ATTACHMENT 5

CLOSURE PLAN

US ECOLOGY MICHIGAN
MID 074 259 565

GLOSSARY

Effective April 22, 2019, the Michigan Department of Environmental Quality (DEQ), Waste Management and Radiological Protection Division (WMRPD), became the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Materials Management Division (MMD).

40 CFR	Title 40 of the Code of Federal Regulations
ABR	Adopted by reference
Act 207	Michigan Fire Protection Act, PA 207, as amended
Act 451	Natural Resources and Environmental Protection Act, 1994 PA 451, as amended
Dynecol	former name of facility, now known as US Ecology Detroit North, Inc US Ecology Michigan?
EPA	United States Environmental Protection Agency
HWSA	Hazardous and Solid Waste Amendments of 1984
Part 111	Part 111, Hazardous Waste Management, of Act 451
Part 111 Rules	Administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Act 451
R	Rule (example: R 299.9504)

FORM EQP5111 ATTACHMENT TEMPLATE MODULE A.11
GENERAL INFORMATION: CLOSURE AND POSTCLOSURE CARE PLANS

This document is an attachment to the Michigan Department of Environmental Quality's *Instructions for Completing Form EQP 5111, Construction Permit and Operating License Applications, Hazardous Waste Treatment Storage and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

Michigan Public Act 451 Rule (R) 299.9613 and Title 40 of the Code of Federal Regulations (40 CFR) Part 264, Subpart G, which is adopted by reference (ABR) in R 299.11003, establishes requirements for the closure and, if necessary, postclosure care of hazardous waste management facilities. This license application module addresses requirements for the proper closure and, if necessary, postclosure care of the hazardous waste management units and the hazardous waste management facility for *Dynecol, Inc.* in *Detroit*, Michigan. The information provided in this module was used to prepare the closure and postclosure care cost estimate provided in Module A.12, "Closure and Postclosure Care Cost Estimates."

This module is organized as follows:

A.11.A CLOSURE PLAN

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A.11.A CLOSURE PLAN

A.11.A.1 CLOSURE PERFORMANCE STANDARD {R 299.9613 and 40 CFR 264.111, which is adopted by reference (ABR) in R 299.11003}

This closure plan is designed to ensure that the facility will be closed in a manner that achieves the following:

a. Minimizes the need for further maintenance;
b. Controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, postclosure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition byproducts to the ground or surface waters or to the atmosphere; and, as applicable,
c. Complies with the unit-specific closure requirements for each of the following units:

(Check as appropriate)

☒	Use and management of containers	R 299.9614 and 40 CFR 264.178, which is ABR in R 299.11003
☒	Tank systems	R 299.9615 and 40 CFR 264.197, which is ABR in R 299.11003
☐	Surface impoundments	R 299.9616 and 40 CFR 264.228, which is ABR in R 299.11003
☐	Waste piles	R 299.9617 and 40 CFR 264.258, which is ABR in R 299.11003
☐	Land treatment[a]	R 299.9618 and 40 CFR 264.280, which is ABR in R 299.11003
☐	Landfill	R 299.9619 and 40 CFR 264.310, which is ABR in R 299.11003
☐	Incinerators	R 299.9620 and 40 CFR 264.351, which is ABR in R 299.11003
☐	Drip pads[b]	R 299.9621 and 40 CFR 264.575, which is ABR in R 299.11003
☐	Miscellaneous units	R 299.9623 and 40 CFR 264.601-603, which are ABR in R 299.11003
☐	Hazardous waste munitions and explosive storage[b]	R 299.9637 and 40 CFR 264.1202, which is ABR in R 299.11003
☐	Boilers and industrial furnaces	R 299.9808 and 40 CFR 266.102(e)(11), which is ABR in R 299.11003

Notes: [a] Not included in the module
[b] *Not yet included in 40 CFR 264.111; therefore not considered*

Unit-specific closure procedures are discussed in Section A.11.A.5 of this module for each unit type indicated above.

A.11.A.2 UNIT-SPECIFIC INFORMATION
{R 299.9613 and 40 CFR 264.112(b)(3) and (6), which is ABR in R 299.11003}

The following table identifies each hazardous waste management unit at the *Dynecol* facility subject to the closure requirements of this hazardous waste operating license. The table also includes: each unit's maximum licensed hazardous waste inventory, a list of the waste codes managed in the unit, the anticipated date of closure (if known), and the estimated duration of closure activities once closure begins. Unit-specific methods for closure and detailed schedules are discussed in Section 11.A.5 of this module. See Table A11-1 for the estimated duration of closure.

Unit Designation	Maximum Inventory (Include Units)	Waste Codes of Hazardous Wastes Managed	Scheduled Closure Date
Primary treatment	45,000 Gallons *	See Tables A2-1 and A2-2	N/A
Secondary Treatment	33,000 Gallons **	See Tables A2-1 and A2-2	N/A
Listed Hazardous Waste Treatment	8,250 Gallons **	See Tables A2-1 and A2-2	N/A
Treatment Press Residue	14 Yards	See Tables A2-1 and A2-2	N/A
Listed Waste Press Residue	4 Yards	See Tables A2-1 and A2-2	N/A
Storage Tank	20,000 Gallons	See Tables A2-1 and A2-2	N/A
CMF	41,000 Gallons	See Tables A2-1 and A2-2	N/A
Activated Carbon ***	10,000 Pounds	See Tables A2-1 and A2-2	N/A

* Primary tanks are assumed to be 75% filled. The remainder of the tank volume is required for chemical reagent addition.
** Secondary/listed waste treatment tanks are considered full at 8,250 gallons. The remainder of the tank volume is reserved for chemical reagent addition.
*** 2,000 lbs (Treatment Plant) and 8,000 lbs (Container Facility)

A.11.A.3 SCHEDULE OF FINAL FACILITY CLOSURE

{R 299.9613 and 40 CFR 264.112(b)(6), which is ABR in R 299.11003}

The *Dynecol* facility:

(Check as appropriate)

☐ Anticipates completing final closure of the entire facility by
☒ Has not determined when the facility will close and does not anticipate completing final closure of the entire facility prior to expiration of the facility's hazardous waste operating license.

Table A11-1 outlines the tasks to be done for closure and provides an approximate schedule of final closure activities. Final closure of the treatment tanks, storage tanks, and container storage areas will take place concurrently.

A.11.A.4 NOTIFICATION AND TIME ALLOWED FOR CLOSURE

{R 299.9613 and 40 CFR 264.112(d)(2) and 264.113(a) and (b), which is ABR in R 299.11003}

Final closure activities will be initiated within 90 days after receipt of the final volume of hazardous wastes and completed within 180 days of receipt of the final volume of waste. The tasks and estimated time required for partial closure shall follow the schedule specified in Section 11.A.3. The Director will be notified by *Dynecol* at least 60 days before final closure begins. Final closure will be certified by both the Dynecol facility and an independent, qualified, registered professional engineer of the State of Michigan.

Extensions for Closure Time
R 299.9613 and 40 CFR 264.113(a) and (b), which is ABR in R 299.11003}

Dynecol does not anticipate requiring an extension for closure time for closure of the hazardous waste process and storage areas.

In the event that an extension for closure for the facility or any unit is necessary, the Dynecol facility will request an extension in accordance with the requirements of 40 CFR 264.113(a).

A.11.A.5 UNIT-SPECIFIC CLOSURE PROCEDURES

Unit-specific closure procedures are provided for each unit identified in Section A.11.A.2 of this module.

A.11.A.5(a) Closure of Container Storage Areas

{R 299.9614 and 40 CFR 264.178, which is ABR in R 299.11003}

This section describes the procedures for closure of the *CMF.* The general closure requirements and specific closure procedures are discussed below.

A. General Closure Requirements

At closure, all hazardous waste and hazardous waste residues will be removed from the containment system. Remaining containers, liners, bases, and soil containing or contaminated with hazardous waste or hazardous waste residues will be decontaminated or removed.

B. Specific Closure Procedures

Specific procedures for inventory management, unit inspection, decontamination, sampling and analysis, and additional waste management are discussed below.

1. Inventory and Remedial Waste Management Procedures

The CMF was designed and constructed for the sole purpose of storing hazardous wastes, subsequent to receipt and prior to transfer out in bulk or in original containers. It is designed to contain any spills that may occur without adversely impacting the environment. It contains eight isolation bays which have poured concrete floors with a blind sump in each bay. Each bay also has a chemical-resistant coating and the required containment capacity of 10 percent of the maximum total quantity of hazardous waste that can be stored in the bay. The two loading docks are located under a roof and have the necessary containment for spills or leaks. The isolation bays are located within a metal insulated building which is constructed of double-panel walls and a built-up roof. With proper containment for any releases and established spill response program (Module A7), it is unlikely that the containment area will be contaminated at the time of closure.

All hazardous wastes in the CMF will be manifested and shipped to a licensed hazardous waste facility. During receipt of waste into the container facility and subsequent shipment of waste from the container facility, either in bulk or container and whether for on-site treatment or off-site transfer, the truck transporting route is essentially the same as treatment transport routing. Such routing passes immediately adjacent to the container loading docks. Hence, closure of routing areas is addressed in 11.A.5(b), below.

2. Unit Inspection Procedures

With proper containment for any releases and an established spill response program (Module A7), it is unlikely that the containment area will be contaminated at the time of closure. Notwithstanding the design and practices noted herein, at the time of closure, the container storage area, the loading docks and related containment area, and the container bulking area shall be inspected for cracks and gaps. If any are found, and if the approved closure plan has to be amended, Dynecol shall submit a written request to the MDEQ for approval to modify the plan. If approved and needed, a closure plan amendment that provides for soil sampling beneath the concrete areas possibly affected by such cracks or gaps will comply with all of the applicable provisions specified in 40 CFR 264.112(c)(3). The closure plan amendment shall include the following elements:

- A map showing the proposed sampling locations
- The depth at which samples are to be collected
- The procedures to be used to collect soil samples
- The parameters that are proposed for testing

- The procedures to be used to decontaminate any non-dedicated equipment and to document that the equipment was adequately cleaned
- A description of the method(s) to be used to evaluate the analytical data
- The proposed response activities that will be undertaken to address any contaminated areas
- A schedule for the work to be conducted

3. Decontamination Procedures

- *List of equipment and structures to be decontaminated*

  Isolation bays, blind sumps, loading docks, containers and secondary containment structures.
- *Decontamination procedures*

  - The concrete pad and containment sumps will be triple-rinsed with high-pressure water and using soap and/or sodium hydroxide solution. The rinse water will be collected and placed into drums after each rinse.

  - All rinse water will be discharged to the city sewer system if it meets the discharge limits. If the rinse does not meet the restrictions, it will be shipped off-site to an approved treatment facility.

- *Measures to ensure decontaminated liquids (if applicable) do not migrate to surface soils or surface waters*

  The rinse water will be collected and placed into drums after each rinse. All rinse water will be discharged to the city sewer system if it meets the discharge limits. If the rinse does not meet the restrictions, it will be shipped off-site to an approved treatment facility.

- *Criteria for determining whether decontamination is complete*

  High pressure triple-rinsing using soap and/or sodium hydroxide solution and visual inspection shall be performed to verify that all contamination has been removed.

- *Decontamination of clean-up materials and equipment*

  Final decontamination of equipment and materials will be completed using high pressure decontamination with water tested using DWSD parameters and with disposal at a licensed facility.

4. Sampling and Analysis Procedures

The soil samples will be obtained with a hand auger from a depth of one foot, using the procedures outlined in ASTM D1452-09 (historical ASTM D1452-80), “Standard

Practice for Soil Exploration and Sampling by Auger Borings" or most recent procedure. See Appendix A11-1 for a copy of the ASTM guidance.

All rinse water will be collected and placed in drums. A sample of the rinse water will then be analyzed for the parameters listed in Table A11-2. The rinse water will be disposed of in accordance with the test results.

The soil and concrete samples will be analyzed for metals, VOCs, Semi-Volatiles, pesticides, herbicides, cyanides, mercury and PCB's. The laboratory analysis of the samples will be conducted in accordance with MDEQ RRD OP Memo #2 and associated target detection levels to allow comparison to the cleanup criteria established pursuant to Part 201. Any monitoring parameters, not exceeding the Generic Industrial Cleanup Criteria at a particular sample location, will be removed from further consideration at that location. Background samples will be collected from a minimum of four boring locations at unimpacted areas located within the boundaries of the site but beyond the limits of the permitted facility (Refer to Figure A1-1).

The time estimated to perform soil sampling and analyses is approximately one to two weeks.

5. Additional Waste Management Procedures

All waste and materials will be decontaminated as part of the Closure activities. There are no additional waste management procedures.

Concrete rinseates which can not be decontaminated will be disposed of at a licensed waste disposal facility.

A.11.A.5(b) Closure of Tank Systems
{R 299.9615 and 40 CFR 264.197, which is ABR in R 299.11003}

This section describes the procedures for closure of *Treatment and Storage Tanks and Filter Press Area*. The general closure requirement and specific closure procedures are discussed below.

A. General Closure Requirement

At closure of the tank system, the *Dynecol* facility will remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous waste, unless 40 CFR 264.3(d) applies. If the *Dynecol* facility demonstrates that not all contaminated soils can be practicably removed or decontaminated, then the tank system will be managed in accordance with the closure and postclosure care requirements that apply to tanks.

B. Specific Procedures

Specific procedures for inventory management, unit inspection, decontamination, sampling and analysis, and additional waste management are discussed below.

1. Inventory and Remedial Waste Management Procedures

- All hazardous wastes and hazardous waste residues will be removed from the treatment/storage tanks, filter press, and containment structures at the time of closure.

- Once the treatment tanks, storage tanks, filter presses, and associated equipment are removed, a limited sampling program in accordance with the procedures outlined below in A.11.A.5(b)B.4 - Sampling and Analysis Procedures will be initiated. Since the hazardous waste tanks and filter presses were contained within concrete containment structures and because there is no exposed soil in the area, samples will be taken at any major low spot in the floor. Additionally, if there are any visible cracks in the concrete containment area, and if the approved closure plan has to be amended, Dynecol shall submit a written request to the MDEQ for approval to modify the plan. See Unit Inspection Procedures below for details..

- Truck transport unloading, including transfers from the container facility for on-site treatment, takes place exclusively within the secondary containment area of the unloading pad. Low spots and any visible cracks in this containment area, as well as in the very limited route between the container loading dock containment area and the treatment area would be cored and sampled.

- Excavated soil will be disposed of at a licensed hazardous waste facility or a Type II landfill or placed back into the excavation, depending on the results of the analysis.

2. Unit Inspection Procedures

Once the treatment tanks, storage tanks, filter presses, and associated equipment are removed, a limited sampling program in accordance with the procedures outlined below in A.11.A.5(b)B.4 - Sampling and Analysis Procedures will be initiated. At the time of closure, the treatment/storage tanks, filter press and containment structures shall be inspected for cracks and gaps. If any are found, and if the approved closure plan has to be amended, Dynecol shall submit a written request to the MDEQ for approval to modify the plan. If approved and needed, the closure plan amendment that provides for soil sampling beneath the concrete areas possibly affected by such cracks or gaps will comply with all of the applicable provisions specified in 40 CFR 264.112(c)(3). The closure plan amendment shall include the following elements:

- A map showing the proposed sampling locations
- The depth at which samples are to be collected
- The procedures to be used to collect soil samples
- The parameters that are proposed for testing
- The procedures to be used to decontaminate any non-dedicated equipment and to document that the equipment was adequately cleaned
- A description of the method(s) to be used to evaluate the analytical data
- The proposed response activities that will be undertaken to address any contaminated areas
- A schedule for the work to be conducted

3. Decontamination Procedures

- *List of equipment and structures to be decontaminated*

  Treatment/storage tanks, filter presses, and associated secondary containment structures.

- *Decontamination procedures*

  - All hazardous waste remaining in the treatment or storage tanks will be pumped through the treatment process for neutralization by plant personnel. Treated waters will be discharged to the Detroit Water and Sewerage system. The sludge remaining in the tanks, estimated to be no more than 60 cubic yards, will be dewatered on site and shipped by a licensed hazardous waste transporter to a licensed off-site waste facility for disposal.

  - All treatment tanks (with the exception of one treatment tank reserved for neutralization during closure), storage tanks, filter presses, related pumps and piping, and all containment structures will be triple rinsed with either hot water or high-pressure wash.

  - All rinse water generated during tank and equipment decontamination will be collected and neutralized in the treatment tank reserved for neutralization during closure. Any sludge generated during rinse water neutralization will be dewatered on site and shipped off-site for proper disposal. After sludge dewatering, the filter presses will be decontaminated and the rinse water will be pumped out and shipped off-site to an approved treatment facility.

- *Measures to ensure decontaminated liquids (if applicable) do not migrate to surface soils or surface waters*

  The rinse water will be collected and placed into drums after each rinse. All rinse water will be discharged to the city sewer system if it meets the discharge limits. If the rinse does not meet the restrictions, it will be shipped off-site to an approved treatment facility.

- *Criteria for determining whether decontamination is complete*

  High pressure triple rinsing using soap and/or sodium hydroxide solution and visual inspection shall be performed to verify that all contamination has been removed.

- *Decontamination of clean-up materials and equipment*

  Final decontamination of equipment and materials will be completed using high pressure decontamination with water tested using DWSD parameters and with disposal at a licensed facility.

4. Sampling and Analysis Procedures

The soil samples will be obtained with a hand auger from a depth of one foot, using the procedures outlined in ASTM D1452-09 (historical ASTM D1452-80), "Standard Practice for Soil Exploration and Sampling by Auger Borings" or most recent procedure. See Appendix A11-1 for a copy of the ASTM guidance.

Background samples will be collected from a minimum of four boring locations at unimpacted areas located within the boundaries of the site but beyond the limits of the permitted facility. (Refer to Figure A1-1) The lithology beneath the subject site is expected to consist of fill materials overlying native clays. At each boring location, a representative background sample of the: (1) fill materials; and (2) of the upper first foot of native clays, will be collected for analysis. The number of background samples collected will be consistent with the Michigan Department of Environmental Quality (MDEQ), Environmental Response Division, Waste Management Division, Guidance Document Verification of Soil Remediation (VSR), April 1994, Revision 1. Additionally, sampling will be performed based on the methodologies described in the MDEQ Remediation and Redevelopment Division (RRD) Operational Memorandum No. 2, July 5, 2007.

No background subsurface organics analytical data for site is available. However, based upon previous industrial uses of the property and due to the expected existence of pre-existing fill materials beneath the site overlaying native clays, it is anticipated that potential organics may be present in the pre-existing fill materials that is not due to the handling of hazardous wastes by the facility. A known potential organic material that is expected to be present in the pre-existing fill materials is coal. Therefore, based on this assumption, collection of background samples from unimpacted areas should be representative of any pre-existing organics present in the fill materials.

After background levels have been established, based on the VSR, closure sampling will be compared to the background, using the VSR calculations. If the soil samples do not show concentrations which are in excess of background, it will be assumed that no release of hazardous waste has occurred. Any decontamination water associated with soil sampling will be analyzed for a full range TCLP prior to disposal at a licensed waste disposal facility.

In the unlikely event that contamination is found at any of the sampling locations, excavation will be initiated. A circle with a radius of up to five feet and depth of two feet will be excavated around each contaminated sample point. This will ensure that any potentially contaminated soil below the original sampling depth will also be removed. Because the sample points are located inside a building, excavation may be restricted by the physical limitations imposed by the foundation of the building.

After the initial excavation is completed, the contaminated sample locations will be resampled to verify that the area is free of contamination. If any of the samples exceeds background, the excavation procedures will be repeated at 0.5 feet intervals until clean closure is documented.

All rinse water will be collected and placed in drums. A sample of the rinse water will then be analyzed for the parameters listed in Table A11-2. The rinse water will be disposed of in accordance with the test results.

The soil and concrete samples will be analyzed for metals, VOCs, Semi-Volatiles, pesticides, herbicides, cyanides, mercury and PCB's. The laboratory analysis of the samples will be conducted in accordance with MDEQ RRD OP Memo #2 and associated target detection levels to allow comparison to the cleanup criteria established pursuant to Part 201. Any monitoring parameters, not exceeding the Generic Industrial Cleanup Criteria at a particular sample location, will be removed from further consideration at that location. Background samples will be collected from a minimum of four boring locations at unimpacted areas located within the boundaries of the site but beyond the limits of the permitted facility (Refer to Figure A1-1).

The time estimated to perform soil sampling and analyses is approximately one to two weeks.

5. Additional Waste Management Procedures

All waste and materials will be decontaminated as part of the Closure activities. There are no additional waste management procedures.

A.11.A.5(c) Closure of Surface Impoundments
{R 299.9616 and 40 CFR 264.228(a)(1) and (2), which is ABR in R 299.11003}

Not applicable.

A.11.A.5 (d) Closure of Waste Piles
{R 299.9617 and 40 CFR 264.258, which is ABR in R 299.11003}

Not applicable.

A.11.A.5 (e) Closure of Landfills
{R 299.9619 and 40 CFR 264.310(a), which is ABR in R 299.11003}

Not applicable.

A.11.A.5 (f) Closure of Incinerators
{R 299.9620 and 40 CFR 264.351, which is ABR in R 299.11003}

Not applicable.

A.11.A.5 (g) Closure of Miscellaneous Units
{R 299.9623 and 40 CFR 264.601 through 264. 603, which is ABR in R 299.11003}

Not applicable.

A.11.A.5 (h) Closure of Boilers and Industrial Furnaces (BIF)
{R 299.9808 and 40 CFR 266.102(e)(11), which is ABR in R 299.11003}

Not applicable.

A.11.A.5 (i) Other Closure Activities
{R 299.9504(1)(c), R 299.9508(1)(b), R 299.9613(1), 40 CFR 270.14(b)(13) and 264.112(b)(5), which are ABR in R 299.11003}

There are no other closure activities.

A.11.A.6 CERTIFICATION OF CLOSURE
{R 299.9613}

Within 60 days of completion of closure, *Dynecol, Inc* will submit to the Director by registered mail, a certification that the hazardous waste management unit or facility, as applicable, has been closed in accordance with the specifications in the approved closure plan. The certification will be signed by the *Dynecol facility* representative and by an independent registered professional engineer. Documentation supporting the independent registered engineer's certification will be furnished to the Director in accordance with R 299.9613(3), including:

- Manifests or waste removal summaries for the hazardous waste inventory and rinse water.
- A summary of any procedures that deviated from the approved closure plan.
- Field reports of closure activities including daily timetable, weather conditions and other relevant observations.
- Results of all analytical results used to certify clean closure (lab sheets, chain of custody records, QA/QC report, and summary tables).
- Sampling and analysis procedures.
- A map showing locations of samples.
- Statistical evaluations.

- Destinations of wastes removed, where manifests have not been provided.
- Final depths of excavations and elevations and fill material used.
- Any other documentation required to support the certification of the independent registered Professional Engineer.
- A copy of the approved closure plan and letter of approval.

The *Dynecol* facility will maintain financial assurance for closure until the Director releases the *Dynecol* facility from the financial assurance requirements for closure under R 299.9703.

The certification must be worded as follows:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A.11.A.7 POST CLOSURE NOTICES FILED

{R 299.9504(1)(c), R 299.9508(1)(b), and 40 CFR 270.14(b)(14), which is ABR in R 299.11003}

Not applicable.

A.11.B POSTCLOSURE PLAN

{R 299.9613 and 40 CFR 264.118, which is ABR in R 299.11003}

A.11.B.1 APPLICABILITY

(Check as appropriate)

☒ **Not applicable**: Hazardous waste will not be left behind at closure. A survey plat, postclosure care, postclosure certifications, and other notices are not required.

☐ **Applicable**:
- ☐ Contingent plan
- ☐ Landfill unit

A.11.B.2 POSTCLOSURE CARE OBJECTIVES

Not applicable.

A.11.B.3 POSTCLOSURE CARE PERIOD POINT OF CONTACT

Not applicable.

A.11.B.4 POSTCLOSURE CARE ACTIVITIES

Not applicable.

A.11.B.5 POSTCLOSURE CARE PLAN AMENDMENT

{R 299.9613 and 40 CFR 264.118(d), which is ABR in R 299.11003}

Not applicable.

A.11.B.6 CERTIFICATION OF POSTCLOSURE

{R 299.9613}

Not applicable.

Table A11-1

Schedule of Final Closure

DAYS	0	15	30	45	60	75	90	105	120	135	150	165	180
Final volume of waste received	X												
Treatment of the waste			X										
Disposal of sludge				X									
Decontamination of equipment and containment areas					X								
Disposal of rinse waters						X							
Soil Sampling and analyses								X					
Excavation and disposal of contaminated soil												X	
Closure certification													X

Table A11-2

Concrete, Soil, and Rinse Water Parameters

Parameters	Test Method Numbers*
Sample Preparation Method Toxicity Characteristic Leaching Procedure (TCLP)	1311
pH	9040/9045
Reactive Cyanide/Sulfide	6010
Arsenic	6010
Barium	6010
Cadmium	6010
Chromium, Total	6010
Chromium, Hexavalent	7198
Copper	6010, 7210, 7211
Lead	6010
Mercury (in liquid waste)	7470
Mercury (in solid/semi solid waste)	7471
Selenium	6010
Silver	6010
Zinc	6010, 7950, 7951
Volatile Organic Compounds	8260

*SW-846, EPA “Test Methods for Evaluating Solid Waste Physical/ Chemical Methods.”

Designation: D1452 – 09

Standard Practice for Soil Exploration and Sampling by Auger Borings[1]

This standard is issued under the fixed designation D1452; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This practice covers equipment and procedures for the use of earth augers in shallow depth geotechnical exploration. This practice does not apply to hollow-stem augers. Uses of hollow-stem auger drilling methods for geotechnical exploration are addressed in Test Method D6151.

1.2 This practice does not include considerations for geoenvironmental site characteristics and installation of monitoring wells which are discussed in Guide D5784.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026 unless superseded by this method.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D1586 Test Method for Penetration Test (SPT) and Split-Barrel Sampling of Soils

D1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes

D2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)

D5434 Guide for Field Logging of Subsurface Explorations of Soil and Rock

D4750 Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well) (Withdrawn 2010)[3]

D5784 Guide for Use of Hollow-Stem Augers for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices

D6026 Practice for Using Significant Digits in Geotechnical Data

D6151 Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling

3. Terminology

3.1 *Definitions*—For common definitions of terms in this standard, refer to Terminology D653.

4. Significance and Use

4.1 Auger borings often provide the simplest method of soil exploration and sampling. They may be used for any purpose where disturbed samples can be used and are valuable in connection with groundwater level determination and indication of changes in strata and advancement of hole for split-barrel penetration tests and sampling (Test Method D1586) and

[1] This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.02 on Sampling and Related Field Testing for Soil Evaluations.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

***A Summary of Changes section appears at the end of this standard**

thin-walled tube sampling (Practice D1587). Equipment required is simple and readily available. Depths of auger explorations are, however, limited by groundwater conditions, soil characteristics, and the equipment used.

5. Apparatus

5.1 *Hand-Operated Augers:*

5.1.1 *Helical Augers,* (Fig. 1(a)) small lightweight augers generally available in sizes from 1 through 3 in. (25.4 through 76.2 mm).

5.1.1.1 *Spiral-Type Auger,* consisting of a flat thin metal strip, machine twisted to a spiral configuration of uniform pitch; having at one end, a sharpened or hardened point, with a means of attaching a shaft or extension at the opposite end.

5.1.1.2 *Ship-Type Auger*—Similar to a carpenter's wood bit. It is generally forged from steel and machined to the desired size and configuration. It is normally provided with sharpened and hardened nibs at the point end and with an integral shaft extending through its length for attachment of a handle or extension at the opposite end.

5.1.2 *Open Tubular Augers,* (Fig. 1(b)) ranging in size from 1.5 through 8 in. (38.1 through 203.2 mm) and having the common characteristic of appearing essentially tubular when viewed from the digging end.

5.1.2.1 *Orchard-Barrel Type,* (Fig. 1(c)) consisting essentially of a tube having cutting lips or nibs hardened and sharpened to penetrate the formation on one end and an adaptor fitting for an extension or handle on the opposite end.

5.1.2.2 *Open-Spiral Type,* consisting of a flat thin metal strip that has been helically wound around a circular mandrel to form a spiral in which the flat faces of the strip are parallel to the axis of the augered hole. The lower helix edges are hard-faced to improve wear characteristics. The opposite end is fitted with an adaptor for extension.

5.1.2.3 *Closed-Spiral Type*—Nearly identical to the open-spiral type except the pitch of the helically wound spiral is much less than that of the open-spiral type.

5.1.3 *Post-Hole Augers,* generally 2 through 8 in. (50.8 through 203.2 mm), and having in common a means of blocking the escape of soil from the auger.

5.1.3.1 *Clam-Shell Type,* (Fig. 2(a)) consisting of two halves, hinged to allow opening and closing for alternately digging and retrieving. It is not usable deeper than about 3.5 ft (1.07 m).

5.1.3.2 *Iwan Type,* (Fig. 2(b)) consisting of two tubular steel segments, connected at the top to a common member to form a nearly complete tube, but with diametrically opposed openings. It is connected at the bottom by two radial blades pitched to serve as cutters which also block the escape of contained soil. Attachment of handle or extension is at the top connector.

5.2 *Machine-Operated Augers:*

5.2.1 *Helical Augers,* (Fig. 3(a)) generally 4 through 48 in. (101.6 through 1219 mm), consisting essentially of a center shaft fitted with a shank or socket for application of power, and having one to six complete 360° (6.28-rad) spirals for conveyance and storage of cut soil. Cutter bits and pilot bits are available in moderate and hard formation types and normally replaceable in the field. They are normally operated by heavy-duty, high-torque machines, designed for heavy construction work.

5.2.2 *Stinger Augers,* generally 3 through 30 in. (76.2 through 762 mm), are similar to the helical auger in 5.2.1, but lighter and generally smaller. They are commonly operated by light-duty machines for post and power pole holes.

5.2.3 *Disk Augers,* (Fig. 3(b)) generally 10 through 30 in. (254 through 762 mm), consisting essentially of a flat, steel disk with diametrically opposed segments removed and having a shank or socket located centrally for application of power. Replaceable cutter bits, located downward from the leading edges of the remaining disk, dig and load soil that is held on the disk by valves or shutters hinged at the disk in order to close the removed segments. The disk auger is specifically designed to be operated by machines having limited vertical clearance between spindle and ground surface.

5.2.4 *Bucket Auger,* (Fig. 3(c)) generally 12 through 48 in. (304.8 through 1219 mm), consisting essentially of a disk auger, without shank or socket, but hinge-mounted to the bottom of a steel tube or bucket of approximately the same diameter as the disk auger. A socket or shank for power application is located in the top center of the bucket diametral cross piece provided for the purpose.

5.3 *Casing* (when needed), consisting of pipe of slightly larger diameter than the auger used.

5.4 *Accessory Equipment*—Labels, field log sheets, sample jars, sealing wax, sample bags, and other necessary tools and supplies.

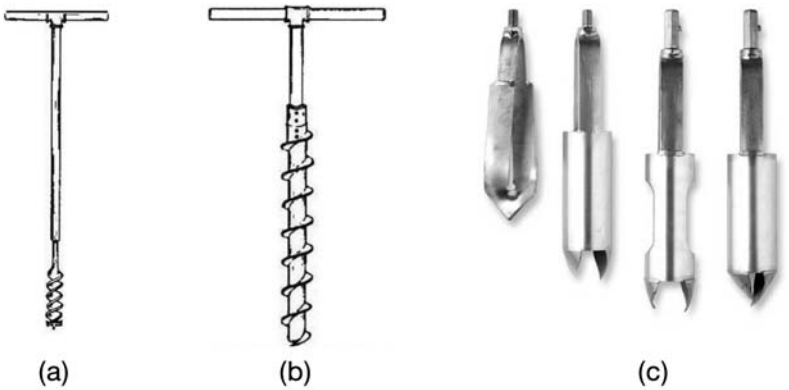

FIG. 1 Hand Augers

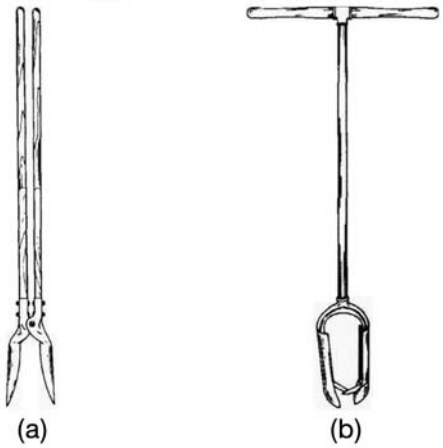

FIG. 2 Post-Hole Augers

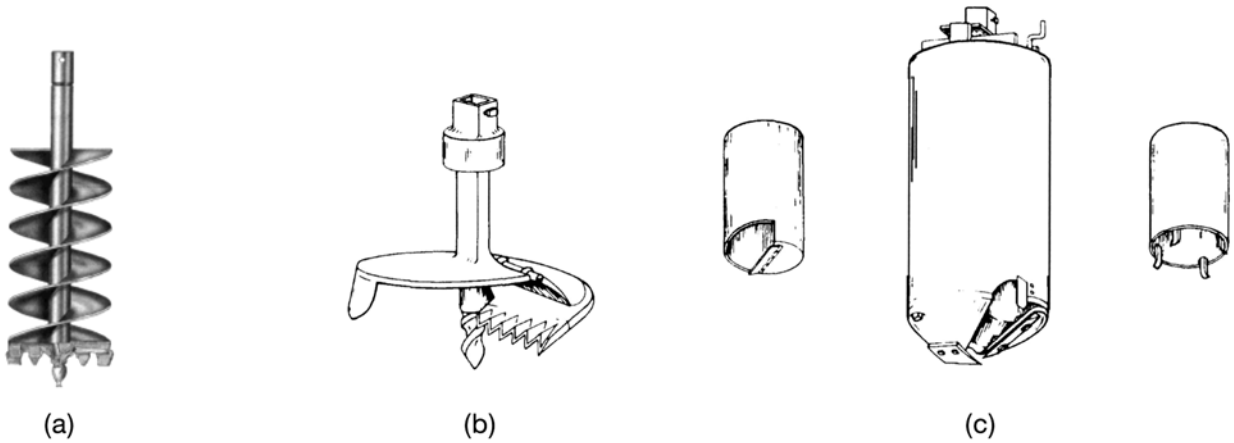

FIG. 3 Machine-Operated Augers

6. Procedure

6.1 Make the auger boring by rotating and advancing the desired distance into the soil. Withdraw the auger from the hole and remove the soil for examination and test. Return the empty auger to the hole and repeat the procedure. Continue the sequence until the required depth is reached.

6.2 Casing is required in unstable soil in which the bore hole fails to stay open and especially when the boring is extended below the groundwater level. The inside diameter of the casing must be slightly larger than the diameter of the auger used. The casing shall be driven to a depth not greater than the top of the next sample and shall be cleaned out by means of the auger. The auger can then be inserted into the bore hole and turned below the bottom of the casing to obtain a sample.

6.3 The soil auger can be used both for boring the hole and for bringing up disturbed samples of the soil encountered. The structure of a cohesive soil is completely destroyed and the moisture may be changed by the auger. Seal all samples in a jar or other airtight container and label appropriately. If more than one type of soil is picked up in the sample, prepare a separate container for each type of soil.

6.4 *Monitoring Water Level*—It is advisable to monitor groundwater levels, if present, in the drill hole during and after removal of the drilling equipment. Groundwater elevation should be measured and documented during drilling to include datum, date and time measured. Method or equipment used to determine depth of groundwater level, such as Test Method D4750 should also be noted. If groundwater is not encountered or if the level is of doubtful reliability, such information should also be documented.

6.4.1 The user is cautioned that there are many factors which can influence borehole water level measurements and the interpretation of borehole water level measurements. These factors are not described or discussed in this practice. The interpretation and application of borehole water level information should be done by a trained specialist. Installation of piezometers should be considered where complex groundwater conditions prevail.

7. Data Sheet/Form

7.1 Report information in accordance with Guide D5434. The data obtained in boring shall be recorded on the field logs and shall include the following:

7.1.1 Date of start and completion of boring,

7.1.2 Identifying number of boring,

7.1.3 Reference datum including direction and distance of boring relative to reference line of project or other suitable reference points,

7.1.4 Type and size of auger used in boring,

7.1.5 Depth of changes in strata,

7.1.6 Description of soil in each major stratum in accordance with Practice D2488,

7.1.7 Groundwater elevation and location of seepage zones, when found,

7.1.8 Datum, date and time of borehole water-level measurement and method or equipment used, and

7.1.9 Condition of augered hole upon removal of auger, that is, whether the hole remains open or the sides cave, when such can be observed.

8. Keywords

8.1 auger borings; geotechnical exploration; sampling; soil explorations

APPENDIX

(Nonmandatory Information)

X1. EXAMPLE DATA SHEET

X1.1 Fig. X1. provides an example data sheet.

DRILLERS BORING LOG

Project: _____ Project No.: _____ Boring No.: _____

Location: _____ Sheet _____ of _____

Date Started: _____ Date Completed: _____

Drill Crew:: _____

Boring Location
Station _____ Offset _____

Elevation _____

Strata Depth From	Strata Depth To	Soil Description and Remarks	Sample Type	No.	Depth From	Depth To

Method Of Drilling:

Auger _____ Size _____

Weather _____

Non-Drilling Time (Hrs.)

Boring Layout _____ Moving _____

Hauling Water _____ Standby _____

Water Level @ _____ Date _____

@ _____ Date _____

@ _____ Date _____

Cave-in Depth

@ _____ Date _____

SUMMARY OF CHANGES

Committee D18 has identified the location of selected changes to this standard since the last issue (D1452 – 07a) that may impact the use of this standard. (Approved Feb. 15, 2009.)

(1) Added Referenced Documents.
(2) Added Figs. 1-3.
(3) Other minor revisions throughout.

FORM EQP5111
ATTACHMENT TEMPLATE MODULE A.12
GENERAL INFORMATION: CLOSURE & POSTCLOSURE CARE COST ESTIMATES

This document is an attachment to the Michigan Department of Environmental Quality's *Instructions for Completing Form EQP 5111, Construction Permit and Operating License Applications, Hazardous Waste Treatment Storage and Disposal Facilities.* See Form EQP 5111 for details on how to use this attachment.

Michigan Public Act 451 Rule (R) 299.9702, which incorporates portions of Title 40 of the Code of Federal Regulations (40 CFR) Part 264, Subpart H, which is adopted by reference (ABR) in R 299.11003, establishes requirements for providing financial assurance for closure and, if necessary, postclosure care. Specifically, R 299.9702(1) requires the preparation of associated cost estimates. This license application module addresses the requirement for preparing a closure cost estimate and, if necessary, a postclosure care cost estimate. The cost estimates provided in this attachment are based on the closure and postclosure care activities detailed in Module A.11.

This module is organized as follows:

A.12.A Closure Cost Estimate
A.12.B Postclosure Cost Estimate

A.12.A CLOSURE COST ESTIMATE

{R 299.9702(1) and 40 CFR 264.142, which is adopted by reference (ABR) in R 299.11003}

The closure cost estimate covers closure activities that include removal of waste inventory, decontamination, sampling and analysis, and closure certification. Unless otherwise specified in Table A.11-1 of Module A.11, the date of closure of the hazardous waste management units has not been determined. As such, it is not possible to predict, with any high degree of certainty, actual facility conditions or regulatory requirements at time of closure. Therefore, this closure cost estimate is based on closure of the unit within the next six months and includes a contingency estimate to account for media sampling and analysis, and removal based on current conditions.

The estimate assumes closure procedures are completed by a third party at the time facility closure would be most expensive (for example, with a maximum inventory). The cost estimate for disposal assumes wastes will be treated and contaminated equipment disposed of rather than recovered or salvaged. The total closure cost for the closure of the *Dynecol, Inc.* facility is estimated at $ 930,432. The closure cost estimate breakdown by unit is provided in Table A12-1. Unit-specific work sheets are provided, as applicable, in Table A12-2.

Additional cost estimate assumptions are listed below.

a. All hazardous waste will be transported off site to a permitted facility in accordance with all applicable state and federal regulations.
b. Costs are based on current year costs. All labor rates reflect commercial rates and include fringe benefits, payroll burden, and taxes.
c. Total costs include a 10 percent contingency for administrative and a 15 percent contingency for miscellaneous operating costs.

This closure cost estimate will be maintained at the facility. It will be revised whenever a change in the closure plan affects the cost of closure. It will be adjusted annually as required by pertinent regulations or when the types and quantity of wastes received at the facility change.

A.12.B POSTCLOSURE COST ESTIMATE

{R 299.9702(1) and 40 CFR 264.144, which is ABR in R 299.11003}

Not applicable.

TABLE A12-1
FACILITY CLOSURE COST ESTIMATE BREAKDOWN BY UNIT*

1.	Container Storage Areas	$ 62,568
2.	Tank Systems	$ 145,990
3.	Building 4	$ 315,521
4.	Proposed Building 5A	$ 223,885
5.	Proposed Building 5B	$ 182,468
TOTAL FACILITY CLOSURE ESTIMATE		$ 930,432

* Tables not included at this time for Land Treatment Units, Drip Pads, and Hazardous Waste Munitions and Explosives Storage Units

Assuming 70% of the total closure costs for the tank systems and 30% for the container storage areas.

See the following Table A12-2 for a detailed cost estimate breakdown.

TABLE A12-2
FACILITY CLOSURE COST ESTIMATE FOR TREATMENT AND STORAGE AREAS AND CONTAINER STORAGE AREA

Treatment and Storage Area

1.	Treat 45,000 gallons of raw hazardous waste: (Primary Tank #s 2-4) @ $0.20/gallon	$9,000
	Sludge Disposal and Transport: 60 cubic yards @ $17/cubic yard	$1,020
2.	Treat 33,000 gallons of neutralized waste from primary treatment process:	
	(Secondary tank #s 18-21) @ $0.15/gallon	$4,950
	Sludge Disposal and Transport 35 cubic yards @ $17/cubic yard	$595
3.	Treat 20,000 gallons of raw hazardous waste: (Storage Tank #1) @ $0.20/gallon	$4,000
	Sludge Disposal: 27 cubic yards @ $110/ cubic yard	$2,970
	Sludge Transport:	
	27 cubic yards @ $15/ cubic yard	$405
4.	Sludge Disposal: 11 yards @ $110/cubic yard	$1,210
	Sludge Transport: 11 yards @ $15/cubic yard	$165
5.	Disposal: Activated Carbon 2,000 lb (Treatment Plant) @ $1.5/ lb	$3,000
	8,000 lb (Container Facility) @ $1.5/lb	$12,000
6.	Sludge Disposal & Transport : Filter Press Residue	
	Presses A & B: 14 yards @ $17/cubic yards	$238
	Press C: 4 yards @ $110/cubic yards	$440
7.	Container Storage Area: loading, transport and disposal of 55-gallon drums of hazardous waste (711 drums & 1900 gallons from storage tank into 34 55-gallon drums):	
	Load Labor 74 hours @ $45/hour	$3,330
	Transport 19 loads @ $250/load	$4,750
	Disposal 745 drums @ $90/drum	$67,050

TABLE A12-2 (continued)

Cleaning, Disposal, Sampling Costs

1.	Tank cleaning and disposal of rinse waters:	
	Labor: 100 hours @ $65/hour	$6,500
	Disposal of rinse water: 12,000 gallons @ $0.35/gallon	$4,200
2.	Decontamination of filter press building floors/walls: 5,100 square feet @ $0.65/square feet	$3,315
	Disposal of rinse water: 5,000 gallons @ $0.35/gallon	$1,750
3.	Concrete coring and soil sampling (20 locations):	
	Coring: 16 hours @ $65/hour	$1,040
	Soil Sampling: 8 hours @ $65/hour	$520
	Analytical Testing (8 metals and RCI) 20 samples @ $200/sample	$4,000
4.	Transport/disposal of contaminated soil:	
	20 yards @ $125/cubic yard	$2,500
5.	Decontamination of container storage area:	
	Eight bays: 4,800 square feet @ $0.65/square feet	$3,120
	Two loading docks: 2,300 square feet @ $0.65/ square feet	$1,495
	Bulking/transfer area: 800 square feet @ $0.65/ square feet	$520
	Disposal of rinse water: 5,000 gallons @ $0.35/ gallon	$1,750
6.	Decontamination of the secondary containment system: 9,200 square feet @ $0.65/ square feet	$5,980
	Disposal of rinse water: 5,000 gallons @ $0.35/ gallon	$1,750

TABLE A12-2 (continued)

7. Decontamination of filter presses:

Labor: 14 hours @ $65/ hour	$910
Disposal of rinse water: 1,600 gallons @ $0.35/ gallon	$560

Building 4 Disposal Cost

1. Treatment, Transportation and Disposal of 90,000 gallons of characteristic hazardous waste in Pits 1, 2 and 3

90,000 gallons @ $.80 gallon	$72,000

2. Container storage area: loading, transport and disposal of 1,120 55 gallon drums of hazardous waste

Load labor 120 hours @ $45/hour	$5,400
Transport 15 loads @ $250/load	$3,750
Disposal 1,120 drums @ $100.00/drum	$112,000

3. Transportation and Disposal of bulk container storage area on south wall (four thirty yard roll offs)

120 yards @ $17.00/yard	$2,040

Building 4 Facility Cleaning, Disposal, Sampling Costs

1. Pit cleaning and disposal of rinse waters:

Labor: 100 hours @ $65/hour	$6,500
Disposal of rinse water: 12,000 gallons @ $0.35/gallon	$4,200

2. Concrete coring and soil sampling (20 locations):

Coring: 16 hours @ $65/hour	$1,040
Soil Sampling: 8 hours @ $65/hour	$520
Analytical Testing (8 metals and RCI) 20 samples @ $200/sample	$4,000

TABLE A12-2 (continued)

3. Transport/disposal of contaminated soil:

20 yards @ $125/cubic yard	$2,500

4. Decontamination of building floors:

Processing and container storage area: 20,250 square feet @ $0.65/square feet	$13,163
Disposal of rinse water: 5,000 gallons @ $0.35/ gallon	$1,750

Building 5A Disposal Cost

1. Transportation and Disposal of four roll-offs of consolidated waste

120 yards @ $150.00/yard	$18,000

2. Container storage area: loading, transport and disposal of 1,120 55 gallon drums of hazardous waste

Load labor 120 hours @ $45/hour	$5,400
Transport 15 loads @ $250/load	$3,750
Disposal 1,120 drums @ $100.00/drum	$112,000

Building 5A Facility Cleaning, Disposal, Sampling Costs

1. Concrete coring and soil sampling (20 locations):

Coring: 16 hours @ $65/hour	$1,040
Soil Sampling: 8 hours @ $65/hour	$520
Analytical Testing (8 metals and RCI) 20 samples @ $200/sample	$4,000

2. Transport/disposal of contaminated soil:

20 yards @ $125/cubic yard	$2,500

3. Decontamination of building floors:

Processing and container storage area: 20,250 square feet @ $0.65/square feet	$13,163

TABLE A12-2 (continued)

Disposal of rinse water:
5,000 gallons @ $0.35/ gallon $1,750

Building 5B Disposal Cost

1. Transportation and Disposal of twenty thirty yard roll-offs of Hazardous waste staged for offsite shipment

   600 yards @ $150.00/yard $90,000

Building 5B Facility Cleaning, Disposal, Sampling Costs

1. Concrete coring and soil sampling (20 locations):

   Coring:
   16 hours @ $65/hour $1,040

   Soil Sampling:
   8 hours @ $65/hour $520

   Analytical Testing (8 metals and RCI)
   20 samples @ $200/sample $4,000

2. Transport/disposal of contaminated soil:

   20 yards @ $125/cubic yard $2,500

3. Decontamination of building floors:

   Processing and container storage area:
   20,250 square feet @ $0.65/square feet $13,163

   Disposal of rinse water:
   5,000 gallons @ $0.35/ gallon $1,750

Certification of Closure

1. Prepare clean closure certification report:
   40 hours @ $ 75/hour $3,000

2. Certification by Professional Engineer:
   16 hours @ $150/hour $2,400

Sub-Total Closure Costs $715,717.00

TABLE A12-2 (continued)

1.	Administrative Contingency:		
		10%	$71,571.70
2.	Miscellaneous Operating Costs:		
		15%	$107,357.55

Total Closure Costs **$894,647**

Inflation factor of 1.04 is assumed.

New Total Closure Costs **$930,432**