for the execution of decommissioning activities at the SCA Hartley& Hartley Landfill site has been developed consistent with applicable USNRC guidelines. The objective of the QAPP is to ensure confidence in the radiological sampling, analysis, interpretation, and use of radiological data generated during decommissioning and as part of the final status survey.

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[1] In the Addendum, the term "facility" has the specific meaning defined in the Part 201 statute at 324.20101(1)(o). For purposes of the Part 201 response activities, the "facility" includes the properties identified in the Order and the Amendment as the Kawkawlin Site, the SCA Property, and the State Property, as well as any area, place, or property where a hazardous substance(s) originating at or from these properties has come to be located in excess of applicable requirements. To reduce confusion with Part 201 terminology, the use of the term "facility" in the Decommissioning Plan and this QAPP has been minimized. When used in the Decommissioning Plan and QAPP, "facility" carries the Webster's Dictionary definition (see List of Definitions and Acronyms). Additionally, the term "site" also has specific meaning in the context of Part 201. Note, however, that the term "site" is always used in the Decommissioning Plan and this QAPP to carry the definition used in the USNRC Source Materials License No. SUC-1565, which is the SCA Services (now S.C. Holdings, Inc.) property located at 2370 Two Mile Road, Bay County, Michigan.

[2] Also referred to as the Tobico Marsh State Game Area Site.

The QAPP will be the instrument of control for the radiological field and analytical activities associated with the decommissioning project.

This document contains the quality assurance policies, quality control criteria, and reporting requirements that will be followed by project personnel when carrying out their assigned responsibilities, as well as the functional activities and quality assurance/quality control (QA/QC) protocols necessary to collect data of adequate quality. In addition, as recommended in NUREG-1757 (Vol. 1, Section 17.6), this QAPP contains the following:

1. A description of the organization responsible for implementing the QA program;
2. A description of the QA program, including descriptions of the manner in which QA activities are controlled;
3. A description of the manner in which QA program documents are controlled;
4. A description of how measuring and test equipment will be controlled;
5. A description of how conditions adverse to quality are corrected;
6. A description of the QA records that will be maintained; and
7. A description of the audits and surveillances that will be performed as part of the QA program

Supporting Quality Implementing Procedures (QIPs) will provide step-by-step details for complying with the project QA requirements. The final status survey, including development of sampling plans, direct measurements, sample analysis, instrument calibration, daily functional checks of instruments, and sampling methods, will be performed according to written procedures.

Section 2
Project Organization

S.C. Holdings, Inc. (S.C. Holdings), will maintain responsibility for all site activities conducted under the requirements of License No. SUC-1565. Figure 1 shows the organizational structure for the decommissioning of the SCA Hartley & Hartley Landfill Site. This organizational structure minimizes administrative functions, keeps overhead costs to a practical minimum, provides flexibility for resource allocation, and facilitates S.C. Holdings' oversight of the decommissioning operations. The USNRC's primary point of contact for S.C. Holdings is, at present, Phillip Mazor, an employee of Waste Management, Inc. Mr. Mazor is also the Radiation Safety Officer (RSO) for the SCA Hartley & Hartley Landfill Site.

Decommissioning activities will be performed in a manner that will ensure that the end result is consistent with the objectives of the Decommissioning Plan, and that uncertainties have been appropriately considered. The Quality Assurance Program will be implemented throughout the decommissioning process, including construction, performance of the Final Status Survey, validation of the data, and the interpretation of the results.

Site decommissioning will be implemented by personnel possessing the appropriate qualifications and experience to serve in the project roles assigned to them. Persons responsible for ensuring that the Quality Assurance Program has been established and for verifying that activities affecting quality are being correctly performed will have sufficient authority, access to work areas, and organizational freedom to accomplish the following:

- Identify problems related to data quality.
- Initiate, recommend, or provide solutions to quality-related problems through designated chains of communication.
- Ensure that further decommissioning activities are controlled until proper resolution of a nonconforming condition or deficiency has occurred.
- Verify the implementation of corrective actions taken to address a nonconforming condition or deficiency.

The responsibility for achieving project quality goals belongs to the Decommissioning Contractor's Project Manager (PM). The PM is the single point of contact for any quality problems that are identified during the implementation of the Decommissioning Plan. The PM has the authority to implement all provisions of this QAPP and take necessary actions when work under the Plan fails to meet quality objectives. The PM, who will report to S.C. Holdings Project Manager, is responsible for the following quality elements:

- Reviewing the procedures to decommission the site with the RSO and S.C. Holdings and submitting changes to the Decommissioning Plan approved by the RSO and S.C. Holdings to the USNRC for approval. Changes will not be implemented until they are approved by the USNRC in writing.
- Ensuring that the radiation protection services are sufficient to meet the requirements of the Decommissioning Plan and the applicable state and federal regulations.
- Verifying that the personnel used by each subcontractor are provided with the proper radiation protection, industrial safety and quality assurance training, and that they possess the requisite knowledge of the details of the job assignment
- Observing work in progress to verify adherence to the requirements of the Decommissioning Plan and this QAPP.
- Recommending changes to operational and radiological protection practices to the subcontractors
- Ensuring compliance with S.C. Holdings' site rules and license requirements
- Reviewing reports and results provided by subcontractors
- Establishing and maintaining a records management system to verify that project documents, such as correspondence, procedures, drawings, specifications, and contract documents; changes to documents; and inspection records are controlled

To assist the PM in implementing the quality elements of the project, a QAO (QAO) will be assigned. The QAO will have lines of reporting to both the Decommissioning Contractor's PM and S.C. Holdings' Project Manager to ensure the integrity and independence of the Quality Assurance Program. The QAO, who may authorize others to implement specific elements of this QAPP, will be responsible for the following:

- Providing technical assistance and peer review of deliverables
- Preparing, revising, and updating the QAPP
- Coordinating activities with the analytical laboratory(ies)
- Overseeing subcontractor quality control activities to ensure compliance with the QAPP
- Tracking laboratory submittals and sample analyses, and verifying delivery of data, as necessary
- Coordinating the validation of analytical data
- Monitoring the on-site activities
- Preparing and submitting QA reports, as required

Assisting the PM and the QAO in the quality assurance role is the project team, made up of the site Radiation Safety Officer, the Health and Safety Officer, health physics technicians, and

other project personnel. The roles of the each of these individuals, as they pertain to quality, are described briefly as follows.[3]

2.1 Radiation Safety Officer

The RSO has been designated by the USNRC in writing and will not be changed without the written approval of the USNRC and an amendment of the radioactive materials license. The RSO will have the responsibility and authority to terminate any work activities that may violate regulatory or S.C. Holdings' requirements for radiological protection. Upon implementation of a stop-work order, specific work activities may be permitted by the RSO to proceed to a safe condition. Stop-work orders will be lifted by the RSO once the out-of-compliance conditions have been alleviated.

At a minimum, the RSO will have an associate degree (or equivalent), and should have completed course work and/or have experience with the following:

- Principles and practices of radiation protection
- Radioactivity measurements, monitoring techniques, and the use of instruments
- Mathematics and calculations basic to the use and measurement of radioactivity
- Biological effects of radiation
- Safety practices applicable to protection from the radiation, chemical toxicity, and other properties of the radioactive materials present at the SCA Hartley & Hartley Landfill Site
- Radiological surveys and the evaluation of the results of such surveys
- Evaluation of radioactive material processing facilities for proper operations from a radiological safety standpoint
- Familiarity with applicable USNRC, U.S. Environmental Protection Agency (USEPA), and Occupational Safety and Health Administration (OSHA) regulations, as well as the terms and conditions of any licenses and permits issued to S.C. Holdings by these agencies

The RSO is an individual who, by virtue of qualifications and experience, has been given the authority to implement the Radiation Safety Program for the SCA Hartley & Hartley Landfill Site. The RSO is qualified to direct the management of radioactive material for its intended purpose in a manner that protects health and minimizes danger to life or property. The RSO is responsible for recognizing potential radiological hazards, developing a radiation safety program to protect against these hazards, training workers in safe work practices, and supervising day-to-day radiation safety operations.

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[3] An individual may serve in one or more roles during decommissioning. Likewise, each role described herein may be fulfilled by more than one individual. Those individuals specifically assigned to each role will be named and their qualifications presented in the associated workplans.

2.2 Decommissioning Contractor

S.C. Holdings will retain a Decommissioning Contractor to implement the Decommissioning Plan under the direction and control of S.C. Holdings. The Decommissioning Contractor, to be selected by S.C. Holdings following the USNRC's approval of the Decommissioning Plan, will prepare the final workplans, prequalify and select all subcontractors, monitor subcontractors' performance, perform and document the Final Status Surveys, facilitate communications with federal and state regulatory authorities, and provide on-site project management and health and safety support (radiological, industrial hygiene, and industrial safety) during the construction phase. To fulfill this role, the Decommissioning Contractor will have demonstrated experience in facility decommissioning, industrial safety/surveillance, radiological safety/surveillance, license/regulatory interactions, negotiations and compliance demonstration, development of technical bases for radiological operations, and preparation of standard operating procedures to implement the decommissioning tasks.

The efforts of the Decommissioning Contractor will be focused on radiological health and safety, regulatory compliance, and project management matters. Specialty services necessary to complete certain field components of the Decommissioning Plan (*e.g.*, engineering design, construction, and surveying) may be subcontracted to firms with the appropriate skills and experience. Each subcontractor will be provided with written instructions to complete their tasks. Each subcontractor will designate a Task Manager and, as necessary, a health and safety and/or quality control contact, who will report to the Task Manager. At all times, however, the Decommissioning Contractor will remain responsible for the scope, quality, and timeliness of services provided by all subcontractors. The RSO will verify that subcontractor personnel are adequately informed of the hazards, the preventive measures, and the procedures associated with performing each decommissioning task. The RSO will verify that subcontractor personnel perform decommissioning activities in accordance with all license commitments and USNRC requirements.

2.3 Health and Safety Officer

The Health and Safety Officer (HSO) will report to the Decommissioning Contractor's PM. The HSO will be a health physicist who will be present at the SCA Hartley & Hartley Landfill Site during all on-site work, or who will designate a qualified health and safety representative to implement specific elements of the Health and Safety Plan (RMT, 2005). The HSO will be knowledgeable in the following radiation protection and industrial safety topics:

- Principles and practices of radiation protection
- Radioactivity measurements, monitoring techniques, and the use of instruments
- Mathematics and calculations basic to the use and measurement of radioactivity
- Biological effects of radiation

The responsibilities of the HSO will include, but are not limited to, the following:

- Establishing the health and safety requirements for field activities
- Verifying that subcontractors implement the requirements of the Radiation Safety Program in an acceptable manner
- Evaluating both chemical and radiation health and safety issues in conjunction with the RSO
- Reviewing the results of surveys, sampling, and environmental monitoring to identify trends and potential for personnel exposure
- Evaluating the effectiveness of engineering and administrative control, including the requirements for personal protective equipment
- Developing/Modifying safety protocols and procedures for new field activities, if any
- Providing review and approval for health and safety-related documents
- Auditing the Health and Safety Program
- Making recommendations to the Decommissioning Contractor's PM regarding the control of existing and potential industrial, chemical, and radiological hazards
- Stopping work if conditions indicate the potential for unnecessary radiation exposure to site personnel or members of the public, or for unsafe working conditions

2.4 Analytical Laboratory

For off-site sample analysis, Severn Trent Laboratories - St. Louis, Missouri, will perform the radiological analyses required for the decommissioning activities. The laboratory will be responsible for all bench-level QA/QC, data reduction, data reporting, and analytical performance monitoring. Laboratory accuracy will be evaluated by the analysis of blank and spiked samples. Sample handling protocols, analytical procedures, and reporting procedures employed by the analytical laboratory will be described in the laboratory's Quality Assurance Plan.

The laboratory will be responsible for ensuring that laboratory personnel working on this project are familiar with the QAPP and good laboratory practices, and that appropriate laboratory personnel meet the requisite qualifications for their positions within the laboratory. The Laboratory Director, or his/her representative, will review and approve all reports. The Laboratory Director will also be responsible for ensuring that laboratory personnel have appropriate training to perform assigned responsibilities, and for managing the laboratory and its staff on a daily basis.

The laboratory will assign a QA Designee for this project who will be responsible for ensuring that the QA/QC requirements of the QAPP, the laboratory Quality Assurance Plan, and its

associated operating procedures are strictly followed. The QA Designee will be responsible for reviewing data; alerting the Decommissioning Contractor's PM and the Laboratory Director of the need for corrective action, as necessary; performing internal audits as specified by the QAPP; and maintaining the QC records. The QA Designee will also be responsible for preparing project-specific QA/QC Plans, as necessary.

2.5 Health Physics Technicians

The RSO may designate authority for implementing certain aspects of the Radiation Safety Program to health physics technicians. The responsibilities and authority of health physics technicians may include the following:

- Ascertaining compliance with rules and regulations, site-specific license conditions, and the guidelines approved and specified by the RSO
- Providing technical support for some or all aspects of radiation protection, including field operations
- Monitoring and maintaining equipment associated with the use, storage, and/or disposal of radioactive material
- Providing consultation on all aspects of radiation protection to personnel at all levels of responsibility
- Administering and coordinating the distribution of personal monitoring devices, if determined to be necessary by the RSO
- Maintaining personnel/area monitoring records, notifying personnel and management of exposures approaching maximum permissible limits, recommending appropriate corrective action, and evaluating exposures reported by contract dosimetry services if used
- Performing other monitoring/surveillance tasks as may be directed by the RSO

Section 3
Project Description

This section contains a description of the site and its relevant history, the decommissioning goals, and the schedule for the decommissioning activities. (Refer to the List of Definitions and Acronyms for the definitions of the terms "site" and "facility," as used in the Decommissioning Plan and this QAPP.) The information contained herein has been extracted from the Decommissioning Plan and is intended to be consistent with the contents of the Decommissioning Plan. Any changes to the Decommissioning Plan that take place after this QAPP is approved will supercede the information herein.

3.1 Site Location and Description

The SCA Hartley & Hartley Landfill Site is located in an unincorporated area of Kawkawlin Township in Bay County, Michigan. Figure 2 shows the location of the site, which is approximately 5 miles north of Bay City and 1 mile west of Saginaw Bay (Lake Huron). The Tobico Marsh and adjacent Tobico Marsh State Game Area (SGA) are located between Saginaw Bay and the site.

The site is identified by the following federal and state identification numbers:

- USNRC License Number SUC-1565; Docket Number 040-09022
- USEPA Site ID# MID000605956
- MDEQ Site ID# 09000015

The SCA Hartley & Hartley Landfill Site comprises about 170 acres, approximately 50 acres of which were developed for landfilling, and approximately 40 acres of which are actually filled with refuse. There are two main landfilled areas: the "East Landfill" (approximately 32 acres) and the "Northwest Landfill" (approximately 8 acres). There are also two cells, designated "Cell A" and "Cell B," that are adjacent to the northwestern side of the East Landfill. When the facility ceased operations, these cells were under construction in preparation for future landfilling. The cells, which comprise approximately 10 acres, have subsequently filled with precipitation. The clay dike around these cells is keyed into the clay dike around the filled portion of the East Landfill. The physical features of the site are shown on Figure 3.

Several ponds are located on the site. These ponds either were excavated for sand as part of a quarry operation prior to landfilling or were excavated during site activities for cell construction or cover material.

Several on-site roads provide access to different areas on the site. The main road forms a loop, from the site entrance along the western side of the East Landfill, along the northern edge of the Northwest Landfill, along the northern property line, and along the eastern side of the East Landfill back to the site entrance.

Areas of the site that were never developed are still covered with cattail marsh or forest. Cattails are present over the southwestern one third of the site (West Marsh Area) and in the northeastern corner of the site (Northeast Pond Area). Cattails are also present in the northcentral area of the site between Cell A and the Northwest Landfill (North Pond Area). Forests have developed on beach ridges both at the extreme southwestern corner (Southwest Trail Area) and the extreme northeastern corner of the site.

Topography in the vicinity of the site is generally flat, with elevations of between 585 feet and 595 feet above mean sea level (M.S.L.). The sand dunes east of the site reach elevations of approximately 595 feet M.S.L., while areas with ponded water are generally at elevations of 585 feet M.S.L. The East Landfill is the highest topographic feature in the area, at an elevation of 625 feet M.S.L. The elevation of the Northwest Landfill is approximately 592 feet M.S.L. Cells A and B have spillways that maintain the water level elevations at 587.5 feet M.S.L. The elevation of Tobico Lagoon and Saginaw Bay/Lake Huron is approximately 580 feet M.S.L. A topographic map of the vicinity of the SCA Hartley & Hartley Landfill Site is included in the Decommissioning Plan (RMT, 2003).

The former site operations building is located in the southeastern corner of the site, near the site entrance from Two Mile Road. A 6-foot–high chain-link fence surrounds the encapsulated areas of the site. A 6-foot–high chain-link fence also runs along the southern and western property lines of the site. This fence was installed to restrict access to the site by hunters and fishermen using the surrounding Tobico Marsh State Game Area.

3.2 USNRC License

The USNRC license for the SCA Hartley & Hartley Landfill Site is Source Materials License No. SUC-1565, Docket No. 040-09022 (USNRC, 1995). The license, which is the only one that has been issued to SCA Services for this site, was issued on June 14, 1995. All activity associated with the source material (*i.e.*, landfilling) had ceased prior to issuance of the license. The license authorizes possession for those activities leading to the decommissioning of the SCA Hartley & Hartley Landfill Site. The license was amended on September 7, 1999 (Amendment No. 1), and on October 10, 2001 (Amendment No. 2). The license amendments extended the due date for the submittal of the Decommissioning Plan.

The current owner of the property is S.C. Holdings, Inc., successor by merger to SCA Services, Inc. Another part of the former Hartley & Hartley Site, the Tobico Marsh State Game Area Site,

is owned by the Michigan Department of Natural Resources (MDNR). Decommissioning of the MDNR's license for the Tobico Marsh State Game Area Site is being addressed by the MDNR.

The licensed source materials are thorium and uranium contained in contaminated soil, sludge, sediment, trash, building rubble, structures, and any other material contaminated in excess of background. The license does not specify maximum activity levels. The licensed material is encapsulated in the Northwest Landfill, or, for the two slag piles outside of the Northwest Landfill (Slag Piles A and B), is covered with temporary caps, and currently presents no radiological exposure. No off-site disposal of radionuclides has occurred under the current license.

The locations of the Northwest Landfill, the two slag piles, and other pertinent features of the site are shown on Figure 3.

Radiological monitoring is not required under the current license. A variety of investigations have been conducted at the site, although most of these were designed to characterize chemical contamination regulated under the State of Michigan's Part 201 environmental remediation program. Some of these investigations also yielded radiological information. A discussion of the site investigations conducted to date is presented in the Decommissioning Plan (RMT, 2003).

3.3 Selected Decommissioning Alternative

The selected decommissioning alternative is on-site consolidation of radiologically contaminated material into a single location and placement of an engineered barrier over the Northwest Landfill (RMT, 2003). This decommissioning alternative, which was developed to control potential radiological exposures to an industrial worker at the site for a period of at least 1,000 years, includes the following major components:

- Excavating the licensed materials in Slag Piles A and B and placing these materials in the Northwest Landfill
- Installing a leachate collection system in the Northwest Landfill
- Constructing an engineered barrier over the Northwest Landfill (clay and vegetated topsoil)

Prior to implementing these actions, a decommissioning workplan will be submitted to the USNRC. This document will present the final design and technical specifications, the construction methods, and the construction quality assurance procedures and documentation requirements. The decommissioning workplan will also present the implementation and documentation requirements for the Final Status Survey.

3.3.1 Contaminated Structures

No contaminated structures have been identified at the SCA Hartley & Hartley Landfill Site. The Final Status Survey will document that the surfaces inside the office building satisfy the USNRC's criterion for unrestricted release.

3.3.2 On-Site Consolidation of Radiologically Contaminated Material and Placement of an Engineered Cover Over the Northwest Landfill

Sequencing of Field Decommissioning Activities

The SCA Hartley & Hartley Landfill Site has been divided into radiological survey units based on site operating history and site characterization data. There are three Class 1 survey units at the site: the Northwest Landfill, Slag Pile A, and Slag Pile B. The area surrounding the Northwest Landfill is designated as a Class 2 survey unit; however, there are no Class 2 survey units around Slag Piles A and B. The East Landfill is a Class 3 survey unit based upon historical process knowledge, which indicates that industrial and municipal solid wastes were disposed in this portion of the site, but not the thorium-bearing slag from Wellman Dynamics. Figure 4 identifies the following radiological survey units at the site:

SURVEY UNIT ID	CLASSIFICATION	DESCRIPTION
1A	1	Slag Pile A
1B	1	Slag Pile B
1C	1	Northwest Landfill
2A	2	Haul road between Slag Pile A and the Northwest Landfill
2B	2	Haul road between Slag Pile B and the Northwest Landfill
2C	2	Area surrounding the Northwest Landfill
3	3	All other areas of the site, including the East Landfill

The following sequence of field decommissioning actions and Final Status Survey sampling will be conducted:

1. Collect samples of the surface soil in the Class 2 survey unit surrounding the Northwest Landfill (Survey Unit 2C) and in the Class 3 areas, except for the East Landfill. Analyze these soil samples for the radiological parameters associated with the thorium-bearing slag. The new data, in conjunction with the historical radiological data in these areas, will comprise the Final Status Survey for these areas. Samples will not be collected in the East Landfill because the historical data for the East Landfill are sufficient for the Final Status Survey.

2. Install erosion control and sediment control systems to prevent off-site migration of regulated material during construction activities and to control the runon of precipitation into the work area.

3. Excavate the regulated materials in Slag Piles A and B (Survey Units 1A and 1B), and place these materials in suitable areas in the Northwest Landfill. The slag piles will be over-excavated (that is, extra material, laterally and vertically, will be removed) based on visual observation to negate the need for Class 2 survey units around these limited areas of known radiologically contaminated material. As possible, the excavated materials will be placed in areas of the Northwest Landfill that require additional fill to achieve final grades; however, other considerations (*e.g.*, haul distance) may suggest placement in other areas of the Northwest Landfill. Other radiologically contaminated decontamination and/or demolition material or equipment from the decommissioning activities may also be placed in the Northwest Landfill. Physical controls will be placed along the haul roads between Slag Piles A and B and the Northwest Landfill to limit the area in which radiologically contaminated materials could spread during the waste consolidation activities.

4. Collect samples of the residual surface soil in the areas where Slag Piles A and B (Survey Units 1A and 1B) were excavated, and collect surface soil samples in the haul roads used to transport material from Slag Piles A and B to the Northwest Landfill (Survey Units 2A and 2B). Analyze all of these soil samples for radiological parameters associated with the thorium-bearing slag. Residual levels of radiation in these areas will be compared with the DCGLs presented in Table 1.

5. Install a leachate collection system in the Northwest Landfill. The leachate collection system will generally be composed of the following components:

   - Approximately four extraction wells in the Northwest Landfill. A submersible pump will be installed in each extraction well.

Appropriate measures will be designed and installed to facilitate routine maintenance and to provide security from vandalism.

- Leachate transfer piping within the Northwest Landfill.
- A below-grade connection to the existing leachate header pipe that was previously installed by the MDNR on the SCA Hartley & Hartley Landfill to transport leachate from the MDNR Landfill to a load-out facility in the southeastern corner of the SCA Hartley & Hartley Landfill Site property.
- An area located in the southeastern corner of the site to collect and load leachate from the East Landfill into tanker trucks. Treating the leachate from the East Landfill is not part of the scope for the Decommissioning Plan. The leachate will be transported to and disposed at, an off-site treatment and disposal facility. Construction of the leachate collection system for the East Landfill will be completed in the fall of 2005 (the design documents for this system [Earth Tech, 2003b and 2005] were submitted to the MDEQ for approval and to the USNRC for information). The leachate from Northwest Landfill, and possibly from the MDNR Landfill, may be collected and treated, pending approval by the USNRC and the MDEQ (see the discussion later in this section for details).

6. Construct an engineered barrier over the Northwest Landfill (Survey Unit 1C). As shown on Figure 5, the engineered barrier will consist of the following layers over the waste:
   - The existing 24 inches of clay will be left in place to provide radiation shielding from the thorium-bearing slag in the waste. The surface vegetation (grass) will be removed to allow for the placement of additional clayey soil.
   - A minimum of 10 inches of imported low-permeability soil (1×10^{-7} cm/s) will be placed over the existing 24 inches of clay to further shield the radiation from the thorium-bearing slag in the waste and to reduce the infiltration of precipitation.
   - A minimum of 6 inches of imported topsoil will be placed over the new layer of low-permeability soil to support cover vegetation. The topsoil layer will be planted with suitable plant species to provide erosion protection.

In total, the final cover will be composed of 34 inches of compacted soil overlain by 6 inches of topsoil, for a total of 40 inches of cover material.

Existing documentation of the source term for the licensed material (ORAU, 1985) is appropriate and adequate to determine the necessary thickness of cover material needed to provide protection from radiological exposures to the buried thorium-bearing slag in the Northwest Landfill. This determination was made using the RESRAD computer code, and the site-specific input parameters for a potential future industrial worker on the site. Consequently, documentation of the placement of the engineered barrier over the Northwest Landfill, in accordance with a Construction Quality Assurance Plan (to be developed as part of the decommissioning workplan), will serve as the Final Status Survey for the Northwest Landfill (Survey Unit 1C). No additional samples of the waste or new cover material will be collected.

Conceptual Design

The engineered barrier over the Northwest Landfill will be designed to meet the dose criterion for license termination for unrestricted use (USNRC, 1997). Engineering plans and specifications will be provided in a subsequent submission, and may include the following elements:

- Final contour plan
- Cover system design details
- Description of final cover material
- Description of erosion control measures
- Construction Quality Assurance Plan

Primary design considerations include the following: (1) physical characteristics of the regulated materials (*e.g.*, size and density), (2) volumes of the regulated materials, and (3) relative locations of the regulated materials. The cover will be designed to minimize the relocation of regulated material, while establishing a stable cover. Design details will be developed to address the following:

- Required radiological shielding (by placing additional soil [clay and topsoil] over the existing 2-foot–thick clay cover to achieve the calculated thickness of soil necessary to withstand 1,000 years of erosion)
- Drainage of precipitation off of the cover
- Long-term cover slope
- Long-term erosion controls
- Dust control during on-site construction activities

- Measures to minimize the need for waste material handling
- Use of low-maintenance vegetative species

Engineered Cover Over the Northwest Landfill

Construction of the cover will be initiated through preparation of the final subgrade for cover construction. Surface drainage systems will be constructed that will direct surface runoff from the cover away from the landfilled material. Cover preparation may involve the physical movement of slag and other materials using standard construction equipment (front-end loaders, bulldozers, dump trucks), such that effective consolidation and compaction are achieved.

During consolidation of the various regulated materials into a single pile, comprehensive health and safety protocols will be followed to avoid exposing workers and nearby residents to site contaminants, and to prevent the migration of contaminants into the surrounding environment. Water and/or other appropriate dust-control media will be used during all material movement activities. Monitoring and appropriate dust control activities will be performed to minimize vehicle-induced fugitive dust generation. Material loading and unloading activities will also be monitored and controlled in a similar fashion. Further, real-time dust and radiological monitoring will be performed by the Decommissioning Contractor to ensure that exposures to radiological contaminants as well as other constituents of potential concern (*i.e.*, metals) do not occur as a result of materials handling activities.[4] These actions, combined with the fact that the closest residence is more than 400 meters (0.25 mile) from the S.C. Holdings' property boundary, will ensure that radiological and safety conditions that cannot be distinguished from those prior to the start of work will be maintained.

The final cover will be constructed over a prepared subgrade. The barrier layer in the final cover will consist of a compacted soil that is 0.9 meter (34 inches) thick. The thickness of the barrier layer was calculated using the RESRAD computer model, which demonstrated that the potential for radiation exposures from all exposure pathways over the next 1,000 years is less than 25 millirem per year over background (refer to Section 5 of the Decommissioning Plan). The cover in its entirety will consist of 34 inches of a suitable compacted soil,

[4] In the event that exposure levels above established site-specific health and safety action levels are identified, additional dust control activities (*e.g.*, increased application of water or other control medium or use of different/supplemental controls systems) will be implemented.

overlain by 6 inches of topsoil that will be seeded with low-maintenance, drought-resistant grass (Figure 5 presents a cross section of the cover).

Surface water drainage features, such as diversion berms, will be constructed, as necessary, to control surface water runoff and the potential erosion.

Final cover soil material will be secured from a certified off-site source, and will be of appropriate grain size and quality to be stable and to augment the overlying vegetative soil layer.

Given the current conditions at the site, a successional old-field community is proposed in order to provide long-term consolidation of the cover and minimize future maintenance requirements, while promoting rehabitation by indigenous species, as well as migrating birds. The vegetation will include a mixture of grass species. Upland areas may be planted with a mix of perennial species during the growing season to establish permanent vegetative consolidation. Perennials develop a strong sturdy root structure that generally inhibits the growth of volunteer woody vegetation that may affect the integrity of the cover.

Leachate Extraction System in the Northwest Landfill

Pursuant to the Consent Order with the State of Michigan, S.C. Holdings will install a leachate extraction system in the Northwest Landfill. The leachate extraction system will consist of four wells approximately 15 feet deep, and piping that will transfer the leachate from the Northwest Landfill to the leachate storage and load-out facilities for the East Landfill. S.C. Holdings will also manage the collection and disposal of leachate in the MDNR Landfill, as required under the Consent Order with the State. However, the Consent Order does not require S.C. Holdings to address radiological concerns in connection with the leachate in the MDNR Landfill. A conceptual layout of the leachate extraction systems for the Northwest, the East, and the MDNR Landfills is shown on Figure 6.

The leachate extraction wells and piping in the Northwest Landfill will be installed during the field mobilization for consolidating Slag Piles A and B into the Northwest Landfill and upgrading the cover over the Northwest Landfill. The QAPP will cover all intrusive decommissioning (that is, work that may involve contact with thorium-contaminated soil at concentrations greater than the DCGLs).

The operation of the leachate extraction system is incidental to the decommissioning effort of the site, and is not a principal activity as defined in the USNRC's regulations. The operation of the leachate extraction system in the Northwest Landfill does not require a radioactive materials license because the leachate does not contain radioactive materials at concentrations greater than the MCLs. Specifically, analyses to date of leachate from the Northwest Landfill have yielded concentrations of Ra-226 and Ra-228 that total less than 5 pCi/L, and uranium-238 is less than 30 pCi/L (USEPA, 2002). Prior to the startup of the leachate extraction system in the Northwest Landfill, S.C. Holdings will collect additional samples of the leachate in the Northwest Landfill to confirm the historical results. In addition, as part of the Remedial Action to address chemical concerns at the SCA Hartley & Hartley Landfill (under the State of Michigan's environmental response regulations [Part 201]), S.C. Holdings plans to sample the leachate in the on-site storage tank as may be required by the leachate disposal permit. S.C. Holdings also plans to collect a composited leachate sample from within the containment around the Northwest Landfill on an annual frequency for analysis of the constituents required by the disposal permit, as well as for thorium and radium-228. The results for the leachate samples will be used to confirm that levels of the constituents analyzed are consistent with historical results

Surface Water and Groundwater

Decommissioning activities are not needed to address surface water or groundwater, as these media have not been adversely affected by the thorium-bearing slag.

3.4 Schedule for Implementing the Decommissioning Activities

A schedule for implementing the decommissioning activities at the SCA Hartley & Hartley Landfill Site is presented on Figure 7. This is the same schedule as was presented in the Decommissioning Plan. Changes to the schedule will be made to the Decommissioning Plan and to this QAPP simultaneously to maintain consistency between the planning documents.

S.C. Holdings acknowledges that the dates shown in the schedule on Figure 7 are contingent upon the USNRC's approval of the Decommissioning Plan. S.C. Holdings also acknowledges that circumstances may change during decommissioning, and, if the licensee determines that the decommissioning cannot be completed as outlined in the schedule, the licensee or responsible party will provide an updated schedule to the USNRC.

Section 4
Description of the QA Program

4.1 Quality System Components

The quality system definition for each element of the Decommissioning Plan begins with USNRC approval of that document. USNRC approval of the Decommissioning Plan and this QAPP constitutes an agreement among all project participants that the level of quality needed to complete the project is sufficient.

Engineering plans and specifications will be reviewed by the PM and the QAO prior to submission to the USNRC for review. This purpose of this review is to assess whether the requirements of the Decommissioning Plan have been met (including all QAPP requirements). The deliverables will then be submitted to the USNRC, after which comments will be resolved and the deliverable modified as necessary. A comment resolution record will also be prepared to document where the modifications can be found.

Upon USNRC acceptance of the engineering plans and specifications, the final action for each will be to perform a final review. The QAO will take the lead in performing this review, with the assistance of the PM. The review will identify any quality issues that arose during plan execution and document how they were resolved. Lessons learned during plan execution will also be identified and documented. Upon completion of the review, a copy of the completed review will be placed in the project file. The QAO will also maintain a copy of all final plan/specifications.

4.2 Personnel Qualification and Training

The PM has the authority to use any of project team's resources needed to complete any element of the Decommissioning Plan. The PM will work with the Decommissioning Contractor and S. C. Holdings to identify and assign the necessary personnel.

Because all team members will be required to read the Decommissioning Plan and this QAPP, as well as commit to following the requirements of both of those documents, any changes to either will be captured in a written communication to project participants. Included therein will be a detailed description of the changes and the rationale for them. Project participants will be required to acknowledge these changes, in writing, before continuing work on any task related to the Decommissioning Plan.

4.3 Procurement of Items and Services

The project team will implement standardized Quality Implementing Procedures (QIPs) whenever items and services are procured during the decommissioning. These will include the generation of specifications for each purchase order, capturing the necessary quality elements and data quality objectives in the specifications.

4.4 Documents and Records

The following documents are considered to be quality-related for the purposes of the Decommissioning Plan and will be maintained as such:

- Work assignments
- Decommissioning Plan, including all revisions
- Subcontracts and purchase orders
- Correspondence prepared for the project (progress reports, letters, etc.)
- Calculations supporting the preparation of deliverables
- Computer inputs and outputs used in the preparation of deliverables
- Review sheets
- Field documentation (logs, survey records, instrument check sheets, calibration records, etc.)
- Chain-of-custody forms for samples shipped for analysis
- Certificates of analysis
- Data validation packages
- Certificates of disposal
- Deliverables
- Internal audit reports
- Final project review findings

Information and data generated from the requirements of these documents will also be treated as quality records. If additional task-specific records are generated, they will be managed in accordance with Section 2.5 of ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs." For those records that are generated on a computer, both electronic and hard-copy records will be retained.

The PM is responsible for the collection of all project records once the decommissioning actions are complete. The QAO will review the records at that time to ensure all required documentation is included. Once the records have been fully assembled, the records package will be archived, with the PM, in concert with the QAO, specifying the retention location and period.

4.5 Computer Hardware and Software

The work performed during decommissioning of the SCA Hartley & Hartley Landfill Site may include the use of available software packages and the development of database systems. When commercially-available software is used on a particular task, the PM will ensure that it is operating properly. For most software packages, running sample problems contained in the software's documentation and confirming that the results match the documentation is sufficient to demonstrate proper operation. If the sample problem results do not match that contained in the documentation, the software package will not be used until a solution has been identified and implemented.

If later versions of the software are used during task execution, a simulation performed on an earlier version of the code will be repeated with the new version. The outputs of the two runs will be compared to ensure that the results are the same. If the results differ to a predetermined degree of significance, the new version of the software will not be used until the cause is identified and resolved.

However, if it is determined that the difficulty is with the earlier version of the code, the PM will immediately notify the PM and the QAO. The QAO will identify all tasks where the earlier version of the software was been used. The PM will notify S. C. Holdings and applicable project personnel about the problem, institute a review to determine the impact that revising the software outputs will have, and preparing a recovery plan. The QAO will be responsible for ensuring the recovery plan is fully and appropriately implemented.

On occasion, software may be developed by a project team member as part of a particular task's execution. In this event, a benchmarking process will be used to validate the software.

4.6 Planning

The planning process for each assigned task in the Decommissioning Plan will begin with the issuance of the work assignment. The USNRC-approved Decommissioning Plan provides the PM with definitive guidance on the approach to be followed for the work assignment.

As the decommissioning progresses, there may be tasks where it was not possible to define the scope of work completely at the time of Decommissioning Plan preparation. In such an

eventuality, the PM will establish an interim activity, complete with its own scope, cost, and schedule. At the completion of the interim activity, a revision to the Decommissioning Plan may be required. If so, it will be prepared using the information acquired during the interim activity. The revised Decommissioning Plan (or a particular Plan element) will be submitted for USNRC approval before any additional work proceeds.

4.7 Implementation of Work Processes

The Decommissioning Plan and this QAPP establish the general processes used in performing work at the SCA Hartley & Hartley Site. Once both have received regulatory approval, they will be finalized and distributed to project participants. As a parallel effort, the QAO will determine if any of the requirements herein warrant the development of specific implementing procedures to establish the project's "standard way to do business." If project procedures are required, their preparation, control and review will follow a prescribed protocol.

4.8 Assessment and Response

To ensure the experience gained in executing the approved Decommissioning Plan (both positive and negative) can be incorporated into subsequent work processes, the project team will establish methods to identify quality assurance issues. For example, as part of the routine execution of tasks, the PM will communicate via written correspondence, e-mail or conference call with S.C. Holdings and other project representatives on a planned and periodic basis. One of the reasons for these communications is to identify quality issues as they are detected. The results of these important communications will be captured in monthly progress reports that will be prepared as part of the decommissioning.

At the conclusion of each milestone in the site decommissioning, the QAO will conduct a final review of that element. This review will confirm that all outstanding quality issues were resolved, and that any corrective actions taken were effectively implemented. The review will also identify lessons learned that may be applicable to subsequent project elements.

Monthly progress reports, final reviews, and feedback from project personnel, S.C. Holdings and from the USNRC will all be considered as sources of information designed to improve the work performed pursuant to the approved Decommissioning Plan. The QAO will recommend operational changes based on this input. The PM, with input from key personnel, will determine what changes are appropriate and take the necessary steps to ensure their implementation. All revised documents will be reviewed by the key personnel and the QAO. If changes to the Decommissioning Plan or this QAPP are warranted, they will be submitted to the USNRC for review and approval prior to implementation.

Periodic audits of decommissioning activities will be performed by the PM, the RSO, the HSO, the QAO and/or persons so designated to verify that decommissioning activities comply with established procedures and other aspects of the QAPP (such as scope, status, adequacy, and compliance) and to evaluate the overall effectiveness of the QA Program. S.C. Holdings and the QAO will ensure that qualified personnel are employed to conduct audits to ensure that the applicable procedures are being properly implemented. The audits will be conducted in accordance with written guidelines or checklists. Health and safety personnel will also conduct audits in their area of concern. External program audits may also be used at the discretion of S.C. Holdings or the Decommissioning Contractor. Audit results will be reported to both S.C. Holdings and the Decommissioning Contractor in writing, and actions to resolve identified deficiencies will be tracked and appropriately documented. The audit reports will be captured in the project file.

4.9 Quality Improvement

The PM is responsible for developing an effective system of task execution under the provisions of the Decommissioning Plan. The QAO will assist the PM by evaluating the effectiveness of the system, identifying areas where improvements are warranted, and recommending corrective action. Each project team member will have numerous communications channels available for identifying and reporting on quality issues. These channels include the informal methods such as e-mails, conference calls, the formal monthly progress reports, and the final QAO reviews. The QAO accumulates information from these channels for use in the evaluation of each aspect of the project. Finally, the PM, with the assistance of the QAO, makes the necessary changes in the planning documentation, if required. Once made, the revised documents will be distributed to all project participants, along with a listing and description of the changes that were made.

4.10 Corrective Action

Deficiencies and conditions that do not conform to the Decommissioning Plan, this QAPP, or License SUC-1565 will be corrected using a corrective action program. The QAO has overall responsibility for reporting all procedure and contract violations found. All project personnel will be encouraged to identify non-conforming conditions and report them to their supervisor and/or the QAO. The PM will determine if the deficiency requires work to be stopped or if notification is required to S.C. Holdings, the RSO, and/or the USNRC.

A deficiency or nonconforming condition will be documented on a Corrective Action Request (CAR) Form. The form will be completed by the individual who reported the nonconformance and submitted to the QAO who will review the CAR for completeness. The completed form will provide a detailed description of the nonconforming condition and reference the affected

documents that apply. The person writing the CAR will sign the document. The QAO will review the form and maintain a log of all CARs; a unique sequential number will be assigned. The QAO will assign the responsible party to resolve the nonconforming condition and notify the PM and the RSO.

The QAO and the PM will establish a schedule to resolve the nonconforming condition. The QAO will provide a report to the PM listing all open CARs and the person(s) responsible for the corrective action on a planned and periodic basis. The report will list those CARs that are past due, those past due for more than 30 days, and those that are past due for 90 days or longer. The parties assigned the responsibility of resolving the deficiency will provide a detailed description of the actions taken to correct the causes of the nonconforming condition and the preventive actions to prevent recurrence.

The QAO will review the response and verify that the actions address the original concern and provide effective preventive actions. If satisfactory, the QAO will accept the response and close the CAR. The log will be updated to indicate the current status of the CAR.

After corrective action has been completed and verified by the QAO, the closed CAR (original) will be filed. The QAO and the PM will evaluate the effectiveness of corrective action. After an agreed-upon time frame, either the person who generated the CAR or the QAO, or both, may verify the implementation and the effectiveness of the corrective action taken. If needed, a new CAR will be issued to address additional corrective requirements.

Section 5
Quality Objectives and Criteria

5.1 Data Quality Objectives

The final status survey design process for the decommissioning of the SCA Hartley & Hartley Landfill Site begins with the development of data quality objectives (DQOs) (USEPA, 1994). The DQOs are used in conjunction with the radiological conditions at the site to calculate the number and locations of measurement and sampling points to demonstrate compliance with the release criterion. Survey techniques and analytical methodologies are selected to generate the required analytical data. Once the analytical data are received from the laboratory and validated, they are evaluated using statistical techniques to test the hypothesis stated in this section. A Final Status Survey sampling plan will be developed prior to performing the Final Status Survey.

Statement of cleanup objective - After decommissioning is completed, residual radioactivity at the SCA Hartley & Hartley Landfill Site will be low enough that a hypothetical on-site industrial worker will not incur a radiation dose of more than 25 mrem/yr over the 1,000 years following completion of the decommissioning. The decommissioning alternative for the SCA Hartley & Hartley Landfill Site is consolidating the material in the two slag piles that are currently outside of the Northwest Landfill into the Northwest Landfill, and then placing an engineered cover over the consolidated pile to eliminate direct contact with its contents.

Hypothesis to be tested - Following consolidation of the two slag piles, it must be determined whether the derived concentration guideline level (DCGL) has been met, or if further remediation is required. Therefore, the decision to be made is as follows: "Does the soil outside of the Northwest Landfill contain residual radioactivity concentrations that are less than the DCGLs listed in Table 1?" The null hypothesis (H_0) for the statistical test is that the site does not meet the release criteria, that is "The concentration in the survey unit exceeds the concentration in the reference area by more than the DCGLw."

Inputs to the decision - Inputs to the decision include the type, quality, and quantity of data that will be sufficient to make decisions. The type refers to the radiological data needed for the survey unit soil. Quality refers to various aspects of the analytical data collected, such as precision, accuracy, representativeness, comparability, completeness, required and achieved detection limits, and data validation documentation requirements. Validation that the resulting data meet these values will ensure the *quality* of the information and allow the results to be used

in testing the site cleanup hypothesis. Quantity refers to the amount of data necessary to confirm compliance with the release criteria, and is determined as part of the design process.

5.2 Performance Criteria

The performance criteria for meeting the sampling objectives are described as follows.

Precision - Precision refers to the level of agreement among repeated measurements of the same parameter. The overall precision of a piece of data is a mixture of sampling and analytical factors. The analytical precision is much easier to control and quantify because the laboratory is a controlled, and therefore a measurable, environment.

Laboratory sampling precision will be checked by obtaining a minimum of one replicate sample for every 10 physical soil samples collected in a given survey unit. Precision will be evaluated by calculating the relative percent difference (RPD) for each replicate pair. The soil field replicate pairs are expected to have RPDs in the range of 650 percent.

At a minimum, one replicate sample or the recount of a previously sampled location will be performed for every sample batch. A sample batch is defined as a group of samples that behave similarly with respect to the sampling or testing procedures being employed. For quality control (QC) purposes, a group of 10 samples of similar physical media collected within 1 work week, or all such samples collected in a work week (if less than 10), whichever occurs first, is considered a batch.

The RPD for each analytical parameter will be calculated and compared with method-specific precision criteria derived from historical performance data. If these criteria are not met, a careful examination of the sampling techniques, sample media, and analytical procedure will be conducted to identify the cause of the high RPD and to define the usability of the data.

Accuracy - Accuracy refers to the difference between a measured value for a parameter and the true value for the parameter. It is an indicator of the bias in the measurement system. Field instrument accuracy will be evaluated by comparing the static count measurement at each soil sample location with the laboratory result. Laboratory accuracy will be evaluated by the analysis of one method blank per sample batch and one spiked sample (matrix spike/matrix spike duplicate [MS/MSD]) per sample batch (or one MS/MSD for every 20 samples) as applicable for radionuclides.

Representativeness - Representativeness is a measure of the degree to which the measured results accurately reflect the medium being sampled and the overall situation at the site. It is a qualitative parameter that is addressed through the proper design of the sampling program in

terms of sample location, number of samples, selection, preparation, and handling of the samples.

The final status survey unit sampling program will be designed in accordance with the guidance given in MARSSIM (USNRC, 2000), to ensure that the appropriate statistically derived number of samples is collected during final status surveys. Sampling protocols will be developed and used in the field to ensure that the samples collected are representative of the media. Field handling protocols (*e.g.*, storage, handling in the field, and shipping) will be designed to preserve the integrity of the collected samples. Proper field documentation and QC efforts will be used to establish that protocols have been followed and that sample identification and integrity have been maintained.

Comparability - Comparability expresses the confidence with which one data set can be compared with another. When comparing data, it is important to compare data collected under similar sets of conditions. Seasonal trends, depth of sample collection, analytical protocol, Method Detection Limits (MDLs), and any other sampling/analytical variables must be taken into account when comparing data sets.

Completeness - Completeness is a measure of the amount of information that must be collected during the Final Status Survey to allow for successful achievement of the project objectives. The overall objective of the remediation at the site is to remove contaminants exceeding the DCGLs listed in Table 1.

A certain amount and type of data must be collected before a decision on each Final Status Survey unit is considered valid. The statistically-derived number of samples will be calculated in accordance with MARSSIM (USNRC, 2000). The completeness goal for each Final Status Survey will be 95 percent (areal) for the field sampling and 95 percent (number) for the laboratory analyses. The importance of any lost or suspect data will be evaluated in terms of the sample location, the analytical parameter, the nature of the problem, the decision to be made, and the consequence of an erroneous decision. Critical locations or parameters for which data are determined to be inadequate may be resampled.

Sensitivity - Sensitivity refers to the ability to detect a minimal amount of a substance, and is typically expressed as the MDL, Practical Quantitation Limit (PQL), or Reporting Limit (RL). Radiological analyses must indicate if the soil remaining at the site has met the cleanup criteria. Therefore, the required off-site analytical laboratory Minimum Detectable Concentration (MDC) has been set at 1 pCi/g for U-238 and 1 pCi/g for Th-232.

Section 6
Documentation and Records

Data acquired during implementation of the Decommissioning Plan will be captured as part of a data management system. The radiation survey maps will designate the location being surveyed, as well as the name of the surveyor and other pertinent survey information. To the extent practical, State Plane coordinates will be used to define the location of survey measurements and sampling locations. If not available, site-specific references will be used to locate a measurement of sampling point.

Both direct radiation measurements and analytical results will be documented. The results for each survey measurement and/or each sample analysis will be listed in tabular form along with the corresponding grid block location. Radiation survey data will be recorded in a verifiable manner and reviewed for accuracy and consistency. Each of the major phases of the decommissioning process will be documented in a manner suitable for audits or assessments.

6.1 Quality Assurance Records

The following quality assurance records will be monitored and maintained by the PM and the QAO.

6.1.1 Laboratory Data

Data reduction, QC review, and reporting will be the responsibility of the analytical laboratory. Data reduction includes all automated and manual processes for reducing or organizing raw data generated by the laboratory. The laboratory will provide a data package for each set of analyses that will include a copy of the raw data in electronic format, and any other information needed to check and recalculate the analytical results.

Once a data package is received from the laboratory, the analytical results and pertinent QC data will be entered into a computer database. The data packages will serve as basic reference sheets for data validation, as well as for project data use.

6.1.2 Field Survey Data

The generation, handling, computation, evaluation, and reporting of final radiological survey data will be specified in the Decommissioning Contractor's procedures. Included in these procedures will be a system for data review and validation to ensure

consistency, thoroughness, and acceptability of the data. Qualified health and safety, operations, and/or engineering personnel will review and evaluate survey data.

Project team members will maintain a project field logbook. The field logbook will be a hardbound notebook with consecutively numbered pages that is unique to the site. Only one field logbook will be in use at the site at one time. Consecutive logbooks will be used as books are filled. Entries in the field logbook will be made in blue or black ink. Errors will be crossed out with a single line, and initialed and dated by the person making the entry. The correct entry will then be made in the field logbook.

The field logbook will be used to record all information particular to each day's activities, including at a minimum the following:

- Personnel on-site and their responsibilities
- Health and safety data
- Weather conditions
- Equipment calibration information
- Summary of sampling activities (collection and handling)
- Sample shipping information
- Quality assurance infractions
- Summary of key communications

Each entry or page, as appropriate, will be initialed and dated by the person designated to keep the field logbook. Sampling crews will record all specific sampling information (*i.e.*, sample number, date, time, etc.) in the field logbook. The make, model, and serial number (if applicable) of sample collection equipment, other field equipment, and physical measuring equipment will be recorded in the field logbook. The field logbook will become part of the permanent project file.

6.2 Training Records

A form will be developed to demonstrate that training commitments have been met. This form will include the following information: the facility name; the date; the time; the task number; the type of work; the hazardous/radioactive materials used; the protective clothing/equipment used; the chemical, radiological, and physical hazards; the emergency procedures; the hospital's/clinic's telephone numbers; the paramedic's telephone number; the hospital's address; any special equipment needed; the quality elements associated with the topic, and any other matters that may be relevant. All training records will be incorporated into the project file.

Section 7
Sampling Activities

7.1 Design of the Final Status Survey

As described in the Decommissioning Plan, the objective of the Final Status Survey is to collect sufficient information to demonstrate, to a reasonable degree of statistical certainty, that the concentrations of radiological constituents in soil at the site do not exceed the established DCGLs (see Table 1), and that the license termination for unrestricted release has been met.

The Final Status Survey will be conducted in two phases to optimize equipment scheduling and to minimize the likelihood that radiologically contaminated soil is identified after the engineering barrier is constructed over the Northwest Landfill. The following sampling will be conducted:

1. The first phase of the Final Status Survey is the collection of samples of the surface soil in the Class 2 survey unit surrounding the Northwest Landfill (Survey Unit 2C) and in the Class 3 areas except for the East Landfill. These soil samples will be analyzed for the radiological parameters associated with the thorium-bearing slag. The new analytical data, in conjunction with the historical radiological data for these areas, will be used to verify that the slag in the Northwest Landfill is contained within the slurry wall. Samples will not be collected in the East Landfill because historical data for the East Landfill (Appendix B-3 of the Decommissioning Plan) are sufficient for the Final Status Survey.
2. After the analytical results for the first phase of the Final Status Survey are validated, the regulated materials in Slag Piles A and B (Survey Units 1A and 1B, respectively) will be excavated and placed in the Northwest Landfill (Survey Unit 1C). The slag piles will be over-excavated based on visual observation to negate the need for Class 2 survey units around these limited areas of known radiologically contaminated material (*i.e.*, the two slag piles).
3. The second phase of the Final Status Survey is the collection of samples of the residual surface soil in the areas where Slag Piles A and B were excavated (Survey Units 1A and 1B, respectively), and the collection of surface soil samples along the haul roads used to transport material from Slag Piles A and B to the Northwest Landfill (Survey Units 2A and 2B, respectively). These soil samples will be analyzed for the radiological parameters associated with the thorium-bearing slag.

Existing documentation of the source term for the licensed material (ORAU, 1985) is appropriate and adequate to determine the necessary thickness of cover material needed to provide protection from radiological exposures to the buried thorium-bearing slag in the

Northwest Landfill. This determination was made using the RESRAD computer code, and site-specific input parameters for a potential future industrial worker on the site. Consequently, documentation of the placement of the engineered barrier over the Northwest Landfill, in accordance with a Construction Quality Assurance Plan (to be developed as a separate document from this QAPP) will obviate the need for a Final Status Survey of Survey Unit 1C. No additional samples of encapsulated or cover materials will be collected.

Samples collected from background areas in December 2002 showed no evidence of elevated readings for radionuclides of concern. The results for the background study were presented in Subsection 4.3 of the Decommissioning Plan. Data from the Final Status Survey will be compared with the DCGLs for the site plus background using the statistical tests described in the Decommissioning Plan.

7.2 Sampling Methods

Surface soil samples will be collected with a dedicated precleaned stainless-steel scoop or spatula. Samples will be placed in appropriately-sized containers that have been provided by, or that are specified by, the analytical laboratory, as summarized in Table 2. Each will be labeled with a unique sample identifier such that positive correlation between an analytical result and a sampling location is maintained.

7.3 Sample Handling Procedures

All sampling activities will be recorded in the project field logbook and will include sample-specific information such as date/time of sampling, sample location, and sample number. Samples will remain in the custody of sampling personnel or will be locked in a controlled, limited access location until they are packaged for shipment to the commercial laboratory. A sample Chain-of-Custody form will be completed for all samples and will accompany the sample shipment to the analytical laboratory. Samples will be field-screened to approximate the total radioactivity present and to ensure that the sample shipment conforms to applicable Department of Transportation shipping regulations.

Soil samples will be collected in accordance with written procedures. Sampling tools will be cleaned and monitored, as appropriate, after each use. Samples will be collected in clean/unused sealable containers. Equipment rinsate samples will be collected in accordance with the requirements of the Decommissioning Plan.

Sample containers will be permanently labeled/marked in the field at the time of collection by the technician collecting the sample. At a minimum, the following information will be recorded on the sample container: sample date/time, sample identification, sample location, and name of

person collecting the sample. Sample identifications will consist of an alphanumeric code that further defines the sample type, location, and depth at which the sample was taken. All samples that may contain radionuclide levels in excess of 100 times the background concentration, or which, because of their form, may be of potential laboratory contamination concern, will be identified on the outside of the container with a "radioactive material" caution label.

One of the most important aspects of sample management is to ensure that the integrity of the sample is maintained, that is, that there is an accurate record of sample collection, transport, analysis, and disposal. This ensures that samples are neither lost nor tampered with, and that the sample analyzed in the laboratory is actually and verifiably the sample taken from a specific location in the field.

Sample custody will be assigned to one individual at a time. This will prevent confusion as to who is responsible. Custody is maintained when (1) the sample is under direct surveillance by the assigned individual, (2) the sample is maintained in a tamper-free container, or (3) the sample is within a controlled-access facility.

The individual responsible for sample collection will initiate a Chain-of-Custody Record using a standard form provided by the Decommissioning Contractor. A copy of this form will accompany the samples throughout transportation and analyses; and any breach in custody or evidence of tampering will be documented.

7.4 Analytical Methods

Samples will be analyzed by Severn Trent Laboratories - St. Louis, Missouri, for the concentration of thorium isotopes and associated progeny. Gamma spectroscopy and alpha spectroscopy methods, described as follows, will be employed.

7.4.1 Gamma Spectroscopy

All soil samples will be analyzed for the presence of gamma-emitting radionuclides using a method equivalent to HASL-300 (USDOE, 1997). This gamma spectroscopy method uses a calibrated germanium detector. Gamma peaks associated with thorium, uranium, and associated progeny will be quantified; other gamma lines will be identified using existing software libraries employed by the analytical laboratory. To the extent practical, these gamma lines will be quantified also.

7.4.2 Alpha Spectroscopy

Approximately 10 percent of the soil samples will be analyzed for isotopes of thorium (^{232}Th and ^{230}Th) using alpha spectroscopy. These analyses will be performed using analytical methods equivalent to LANL ER200 and ER290 (LANL, 1991).

7.5 Quality Control Requirements

Field quality control samples (*e.g.*, field duplicates, field blanks, and equipment rinsate blanks) will be collected and submitted to the analytical laboratory to provide a means to assess the quality of the data resulting from the field sampling program. Field and laboratory duplicate samples will be analyzed to check for sampling and laboratory precision. Rinsate blanks will be used as a measure of contamination of samples form the sampling equipment. Definitive data documentation will be obtained from the laboratories and will be retained within the project files.

7.5.1 Field Duplicates

A field duplicate is an environmental sample that is divided into two separate aliquots. The aliquots are processed separately and the results compared to evaluate the effects of the matrix on the precision of the analysis. Results are expressed as relative percent difference (RPD) between the duplicate aliquot analyzed. The RPD should be in the (25-35 percent) range for water samples. Duplicate field samples will be obtained at a rate of one per 10 environmental samples and at least one per batch of samples (whichever is greater) and submitted to the laboratory as blind samples. All field duplicate samples will be analyzed using gamma spectroscopy. Approximately 10 percent of the field duplicate samples will also be analyzed using alpha spectroscopy.

7.5.2 Field Blanks

A field blank is a sample of analyte-free water poured into the container in the field, preserved, and shipped to the laboratory with field samples. The field blank is used to assess contamination from field conditions during sampling. One field blank will be collected on each day of sampling. All field blank samples will be analyzed using gamma spectroscopy. Approximately 10 percent of the field blank samples will also be analyzed using alpha spectroscopy.

7.5.3 Equipment Rinsate Blanks

A rinsate blank is prepared in the field by pouring "clean" deionized, distilled (*i.e.*, laboratory-provided analyte-free) or High-Performance Liquid Chromatograph (HPLC) grade water over or through a sample collection device or equipment after it has

been decontaminated. A rinsate blank is sometimes referred to as an equipment blank or wash blank. A rinsate blank will be collected at a frequency of one per day of sampling and will be analyzed for the same analytes as the field samples.

Split samples will also be prepared if so requested by the USNRC. These will be collected, and documented in the same manner as for field duplicate samples.

7.6 QC Hold Points

QC hold points will be utilized as necessary to ensure the quality of surveys and sampling. For example, during the Final Status Survey, the RSO will establish action levels or hold points where a review and signature are required before proceeding to fill an excavation or to place a clean cover over a surface that was decontaminated. Hold points will also be used to ensure that debris is moved only after the QAO has verified that the proper sampling and survey information for the debris in question has been obtained.

Section 8
Control of Instruments

Procedures for the calibration, maintenance, accountability, operation, and quality control of radiation detection instruments implement the guidelines established in American National Standards Institute (ANSI) standard ANSI N323-1978 and ANSI N42.17A-1989 (ANSI, 1978; 1989). Proper maintenance of equipment varies, but maintenance information and use limitations are provided in the vendor documentation and in the Radiation Safety Program. Equipment used for measuring and analyzing will be tested and calibrated before initial use and will be recalibrated if maintenance or modifications could invalidate earlier calibrations. Field and laboratory equipment specifically used for obtaining final radiological survey data will be calibrated based on standards traceable to the National Institute of Standards and Technology (NIST).

Minimum frequencies for calibrating equipment will be established and documented. Equipment used for measuring will be tested at least once on each day the equipment is used. Test results will be recorded in tabular or graphic form and will be compared with predetermined, acceptable performance ranges. Equipment that does not conform to the performance criteria will be promptly removed from service until the deficiencies can be resolved

Section 9
Data Validation and Usability

9.1 Data Review and Verification

Data acquired as part of the decommissioning process will be reviewed by the PM or as designated to verify that the requirements stated in the survey plan are implemented as prescribed and that the results of the data collection activities support the objectives of the survey, or permit a determination that these objectives should be modified. The PM will determine if the data are of the appropriate type, quality, and quantity to demonstrate compliance with the plan objective. The review will check that the appropriate number of samples were taken from the correct locations and that they were analyzed with measurement systems having the appropriate sensitivity. After the data are analyzed, a sample estimate of the data variability, namely the sample standard deviation (σ) and the actual number of valid measurements, will be used to confirm that the sampling design provides adequate power to conclude that the objectives of the survey design are met.

For comparison of survey data with DCGLs, the survey data from field and laboratory measurements will be converted to DCGL units. The PM will ensure that data measurements retain traceability to the NIST and that conversion factors are appropriate for the radiation quantity. The preliminary data reports will be reviewed to ensure that adequate measurement sensitivity is being achieved and to resolve any detector sensitivity problems.

An evaluation will be made to confirm that the data are consistent with the underlying assumptions made for survey plan statistical procedures. The basic statistical quantities that will be calculated for the survey unit are as follows:

- Mean
- Standard deviation
- Median
- Minimum
- Maximum

The value of the sample standard deviation will be used to determine if a sufficient number of samples were collected to achieve the desired power of the statistical test. A verification that the sample sizes determined for the tests are sufficient to achieve the DQOs set for the Type I (α) and Type II (β) error rates will be completed. If an insufficient number of

measurement results were obtained or if the DQO's were not met, another campaign will be initiated. However, re-sampling or re-survey will be performed only if the sample size must be increased by more than 20 percent, since MARSSIM Tables 5-3 and 5-5 include a correction factor of 20 percent to allow for lost or unusable data (USNRC, 2000).

9.2 Data Validation

Prior to releasing data for use by project personnel, selected data will undergo data evaluation based on the intended end use of the data. Data points chosen for evaluation will be examined to determine compliance with QA requirements and other factors that determine the quality of the data. Data taken during a characterization survey will be subjected to quality verification before use as Final Status Survey data. Data acquired outside of the decommissioning process may be usable as FSS data, provided that those data are subjected to quality verification and that they satisfy the DQOs.

Any rejected sample data or data omissions identified during the data validation will be evaluated to determine their impact on the project. Other corrective action may include resampling and reanalyzing, evaluating and amending sampling and analytical procedures, and accepting data acknowledging the level of uncertainty

The PM will review the QA/QC reports associated with the data sets, prepare graphs of the data, and calculate basic statistical quantities to analyze the structure of the data, and to identify patterns, relationships, or potential anomalies. The survey data will be reviewed as they are collected. The preliminary data examination will include the following:

- Evaluation of data completeness
- Verification of instrument calibration
- Verification of sample identification and traceability to sampling location
- Measurement of analytical precision using duplicate samples
- Measurement of analytical bias using spiked samples
- Evaluation of the potential for cross-contamination with equipment rinsate blanks
- Assessment of adherence to method specifications and QC limits
- Evaluation of method specifications and QC limits
- Evaluation of method performance in the sample matrix
- Applicability and validation of analytical procedures for site-specific measurements
- Assessment of external QC measurement results and QA assessments

9.3 Investigation Levels

The PM will use radionuclide-specific investigation levels to determine when additional investigations may be necessary. Investigation levels will also serve as a QC check to assess whether a measurement process is beginning to get out of control. A measurement that exceeds the investigation level may indicate that the survey unit has been improperly classified, or it may indicate a failing instrument. When an investigation level is exceeded, the first step will be to confirm that the initial measurement/sample actually exceeds the particular investigation level. This may involve taking further measurements to determine that the area and level of the elevated residual radioactivity are such that the resulting dose or risk meets the release criteria. Depending on the results of the investigation actions, the survey unit may require reclassification, additional field decommissioning activities, and/or resurveying. Table 3 lists the investigation levels that will be used by the PM.

If the data suggest that the survey unit was improperly classified, then the original DQOs will be redeveloped for the proper classification. The sampling design and data collection documentation will be reviewed for consistency with the DQOs.

9.4 Data Analysis

During the Final Status Survey, the survey data will be evaluated to determine whether the levels of radioactivity in each medium in a survey unit are greater than the levels of radioactivity in the corresponding medium in the background area. Data evaluation will be performed using the tests specified in MARSSIM, as summarized in Table 4

9.4.1 Acceptable Decision Errors

The data evaluation approach described in MARSSIM specifies that failure to meet the release criteria should be assumed as the null hypothesis; the data are then analyzed to demonstrate that the release criteria are met. The null hypothesis can be stated thus: "The median concentration in the survey unit exceeds that in the reference area by more than the DCGLw." The data are then analyzed to demonstrate that the null hypothesis is false (see Section 5). Site measurement data are used to estimate the actual site conditions within a specified margin of error. The sample collection and data analysis process described in MARSSIM attempts to control decision error by defining the types of errors and incorporating them into the interpretation of survey results. The possible types of decision errors include the following:

- Type I errors (α) - concluding that residual radiological contamination does not exceed the cleanup criteria when it actually exceeds the criteria

- Type II errors (β) - concluding that residual radiological contamination exceeds the cleanup criteria when it actually is below the criteria

Type I and Type II errors can have distinct consequences. Type I errors may have human health consequences, political consequences (state and federal officials may face undue pressure if it is discovered that the site may not have been adequately cleaned up), and cost consequences (the cost of excavating selected portions of the site after remediation is complete would be significant). On a preliminary basis, the probability of a Type I error will be less than 5 percent (α [[0.05]).

Type II errors do not have residual risks, but rather have cost and resource consequences (the manpower, equipment, and disposal costs associated with excavating and disposing material that already meets the cleanup criteria are unnecessary expenses). On a preliminary basis, the probability of a Type II error will be less that 10 percent (β [[0.10]).

9.4.2 Wide-Area Measurements

Wide-area measurements will be performed in which the mean measurement for a survey unit will be compared with the mean background plus the DCGLw. The DCGLw is the DCGL to be used for statistical tests (the w subscript is for the Wilcoxon Rank Sum test). In a "hot spot," Elevated Measurement Comparisons (EMCs) will be performed where specific measurements exceed the $DCGL_{EMC}$. The $DCGL_{EMC}$ is derived separately, based on the characteristics of the "hot spot" (USNRC, 2000).

The first level of comparison will be to assess whether the difference between the maximum value in the survey unit and the minimum value in the reference area is less than the DCGLw. If the difference is less than the DCGLw, then the unit passes.

A second level of comparison is to assess whether the difference between the mean of the values in the survey unit and the mean of the values in the reference area is greater than the DCGLw. If the difference is greater than the DCGLw, then the unit fails.

In the intermediate case, where the maximum difference is greater than the DCGLw, but the difference of the means is less than the DCGLw, the Wilcoxon Rank Sum (WRS) test will be used. The WRS test will be used because all of the analytes of concern are present in background. The WRS test is a nonparametric test that can be used to determine if the mean concentration in the survey unit is significantly greater than the mean concentration in the background.

9.4.3 Areas with Isolated Elevated Measurements

Both the measurements at discrete locations and the scans will be subject to the Elevated Measurement Comparison (EMC). The result of the EMC will be used as a trigger for further investigation. If a measurement at any location exceeds the $DCGL_{EMC}$, the investigation may involve taking further measurements to determine that the area and level of the elevated residual radioactivity are such that the resulting dose or risk meets the release criteria. The investigation will provide adequate assurance, using the process outlined in MARSSIM, that there are no other undiscovered areas of elevated residual radioactivity in the survey unit that might otherwise result in a dose or risk exceeding the release criteria. In some cases, this may lead to reclassifying all or part of a survey unit, unless the results of the investigation indicate that reclassification is not necessary.

Section 10
Final Status Survey Report

The Final Status Survey Report will be a stand-alone document, with the amount of information incorporated by reference being kept to a minimum. The report will be reviewed and approved by personnel capable of evaluating all aspects of the report prior to its release, and by the QAO. The required report elements are as follows:

- Site description
- Site conditions at the time of the survey
- Survey objectives
- Derived concentration guideline levels
- Classification of areas
- Selection of instruments and survey techniques
- Survey plan and procedures
- Determination of background
- Scanning survey measurements
- Discrete samples
- Detection sensitivity
- Sample collection and analysis
- Data interpretation

The following construction-related items will be included in the report as well:

- A brief description of the outstanding construction items from the final inspection and an indication that the items were satisfactorily resolved
- A synopsis of the work defined in the decommissioning workplan and certification that this work was performed
- An explanation of any changes to the work defined in the decommissioning workplan, including as-built drawings of the constructed facilities, and the reasons why the changes were necessary or beneficial for the project
- Certification that the completed decommissioning activities met the applicable construction quality assurance criteria

Additionally, the Final Status Survey Report will contain the following:

- A discussion of any changes that were made in the Final Status Survey from what was proposed in the Decommissioning Plan, this QAPP or other submittals
- A description of the method by which the number of measurements and samples were determined for each survey unit
- A summary of the values used to determine the necessary number of samples and a justification for these values

Furthermore, the survey results reported for each survey unit will include the following, as applicable:

- The number of samples collected from the survey unit.
- A drawing of the survey unit showing the reference system and the systematic random sample locations for Class 1 and 2 survey units and random locations shown for Class 3 survey units and reference areas
- The measured sample concentrations
- The statistical evaluation of the measured concentrations
- Judgmental and miscellaneous sample data sets reported separately from those samples collected for performing the statistical evaluation
- A discussion of anomalous data, including any areas of elevated direct radiation detected during scanning that exceeded the investigation level or measurement
- A statement that a given survey unit satisfied the DCGLw and the elevated measurement comparison if any sample points exceeded the DCGLw

Section 11
References Cited

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Table 1
Derived Concentration Guideline Levels for the Surface Soil Outside the Northwest Landfill SCA Hartley & Hartley Landfill Site Kawkawlin Township, Michigan

ISOTOPE	CONCENTRATION[1] (pCi/gram)
Radium-226	108
Radium-228	228
Thorium-230	206
Thorium-232	141
Uranium-234	358
Uranium-238	358

Note:

(1) The DCGLs for surface soil were derived from the concentrations of radioactive materials calculated by RESRAD, using the input parameters described in Section 5 of the Decommissioning Plan (RMT, 2003). These concentrations are estimated to result in less than 25 millirem per year to an industrial worker on the site over an exposure period of 1,000 years.

Table 2
Sample Containers and Preservation
SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

SAMPLE MEDIUM	ANALYSIS	CONTAINER	QUANTITY	PRESERVATION
Solid	Gamma spectroscopy	One 1-gallon plastic "baggie"	More than 600 grams (>1.3 pounds)	Not required
Solid	Isotopic thorium (alpha spectroscopy)	4-ounce wide-mouth jar	More than 100 grams	Not required

Table 3
Final Status Survey Investigation Levels
SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

SURVEY UNIT CLASSIFICATION	INVESTIGATE DIRECT MEASUREMENT OR SAMPLE RESULT WHEN:	INVESTIGATE SCANNING MEASUREMENT WHEN:
Class 1	>DCGLw or >statistical parameter–based value	>DCGLw
Class 2	>DCGLw	>DCGLw
Class 3	> 0.8 DCGLw	>MDC

DCGLw = DCGL for the Wilcoxon Rank Sum Test.

Table 4
Summary of Statistical Tests
for Analytes that are Present in Background
SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

SURVEY RESULT	CONCLUSION
Difference between largest survey unit measurement and smallest reference area (background) measurement is less than DCGLw.	Survey unit meets release criteria.
Difference of survey unit average and reference area (background) average is greater than DCGLw.	Survey unit does not meet release criteria.
Difference between any survey unit measurement and any reference area (background) measurement is greater than DCGLw, and the difference of survey unit average and reference area average is less than DCGLw.	Conduct WRS test and elevated measurement comparison.

Decommissioning Project Organization

SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

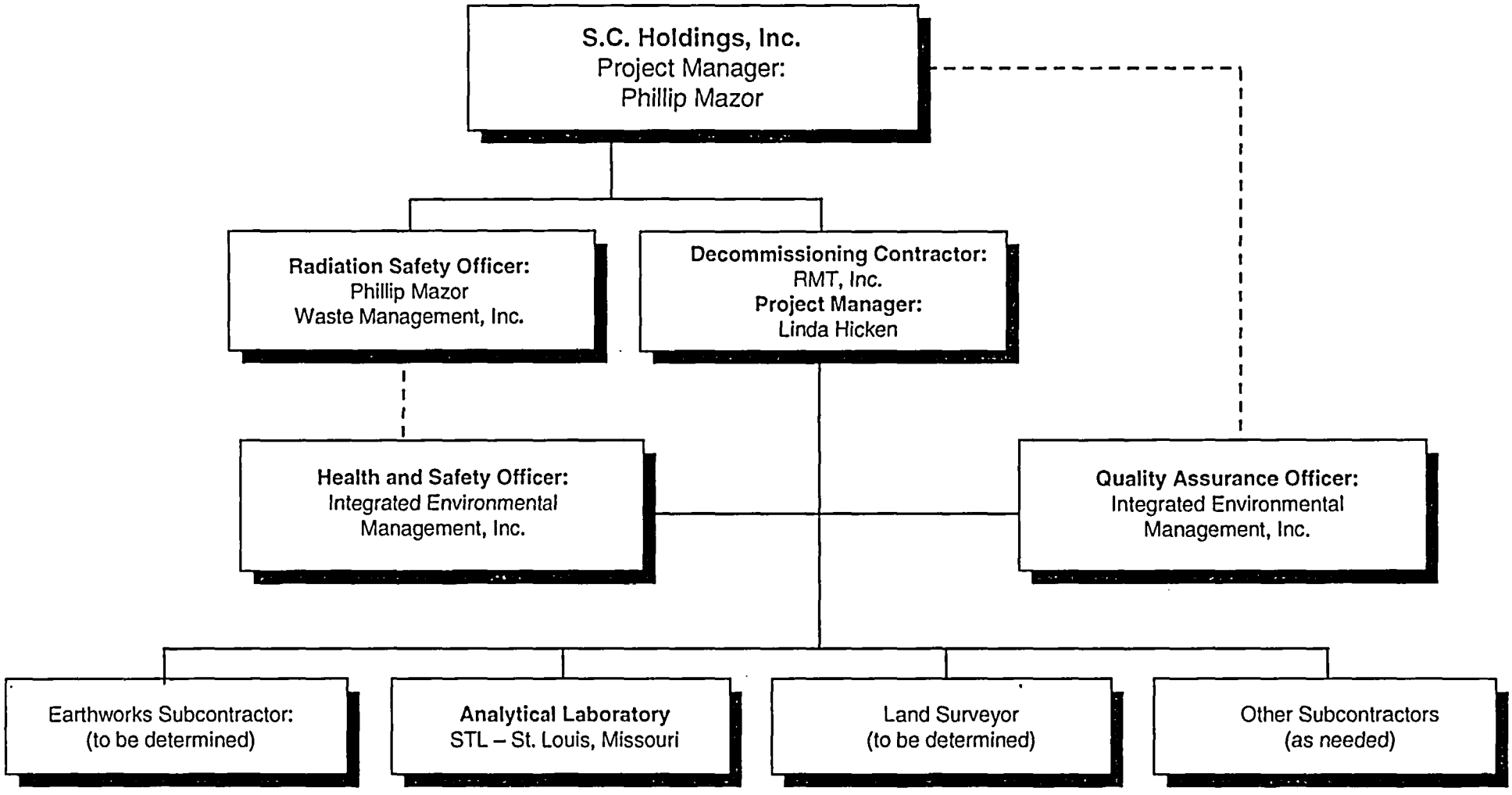

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Figure 1

RMT	FIGURE 2 SITE LOCATOR MAP	DRAWN BY: HANKLEY C
		APPROVED BY: L. HICKEN
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		FILE NO. 61152903.mxd
		DATE: SEPTEMBER 2005

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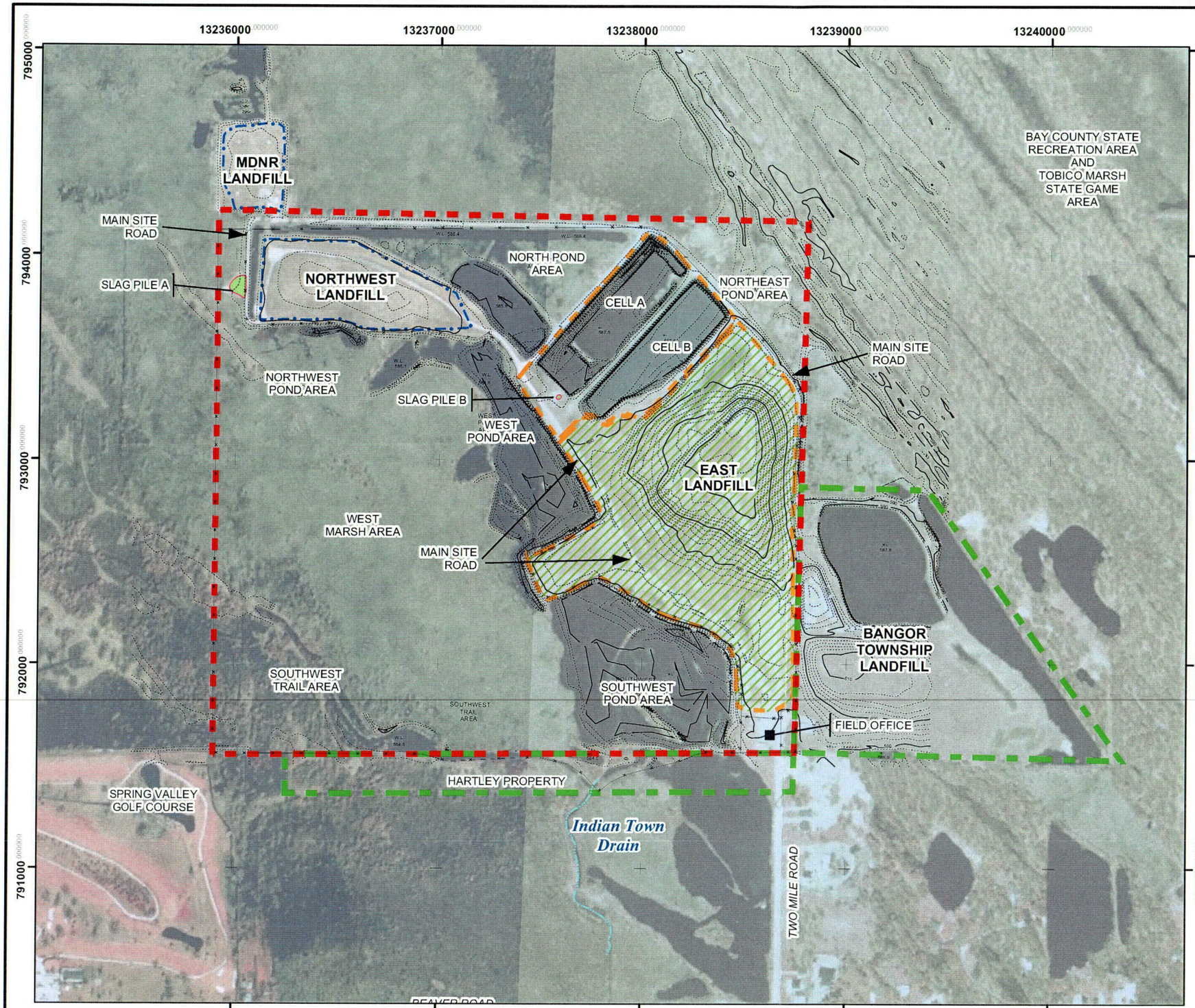
C02



LEGEND

PROPERTY BOUNDARIES

- SCA PROPERTY LINE
- PROPERTY LINE "OTHER"

TOPOGRAPHY

- 10' CONTOURS
- 2' CONTOURS
- SLURRY WALL / CLAY DIKE
- CLAY DIKE
- SLAG PILES
- FENCE

NOTES

MAP COORDINATES ARE REFERENCED TO MICHIGAN STATE PLANE SOUTH, NAD 83, FEET.

0 250 500 1,000 Feet

1 INCH EQUALS 500 FEET

1:6,000

N

PROJECT:
SCA HARTLEY & HARTLEY LANDFILL SITE
KAWKAWLINE TOWNSHIP, MICHIGAN

SHEET TITLE:
FIGURE 3 SITE FEATURES MAP

DRAWN BY: HANKLEY C	SCALE: AS NOTED	PROJ. NO.:	00-06115.29
CHECKED BY:		FILE NO.:	61152902.mxd
APPROVED BY: L HICKEN	DATE PRINTED: 9/15/2005		
DATE: SEPTEMBER 2005			

RMT
744 Heartland Trail
Madison, WI 53717 - 1934
P.O. Box 8923
Madison, WI 53708 - 8923
Phone: 608-831-4444
Fax: 608-831-3021

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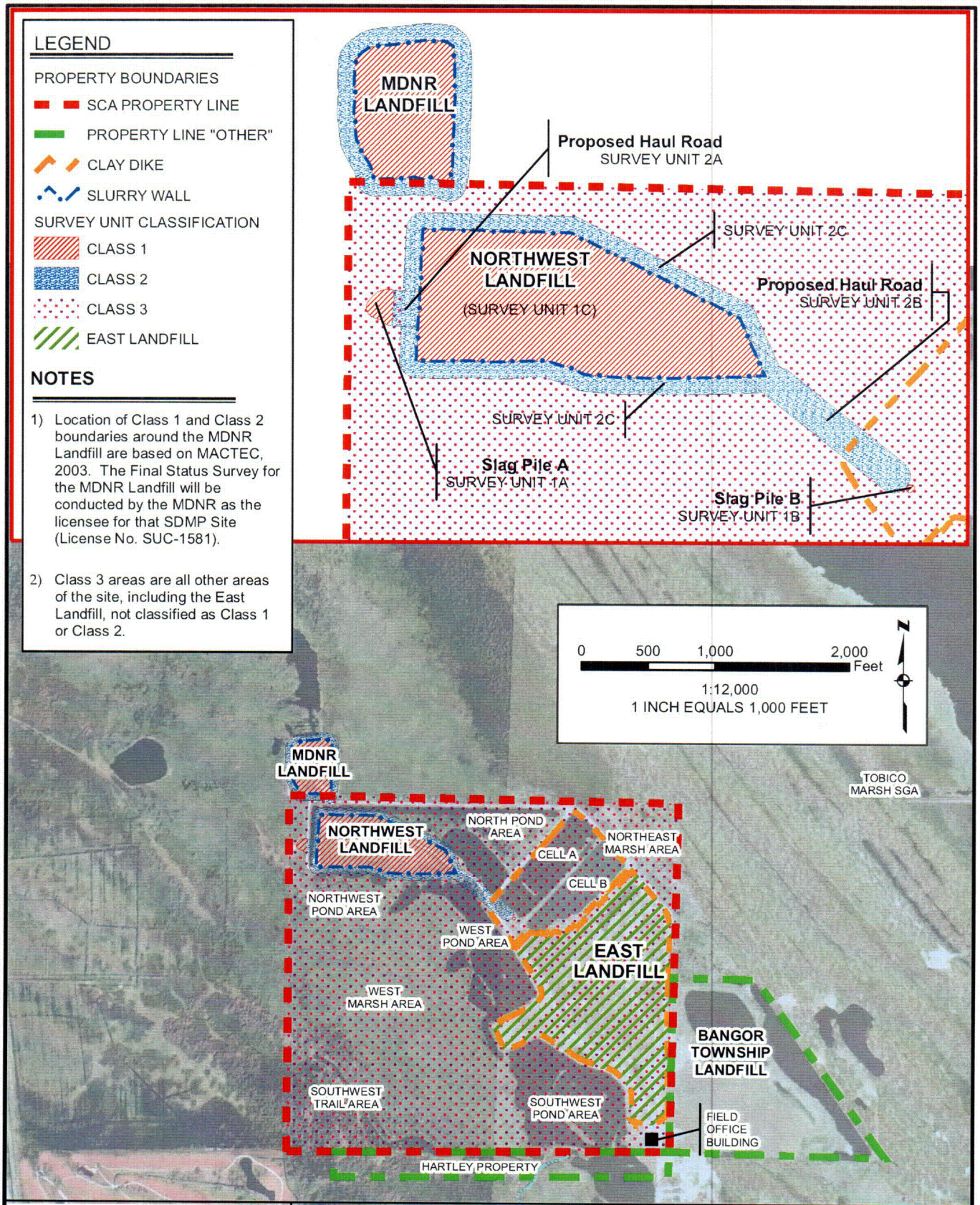
C03



RMT
744 Heartland Trail
Madison, WI 53717 - 1934
P.O. Box 8923
Madison, WI 53708 - 8923
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Fax: 608-831-3021

FIGURE 4 PRELIMINARY DELINEATION OF SURVEY UNITS

Source: 1998 series USGS digital orthophoto quadrangles. 2001. Michigan Department of Natural Resources (MDNR), Forestry, Mineral and Fire Management Division, Resource Mapping and Aerial Photography (RMAP).

SCA HARTLEY & HARTLEY LANDFILL SITE
KAWKAWLIN TOWNSHIP, MICHIGAN

DRAWN BY:	HANKLEY C
APPROVED BY:	L HICKEN
PROJ. NO.:	00-06115.29
FILE NO.:	61152901.mxd
DATE:	SEPTEMBER 2005

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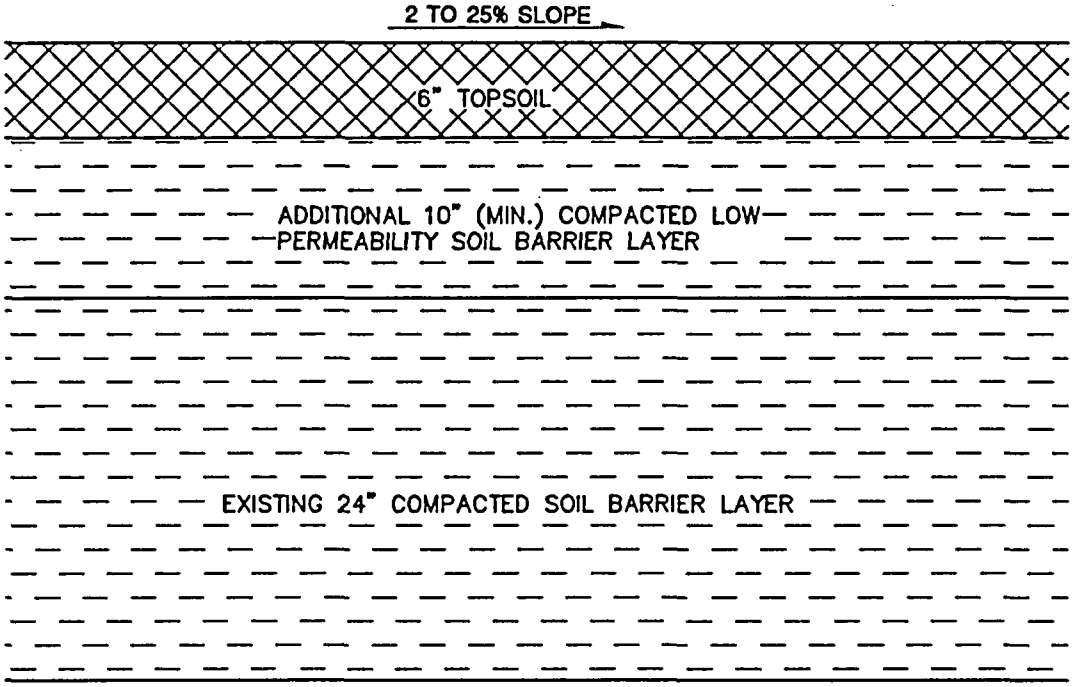
C04



NOTES

1. THE EXISTING 24 INCH SOIL BARRIER LAYER WILL NOT BE RECOMPACTED.

RMT

PROPOSED FINAL COVER FOR THE NORTHWEST LANDFILL

SCA HARTLEY & HARTLEY LANDFILL SITE KAWKAWLIN TOWNSHIP, MICHIGAN

DRAWN BY:	NOLDENR
APPROVED BY:	MJA
PROJECT NO.	6115.29
FILE NO.	61152901.DWG
DATE:	SEPTEMBER 2005

FIGURE 5

E 13235500 E 13236000 E 13236500 E 13237000 E 13237500 E 13238000 E 13238500 E 13239000 E 13239500

N 795000
N 794500
N 794000
N 793500
N 793000
N 792500
N 792000
N 791500

DW-3W DW-3E
DW-2W DW-2E
DW-1W DW-1E

EXISTING BUILDING AND TANK

APPROXIMATE LOCATION OF EXISTING LEACHATE TRANSFER LINE

LE-1 LE-2 LE-3 LE-4 LE-5

NEW TRUCK LOAD-OUT PAD

WET WELL

NEW LEACHATE STORAGE TANK

NORTHWEST FILL AREA
NORTHEAST FILL AREA
SOUTHWEST FILL AREA
SOUTHEAST FILL AREA
BANGOR TOWNSHIP LANDFILL
MDNR PROPERTY
SCA PROPERTY
HARTLEY PROPERTY

LEGEND

- FENCE LINE
- PROPERTY LINE
- CLAY DIKE
- SLURRY WALL
- WATER AREAS
- DW-3E — EXISTING DEWATERING WELL (MDNR LF)
- LE-1 — NEW LEACHATE WELL (EAST LF)
- PROPOSED LEACHATE WELL (NW LF)
- EXISTING LEACHATE TRANSFER LINE
- NEW LEACHATE TRANSFER LINES (EAST LF)
- PROPOSED LEACHATE TRANSFER LINES (NW LF)

NOTES

1. THE LEACHATE EXTRACTION SYSTEM IN THE EAST LANDFILL WAS APPROVED BY THE MDEQ ON 8/26/03. DESIGN MODIFICATIONS WERE SUBMITTED TO THE MDEQ ON JULY 6, 2005. CONSTRUCTION IS EXPECTED TO BE COMPLETED IN THE FALL OF 2005.

N

0 400 800

SCALE: 1"= 400'

PROJECT:
SCA HARTLEY & HARTLEY LANDFILL SITE
KAWKAWLIN TOWNSHIP, MICHIGAN

SHEET TITLE:
CONCEPTUAL DESIGN OF THE LEACHATE EXTRACTION SYSTEMS

DRAWN BY: NOLDENR	SCALE:	PROJ. NO.	6115.29
CHECKED BY: LEH	1" = 400'	FILE NO.	61152902.DWG
APPROVED BY: LEH	DATE PRINTED:	**FIGURE 6**	
DATE: SEPTEMBER 2005			

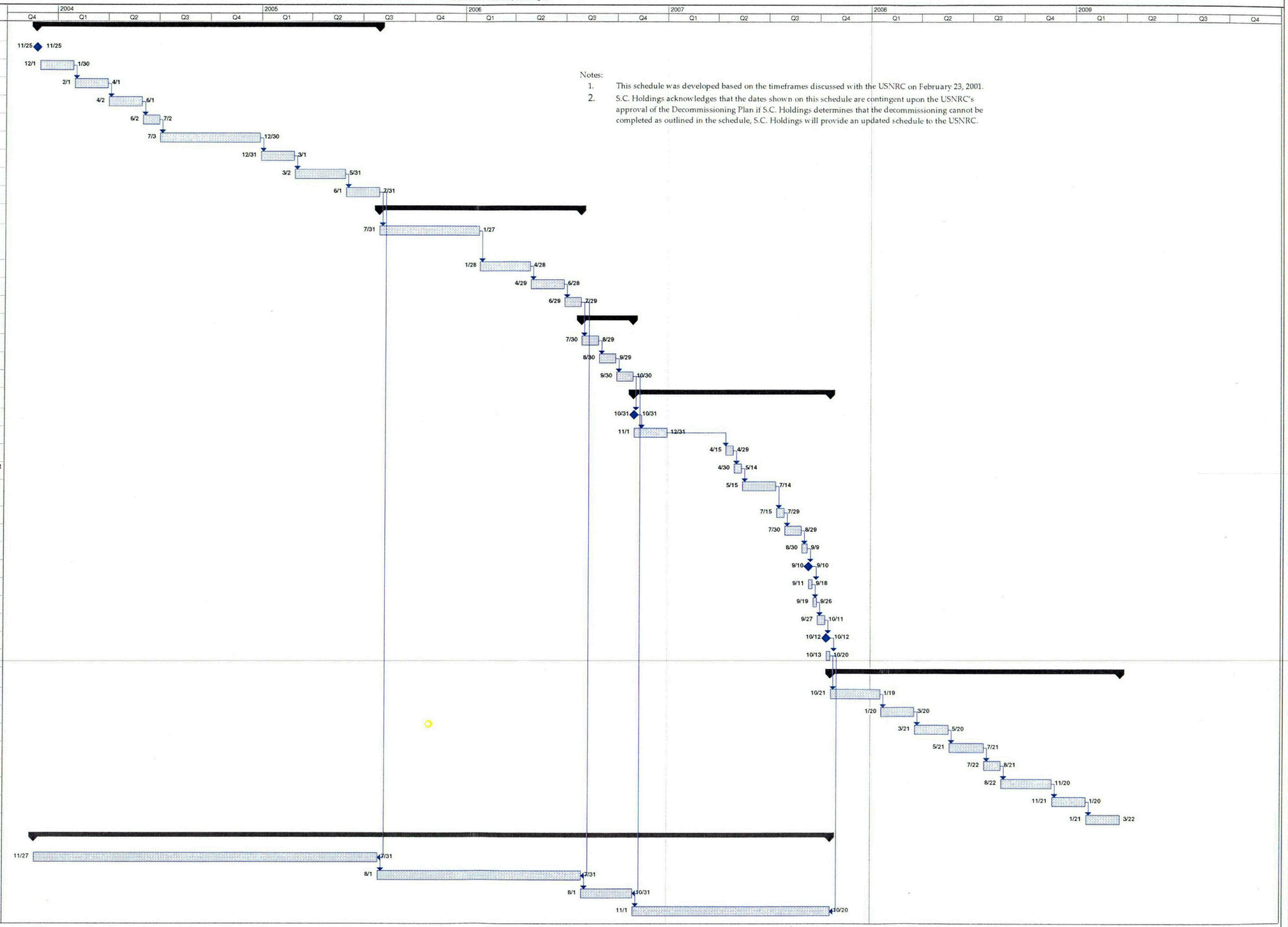
RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923 53708-8923
Phone: 608-831-4444
Fax: 608-831-3334

PLOT DATA
Drawing Name: J:\06115\29\61152902.dwg
Operator Name: NOLDENR
Scale: 1"=40'

C05

Figure 7
Schedule for Implementing the Decommissioning Activities
SCA Hartley & Hartley Landfill Site
Kawkawlin Township, Michigan

ID	Task Name
1	**Decommissioning Plan Review and Approval**
2	Submit Decommissioning Plan
3	USNRC Initial Acceptance Review
4	Submit Revised Decommissioning Plan
5	USNRC Final Acceptance Review
6	USNRC Publishes Notice in the Federal Register
7	USNRC Technical Review of Decommissioning Plan
8	Submit Revised Decommissioning Plan
9	Environmental Assessment of the Site and Findings of No Significant Impact
10	USNRC Amends License
11	**Planning Documents**
12	Prepare Planning Documents: Design Plans and Specifications, Work Plan (WP), Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), Construction Quality Assurance Plan (CQAP), Performance Standard Verification Plan (PSVP)
13	USNRC Review of Planning Documents
14	Revised Planning Documents
15	USNRC Approval of Planning Documents
16	**Construction Contracting**
17	Solicit Bids
18	Evaluate Bids
19	Award Contracts
20	**Implement Field Decommissioning Activities**
21	Preconstruction Inspection and Conference
22	Sample and Analyze Surface Soil in Class 2 Area around Northwest Landfill and in Class 3 Areas, except the East Landfill
23	Install Sedimentation/Erosion Controls
24	Excavate Regulated Materials in Slag Piles A and B and Place in the Northwest Landfill
25	Sample and Analyze Residual Subsurface Soil in Areas Where Slag Piles A and B were Excavated, and in Haul Roads from Slag Piles A and B to the Northwest Landfill
26	Install Leachate Extraction Wells and Header Pipes in the Northwest Landfill
27	Place Soil Barrier Layer over the Northwest Landfill
28	Place Topsoil and Seed the Northwest Landfill
29	Prefinal Inspection and Construction Conference
30	Submittal of Prefinal Inspection Report
31	USNRC Review
32	Completion of Outstanding Construction Items
33	Final Inspection
34	Site Demolization
35	**Final Status Survey and Construction Certification**
36	Prepare Initial Report
37	USNRC Acceptance Review
38	Submit Revised Report
39	USNRC Final Acceptance Review
40	USNRC Publish Notice in Federal Register
41	USNRC Technical Review
42	Submit Revised Report
43	USNRC Terminated License
44	**Coordination with Part 201 Response Actions**
45	Finalize RI Report, Prepare and Submit FS/RAP, and Obtain MDEQ Approval of RAP
46	Prepare and Submit Design Documents for Part 201 Response Activities and Obtain MDEQ Approval
47	Solicit and Award Construction Contracts for Part 201 Response Activities
48	Implement Part 201 Response Activities (Construction Only)



Notes:

1. This schedule was developed based on the timeframes discussed with the USNRC on February 23, 2001.
2. S.C. Holdings acknowledges that the dates shown on this schedule are contingent upon the USNRC's approval of the Decommissioning Plan if S.C. Holdings determines that the decommissioning cannot be completed as outlined in the schedule, S.C. Holdings will provide an updated schedule to the USNRC.

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