

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF AIR AND WASTE MANAGEMENT
SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH

CLOSURE PLAN
GUIDELINE DOCUMENT

UPDATED OCTOBER 2006

1.0 Introduction

The State of Delaware Department of Natural Resources and Environmental Control (DNREC) developed this document to assist hazardous waste closure activities. In developing this document, we considered the Delaware Regulations Governing Hazardous Waste (DRGHW) and various EPA publications as listed in the references, Section 5.0. Facilities planning to perform closure of an operating unit are encouraged to follow the outline and directives detailed within.

Section 2.0 outlines a suggested format for a closure plan. This section also details the information which should be included in a complete closure plan. Submitting closure plans in the suggested format will aid in expediting DNREC review.

Section 3.0 outlines required deliverables. The closure plan must detail the deliverables which will be provided with Certification of Closure in accordance with the items outlined in this section.

Section 4.0 outlines the administrative review process. This information is provided to aid in developing closure scheduling.

This document was developed to outline the closure process in an easy to understand format. Adherence to the recommendations made within does not exempt a facility performing closure from compliance with all applicable regulations and requirements. It is anticipated that this document will be updated as needed when regulations or policies change.

Any questions regarding this document or the closure process should be directed to:

State of Delaware
Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Solid and Hazardous Waste Management Branch
89 Kings Highway
Dover, DE 19901

302.739.9403

2.0 Closure Plan Format

The following pages outline the closure plan sample format. Under each title is a brief description of the contents which should be included. Adherence to this format will expedite the closure review process.

2.1 Sample Cover Page

Closure Plan
For
(Add List of Units Covered by Plan)
At
(Add Facility Name)
(Add Address)

(Date of Plan)

Submitted to

State of Delaware
Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Solid and Hazardous Waste Management Branch
89 Kings Highway
Dover, Delaware 19901

RE: (Add Facility DED #)

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2.3 Sample Report

I. Introduction

The introduction should state the general intent of the closure plan. Applicable regulations and regulatory agencies should be referenced. The introduction should clearly indicate that the closure plan and process will conform to applicable regulations set forth in the State of Delaware Regulations Governing Hazardous Waste, Section 264 and 265, Subpart G.

- A. Scope – Provide a brief summation of the activities pertinent to closure.
- B. Background – Provide a brief history of the area being closed.
- C. Closure Performance Standard – All provisions of the closure plan must be designed toward achievement of the closure performance standard as required by DRGHW Subpart G Sections 264.111 and 265.111. The closure plan should state that performance of activities pursuant to the closure plan will (a) minimize the need for further maintenance, (b) control, minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and (c) comply with DRGHW Section 264 Subpart G, paragraph 264.111 (c) and DRGHW Section 265 Subpart G, paragraph 265.111(c).

II. Facility Description

- A. General Description – Provide a general description of the facility. The description should be sufficient for the reviewer to obtain a general understanding of the activities performed at the facility. The description must also accurately state general site conditions and the location of the facility. The location must be depicted on a topography map.
- B. List Solid Waste Management Units (SWMU) – Provide a list of a SWMU (s), past and present, the wastes handled at each, and their present status.
- C. Hydrogeologic Conditions – Provide all pertinent information regarding the ground water and soil conditions at the site. Tables and maps will be useful. The status of current monitoring activities and results obtained from past activities should be detailed. Any corrective action activities regarding hydrogeologic conditions should be discussed.
- D. List of other Environmental Permits – Provide a list of all environmental permits held by the facility. The list must include application number(s) or permit number(s) and affected area(s).

- E. Anticipated Waivers and Exemptions – Provide a list of any anticipated permit variances, waivers, or exemptions that may be used or needed while performing closure activities.

III. Closure Unit Description

At a minimum the following information must be provided for each closing unit:

- Unit design size and dimensions,
- Permitted capacity,
- A process flow chart,
- A list of chemicals handled in the unit with CAS numbers, and
- A complete list of waste managed at the unit throughout history of operation. List by hazardous waste code and identify quantities of each waste handled.

This description must also identify all known releases of hazardous substances and/or waste at or near the unit.

IV. Closure Procedures

A detailed description of the activities which will be performed to achieve the closure performance standard must be provided. Most closure plans will need to detail the following activities:

- A. List the Quantity of Inventory – Provide a list of the maximum quantity of hazardous waste and other materials expected to be removed at closure. List the quantities by hazardous waste code.
- B. Procedures for Handling Removed Inventory – Provide details for removing waste and other materials expected to be removed during closure. Treatment and disposal methods must be identified. Destinations for disposed material and the distance to off-site treatment or disposal facilities must be included.
- C. Procedures for Decontamination and/or Disposal – Provide a detailed description of the proposed decontamination procedure. Estimate the quantity of waste (hazardous and non-hazardous) that may be generated from the decontamination processes and outline disposal methods.
- D. Procedures to Confirm Effectiveness of Decontamination, Demolition, and/or Excavation – The Closure Plan shall include procedures for performing sample collection and analysis. All field and laboratory procedures must conform to QC procedures outlined in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846) 3rd edition (as updated).

The data generated from the sampling plan must be adequate to demonstrate adherence with the “Closure Performance Standard”. Sample collection

locations, and analytical parameters, as well as justifications for their selection, must be stated. The following information must be provided to DNREC with the closure plan. Table and figures will be useful when presenting the following information.

1. Sample Collection Methods and Procedures – The closure plan must:
 - a. Describe the sampling equipment for each environmental media and/or waste matrix sampled at each unit.
 - b. Describe the sampling procedure for each environmental media and/or waste matrix in explicit detail, including the procedures for collecting QA/QC samples.
 - i. Describe the sequence of events when conducting the field activities.
 - ii. Collect the following quality assurance samples for analysis at the rate specified:

Equipment Blank or Field Blank – The collection of field blanks requires two (2) sets of identical sample containers. One set is filled with demonstrated analyte-free water and the other set is empty. Both sets are carried into the field. At one of the designated sample locations, the water is poured from the filled set of sample containers through the decontaminated sample collection device into the empty set of sample containers. The field blank is then properly preserved, labeled, and shipped to the laboratory with the site characterization samples.

Trip Blanks – The trip blank accompanies the sample bottles to and back from the field. They are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field.

Trip blanks must be included at a rate of one per sample shipment (not to exceed two (2) consecutive field days). Trip blanks must be analyzed for volatile organic parameters; additional parameters may be included at the discretion of DNREC.

Blank Water Quality – The demonstrated analyte-free water used in the field and trip blanks must originate from one central location in the laboratory and also must be the same water used to prepare the method blanks.

The laboratory may be required to provide documentation of the purity of its analyte-free water at the discretion of DNREC. The use of field and trip blanks prepared from the same water as is the method blank, does not change the requirements for the preparation and analysis of method blanks.

Blank Handling and Holding Time – Field and trip blank samples must arrive on-site within one day of preparation and may be held on-site for no longer than two calendar days and must arrive back in the laboratory within one day of shipment from the field (four (4) days total). Blanks and all samples must be kept at four (4) degrees Celsius while on-site and during shipment.

Duplicate Samples – Duplicate samples consist of an identical sample bottle set prepared and filled the same as its corresponding site characterization sample. Duplicate samples are to be collected at a frequency of 5% (every 20 samples) or at least one per day, whichever is greater. A duplicate sample must be prepared for each sample matrix at the previously stated rate.

Additional QA/QC Samples – Additional QA/QC samples may be required by DNREC based on site-specific conditions or any of the previously stated rates of collection pertaining to QA/QC. Samples may be changed at the discretion of DNREC based on site-specific conditions.

- iii. Identify the type and source of the sample containers for each analytical parameter,
- iv. Detail the sample preservation methods and state the maximum permissible holding times for each analytical parameter prior to analysis,
- v. Describe the sample custody procedures starting with the cleaning of sample container, and provide an example “chain-of-custody” form, as well as an example of all field forms (i.e. calibration logs, sample collection logs, and health and safety forms),
- vi. Detail the sampling equipment decontamination procedures, and
- vii. Describe what will be done with disposable equipment contaminated on site and how contaminated materials will be disposed of, including contaminated environmental media.

2. Analytical Methods – The closure plan must:

- a. Identify the proposed analytical laboratory to be used,
- b. Identify all proposed analytical methods, their practical quantitative limits (PQLs), and instrument detection limits,
- c. Use, at a minimum, the quality control procedures found in Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods (SW-846), 3rd Edition as updated, and
- d. The facility shall use an analytical laboratory which has a documented Quality Assurance Program such as those certified by New Jersey’s Department of Environmental Protection (NJDEP) or approved lab per DNREC Site Investigation and Restoration Branch, for the analysis of hazardous waste.

V. Closure Health and Safety Plan

A health and safety plan may be included in the closure plan. At a minimum the closure plan must indicate that the health and safety plan will be submitted to DNREC for review at least 15 days prior to the start of on-site activities. This plan must address all health and safety concerns pertinent to closure activities and at a minimum contain the following:

- Names of key personnel responsible for site safety,
- Safety and health risk analysis for each site task operation,
- Site control measures,
- Employee training requirements,
- Medical surveillance requirements,
- Personal protective equipment for each of the site tasks and operations,
- Frequency and type of air monitoring, personnel monitoring, environmental sampling techniques and instrumentation along with method for maintenance and calibration of equipment,
- Confined space entry procedures (if applicable),
- Spill containment procedures,
- MSDS sheets for all chemicals and mixtures on site,
- Decontamination procedures, and
- Emergency response plan.

At a minimum the emergency response plan must include the following:

- Pre-emergency planning and coordination with outside parties,
- Personnel roles, lines of authority, training, communication,
- Emergency recognition and prevention,
- Safe distances and places of refuge,
- Site security and control,
- Evacuation routes and procedures,
- Decontamination,
- Emergency medical treatment and first aid,
- Emergency alerting and response procedures,
- Procedure for critique of response and follow-up,
- Personnel protection equipment and emergency equipment, and
- Use of the local or State emergency response plan.

VI. Description of Security System

A security system must be utilized to prevent unauthorized access to the areas affected by closure activities. The closure plan must detail the security precautions which will be employed to protect human health and the environment during closure activities.

VII. Closure Certification

Closure certification must be performed by an independent, professional engineer, registered in the State of Delaware. The closure plan must identify the certifying engineer. Closure certification must be based on the observation of closure activities and a quantitative evaluation of achievement of the closure performance standard. Section 3.0 of this guideline outlines the documentation required for closure certification.

- A. Inspections and Field Documentation – Provide an outline of closure oversight activities. DRGHW require that an inspector be present at all times during closure activities to perform a QA/QC program. The inspector may be the certifying engineer or a qualified representative. Examples of the daily logs for documenting field activities and observations should be provided.
- B. Criteria for Evaluating Adequacy – The closure plan must detail the proposed strategy to demonstrate achievement of the closure performance standard and to quantify the adequacy of decontamination/demolition/excavation procedures.

A statistical model should be used to determine adequacy of the sample collection and analysis plan as well as to determine if contamination is present. The model should provide for a comparison of representative data to either (1) background analytical data (2) analytical method practical quantitative limit (PQL) and (3) instrument detection limit. The statistical model shall at a minimum:

- Provide at least a 95% confidence level,
- Propose a method for determining outliers and a plan of action if outliers are found, and
- Propose a method to determine appropriate number of sample points.

The certifying engineer must identify whether contamination is present.

- C. Risk Minimization – The closure plan must identify the corrective actions which will be taken in the event contamination is present to control, minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere. The closure plan should discuss the performance of risk analysis in the event contamination remains after the performance of corrective actions.
- D. Deliverables – The closure plan must identify the information which will be provided with the Closure Final Report. See Section 3.0 for an outline of the

required deliverables. Samples of field reports and logs which will be utilized should be attached.

VIII. Schedule of Closure

A narrative outline and a milestone chart should be provided to aid in coordination of DNREC's oversight activities. To aid in developing the schedule, typical times for providing administrative activities are provided in Section 4.0. Any anticipated requests for permit extensions, pertinent to closure, should also be stated.

IX. Closure Cost Estimate

A detailed closure cost estimate shall be provided by the facility. The estimate must include all cost associated with closure, to include but not limited to:

- Mobilization/demobilization
- Disposal of inventory
- Sample collection
- Laboratory Analysis
- Removal and disposal of contaminated material
- Decontamination
- Certification by independent professional registered engineer
- Contingencies

X. Financial Assurance Statement

A Financial Assurance statement shall be provided by the facility as is required in DRGHW Subpart H Sections 264.140 and 256.140. The Financial Assurance statement may be submitted as an attachment at least thirty (30) days before the commencement of closure activities.

3.0 Required Deliverables

Within sixty (60) days of completing site work the certifying engineer shall submit the Closure Final Report. The report shall include, but not be limited to the following:

1. The Certification of Closure

The independent professional engineer identified in the closure plan shall certify that closure activities were performed in accordance with the approved closure plan and that the closure performance standard is achieved. The certification shall include the basis justifying achievement of the closure performance standard through applying the criteria for evaluating adequacy and if necessary, the implementation of risk minimization activities. In the event contamination remains, the certifying engineer shall identify the associated risks, and justify for DNREC consideration whether or not additional closure or remediation actions should be pursued or required.

2. Field Data

Collection of the following field data should be identified in the closure plan and presented in the final report:

- A. Inspection Reports
- B. Summarized daily logs, and
- C. Field forms used during closure activities, including but no limited to:
 - Sample collection logs,
 - Calibration logs,
 - Manifests for removed hazardous waste, and
 - Health and safety forms.

3. Analytical Data

The results of sample analysis and the following listed QA/QC information must be provided:

- A. The results summary must include:
 - Specific Compound Results,
 - Results of Tentatively Identified Compound Analysis,
 - Method Detection Limits, and
 - Sample Analysis Dates.
- B. The quality control summary must include:
 - Methods Summary,

- Surrogate Recoveries,
- Matrix Spike/Matrix Spike Duplicate Recoveries,
- Method/Trip/Field Blank Results, and
- Storage Times.

C. The quality assurance shall provide for data validation of the analyses done as described in the Quality Assurance Project Plan. The data validation shall determine data acceptability and shall be performed in accordance with the EPA's Functional Guidelines for Data Review for data derived by Contact Laboratory Procedure Methods, (Laboratory Data Validation – Functional Guidelines for Evaluating Organic Analyses, Hazardous Site Evaluation Division, U.S. EPA, June 13, 1988). The appropriate quality assurance data validation summary reports shall be submitted to DNREC, along with sample data and summary sheets and final sample results.

The facility shall ensure that DNREC personnel and/or DNREC authorized representatives are allowed reasonable access to the laboratory (ies), records and personnel utilized by the Facility for analysis of samples collected pursuant to closure.

4.0 Administrative Path

To aid in understanding the administrative regulatory requirements and in development of project schedules please note the following. The current administrative path for facilities performing closure with permitted and interim status follows. These typical schedules are based upon ideal circumstances and may not be achieved if resources are not available for immediate review and oversight of closure plan proposals; or if submitted proposed plans are administratively or technically incomplete. Too, delays may be incurred if a public hearing is requested. Prior to developing a closure plan schedule we recommend contacting the Solid and Hazardous Waste Management Branch to discuss current availability of oversight resources.

Permitted Status

Time	Activity
Day 0	Receive Proposed Closure Plan
Day 5-10	Perform Site Inspection
Day 30	Complete Review and Issue NOD if Necessary
Day 60	Receive Response to NOD
Day 75	Perform Public Notice of Proposed Approval
Day 150	Approve Closure Plan with incorporated public comments as applicable.

Interim Status

Time	Activity
Day 0	Receive Proposed Closure Plan
Day 5-10	Perform Site Inspection
Day 30	Perform Public Notice of Receipt of Complete Application
Day 45	Complete Review and Issue NOD if Necessary
Day 75	Receive Response to NOD
Day 90	Approve Closure Plan with incorporated public comments, and changes as applicable.

5.0 References

40 Codified Federal Register. U.S. Government Printing Office. Washington, D.C. July 1990

Delaware Regulations Governing Hazardous Waste. DNREC, Dover, DE. 40-09-189-101-101

Federal Register. The U.S. Government Printing Office. Washington, D.C. (as updated)

Field Sampling Procedures Manual. New Jersey Department of Environmental Protection (NJDEP). Trenton, NJ. February, 1988 revised June, 1990.

Guide for Decontaminating Buildings, Structures and Equipment at Superfund Sites. (EPA/600/2-85 1028) March, 1985

Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring. U.S. EPA. Washington, D.C. May, 1989,

Model RCRA Permit for Hazardous Waste Management Facilities (Draft). U.S. EPA. Washington, D.C. September, 1988

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. DHHS (NIOSH) Publication No. 85-115. October, 1985.

Quality Assurance Manual. U.S. EPA. Washington, D.C. QAMS-005-80

RCRA Permit Quality Protocol (Draft). U.S. EPA. Washington, D.C. September, 1988

Site Inspection Quality Assurance Project Plan. DNREC, CERCLA Management Branch. Wilmington, DE. July, 1987.

Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846), 3rd Edition. (as updated) U.S. EPA. Washington, D.C.