



DIRECTIVE NUMBER: 9487.50-1A

TITLE: Waiver from Double Liner Requirements Pursuant to Section 3015 (b) (1) and 40 CFR Section 265.301(c) for CECOS International Inc., Williamsburg, O

APPROVAL DATE: 11/18/85

EFFECTIVE DATE: 11/18/85

ORIGINATING OFFICE: OSW

☒ **FINAL**

☐ **DRAFT**

STATUS:

[]	A- Pending OMB approval
[]	B- Pending AA-OSWER approval
[]	C- For review &/or comment
[]	D- In development or circulating

REFERENCE (other documents): headquarters

OSWER OSWER OSWER
E DIRECTIVE DIRECTIVE D



United States Environmental Protection Agency
Washington, DC 20460

OSWER Directive Initiation Request

Interim Directive Number

X9487.6-1A

Originator Information

Name of Contact Person
Kent Anderson

Mail Code
WH-565E

Telephone Number
382-4654

Lead Office

☐ OERR

☒ OSW

☐ OUST

☐ OWPE

☐ AA-OSWER

Approved for Review

Signature of Office Director

Marcia Williams by Jane Wain

Date

11-14-85

Title

"Waiver from Double Liner Requirements Pursuant to Section 3015(b)(1) and 40 CFR Section 265.301(c)" for CECOS International, Inc., Williamsburg, Ohio, Landfill Cell No. 9.

Summary of Directive

CECOS International, Inc., in a letter to EPA of May 30, 1985, formally requested a waiver, as provided for in Section 3004(o)(2) of the Solid Waste Disposal Act, as amended, from the double liner requirements of Section 3004(o)(1) for their previously constructed Cell No. 9.

The attached transmittal memorandum, Waiver, Fact Sheet, and Evaluation Report resulted in a finding that the CECOS Cell No. 9 design and operation can be considered to be as effective as the interim statutory design of Section 3004(o)(5)(B) and 40 CFR Section 265.301(a) under the conditions stated in the Waiver.

Type of Directive (Manual, Policy Directive, Announcement, etc.)

Waiver / memorandum

Status

☒ Draft

☐ Final

☒ New

☐ Revision

Does this Directive Supersede Previous Directive(s)?

☐ Yes

☒ No

Does It Supplement Previous Directive(s)?

☐ Yes

☒ No

If "Yes" to Either Question, What Directive (number, title)

Review Plan

☐ AA-OSWER

☐ OERR

☒ OSW

☐ OUST

☒ OWPE

☒ Regions (V only)

☐ OECM

☐ OGC

☒ OPPE

☐ Other (Specify)

This Request Meets OSWER Directives System Format

Signature of Lead Office Directives Officer

John Wain

Date

11-14-85

Signature of OSWER Directives Officer

Date



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 18 1985

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

OSWER Directive ~~9487.58-1A~~ ~~9487.58-1A~~

MEMORANDUM

SUBJECT: CECOS International, Inc., Williamsburg, Ohio, Landfill
Cell No. 9--Waiver from Double Liner Requirements

FROM: Marcia Williams, Director *Marcia*
Office of Solid Waste (WH-562)

TO: Basil Constantelos, Director
Waste Management Division, Region V

*Bill - for all
Thanks for all
your help on
this
Marcia*

CECOS International Inc., in a letter to John Skinner dated May 30, 1985, requested a waiver from the minimum technological requirements of Section 3004(o)(1) of the Solid Waste Disposal Act, as amended (SWDA), for Landfill Cell No. 9 at CECOS' Aber Road Facility, Clermont County, Ohio.

As you know, the general authority to grant waivers for hazardous waste disposal facilities, such as this request, has been delegated to the Regional Administrator. Because this was the first request for a waiver from the minimum technological requirements and because we have not developed detailed guidance on evaluating such waiver requests, our office, in conjunction with Ohio EPA and the U.S. EPA Offices of Region V, the Office of Research and Development - Cincinnati, the Office of General Counsel, the Office of Waste Programs Enforcement, and the Office of Enforcement and Compliance Monitoring, has developed the attached draft Waiver from Double Liner Requirements Pursuant to Section 3015(b)(1) and 40 CFR §265.301(c).

As we have discussed with your staff, we are turning the draft waiver over to your office for completion of the waiver determination process. This will include the public notice and public hearing requirements of 40 CFR Part 124 for the draft waiver and the issuance (or denial) of the final waiver. Because of the public interest in the general vicinity of the CECOS facility, a public hearing would be advisable. In the interest of concluding the Agency's action on this waiver request as quickly as possible, I believe it is appropriate to announce the

time and place of the public hearing concurrent with the request for public comments. I understand that CECOS is also interested in a final determination in this case as soon as possible.

The package of materials that I am attaching for the purpose of assembling an administrative record regarding this waiver request include:

- Draft Waiver from Double Liner Requirements Pursuant to Section 3015(b)(1) and 40 CFR §265.301(c)
- Fact Sheet
- Correspondence between CECOS and EPA on Cell No. 9
- Memoranda documenting meetings between CECOS and EPA
- CECOS' evaluation report entitled "Evaluation of Leachate Collection and Liner System Performance, Facility No. 9 CECOS International, Clermont, Ohio", May, 1985.
- CECOS International, Clermont County, Ohio, Secured Chemical Management Facility No. 9, AS BUILT drawings sheets 1 to 10, January 31, 1985.
- US EPA's evaluation report entitled "Waiver Evaluation for CECOS International Aber Road Facility Secure Chemical Management Facility No. 9, Clermont County, Ohio", October, 1985.
- Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments -- Design, Construction, and Operation. December 19, 1984.
- Draft Guidance on Implementation of Minimum Technology Requirements of HSWA of 1984. January 31, 1985.
- Draft Guidance on Implementation of the Minimum Technological Requirements of HSWA of 1984, Respecting Liners and Leachate Collection Systems, Reauthorization Statutory Interpretation #5D, EPA/530-SW-85-012, May 24, 1985.
- Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments -- Design, Construction, and Operation, EPA/530-SW-85-014, May 24, 1985.
- Construction Quality Assurance for Hazardous Waste Land Disposal Facilities, EPA/530-SW-85-021, October, 1985.

- Federal Register, Vol. 50, No. 135, July 15, 1985.
- CECOS International "SCMF No. 9: Summary Geotechnical Report", January 1985 (This report is not attached but is already in the Regional Office).
- CECOS International "SCMF No. 9: Field and Laboratory Quality Control Data of HDPE Liner Construction", February 1985 (This report is not attached but is already in the Regional Office).
- CECOS International "SCMF No. 9: Field Quality Control Data of Compacted Soil Liner Construction," January 1985 (This report is not attached but is already in the Regional Office).

Attachments

cc: Waste Management Division Directors Regions I-IV and VI-X
• (with three attachments)

FACT SHEET
for
Waiver from Double Liner
Requirements Pursuant
to Section 3015(b)(1) and
40 CFR §265.301(c) for CECOS International,
Aber Road Facility Secure Chemical
Management Facility No. 9
Clermont County, Ohio

- A. Background: On May 30, 1985, CECOS International, Inc., requested a formal review of the design of their hazardous waste landfill Cell No. 9 at CECOS' Aber Road Facility near Williamsburg, Ohio, for compliance with Section 3015(b)(1) of the Solid Waste Disposal Act (SWDA) as amended regarding double liners and leachate collection and removal systems. In EPA correspondence to CECOS on June 25, 1985, EPA stated that this unit is a "new unit" (because no waste had been placed in the unit as of November 8, 1984) and, therefore, is required under Section 3015(b)(1) of the SWDA to comply with the minimum technological requirements in Section 3004(o)(1) or the waiver requirements of Section 3004(o)(2). Because Cell No. 9 does not meet the requirements of Section 3004(o)(1) (see the EPA Region V letter to CECOS dated May 3, 1985), EPA regards the CECOS letter of May 30, 1985, as a formal request for a waiver under Section 3004(o)(2) of the SWDA.
- B. Legal basis for waiver including reference to statutes, regulations, and supporting references:

The Hazardous and Solid Waste Amendments to the Solid Waste Disposal Act were signed into law on November 8, 1984.

These amendments, under Section 3004(o)(2), provide a provision for a waiver from Section 3004(o)(1)(A)(i), which requires the installation of two or more liners and a leachate collection system above and between such liners for certain landfills seeking permits. Section 3015(b)(1) of the SWDA made the requirements of Section 3004(o) applicable to certain interim status landfills, including "new units" such as CECOS' Cell No. 9. On July 15, 1985, EPA codified the requirements of Sections 3004(o)(1)(A)(i), 3004(o)(2), and 3015(b)(1) of the SWDA in 40 CFR §§264.301(c) and 265.301(a) and (c). The waiver of Section 3004(o)(2) and 40 CFR §265.301(c) is applicable to owners and operators of landfills that demonstrate that alternative design and operating practices, together with location characteristics, will prevent the migration of any hazardous constituents into the ground water or surface water at least as effectively as the liners and leachate collection systems specified in Section 3004(o)(1)(A)(i) and 40 CFR §265.301(a). Section 3004(o)(5)(B) and 40 CFR §264.301(c) describe an interim statutory design that can be used to satisfy the liner and leachate collection system requirements of Section 3004(o)(1)(A)(i) and 40 CFR §265.301(a). EPA determined that the CECOS Cell No. 9 does not meet the design called for in Section 3004(o)(1) because of the lack of a secondary leachate collection and removal system in all areas between the liners, and, therefore, CECOS would have to seek a waiver under Section 3004(o)(2); i.e. 40 CFR §265.301(c).

CECOS' Cell No. 9 was primarily constructed in advance of EPA's draft Minimum Technology Guidance that specifies the use of an extensive construction quality assurance (CQA) program to ensure that the unit is constructed in conformance with the design. While CECOS' CQA program did not completely conform to that in EPA's draft guidance, it was considered at that time to constitute very high CQA standards. Units constructed since issuance of the May 24, 1985, draft guidance should undergo a much more rigorous testing and construction quality assurance plan.

C. Reasons requested waiver appears justified:

CECOS conducted a comparative evaluation of the design of Cell No. 9 versus a "preferred regulatory design" (from EPA's draft liner guidance dated December 19, 1984) that differs somewhat from the interim statutory design of Section 3004(o)(5)(B) of SWDA and 40 CFR §265.301(a). The interim statutory design has a lower liner that consists of three feet of low permeability recompacted natural material while the "preferred regulatory design" used by CECOS in their evaluation has a composite lower liner consisting of a synthetic liner as the uppermost component of the composite and a lower component consisting of two feet of low permeability recompacted natural material. The CECOS comparative evaluation is documented in a report entitled "Evaluation of Leachate Collection and Liner System Performance, Facility No. 9, CECOS International, Clermont County, Ohio". The report, prepared by the consulting engineering firm of STS D'Appolonia Ltd. and dated May 1985, concludes that the performance of the leachate collection and liner systems of the Cell No. 9 design should

exceed the capabilities of the preferred regulatory design in mitigating leakage.

U.S. EPA conducted its own evaluation of the CECOS Cell No. 9 landfill design and operation and compared its ability to prevent migration of any hazardous constituents into the ground water or surface water to that of the interim statutory design of Section 3004(o)(5)(B) and 40 CFR §265.301(a). The EPA evaluation compared the CECOS design to the interim statutory design, rather than the "preferred regulatory design," since this is a design that Congress specified as acceptable at this time. EPA's evaluation is fully documented in the report entitled "Waiver Evaluation for CECOS International Aber Road Facility Secure Chemical Management Facility No. 9, Clermont County, Ohio," October 1985. The result of this study is that the CECOS Cell No. 9 design and operation can be considered to be as effective as the interim statutory design of Section 3004(o)(5)(B) and 40 CFR §265.301(a) only under the conditions stated in the "Waiver from Double Liner Requirements Pursuant to Section 3015(b)(1) and 40 CFR §265.301(c)" for CECOS Cell No. 9.

D. Description of procedures for reaching a final decision:

The draft Waiver will be made available for public comment, including a public hearing in a location convenient to the public living near the facility. The public comment period will be for 45 days. Public notice of the draft Waiver and of the public hearing will be given at least 30 days before the hearing. Applicable methods outlined in the Code of Federal Regulations, 40 CFR §124.10, for making the notice public will be followed.

The beginning and end dates of the public comment period are November _____ 1985 [DATE OF PUBLIC NOTICE] to _____ 1985 [DATE 45 DAYS AFTER DATE OF PUBLIC NOTICE] . After the close of the public comment period, the Regional Administrator will issue a final Waiver decision.

E. The following person may be contacted for additional information regarding this request for waiver:

Bruce Sypniewski
U.S. EPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604
(312) 886-6189

DRAFT

Waiver from Double Liner Requirements
Pursuant to Section 3015(b)(1) and 40 CFR §265.301(c)

Section 3015(b)(1) of the Solid Waste Disposal Act (SWDA), as amended, requires that new landfill units that qualify to operate under interim status comply with the minimum technological requirements of Section 3004(o), including the requirements of Sections 3004(o)(1) (codified at 40 CFR §265.301(a)) and 3004(o)(2) (codified at 40 CFR §265.301(c)), with respect to waste received on or after May 8, 1985. Section 3004(o)(1) requires that the owner or operator of a landfill install two or more liners and leachate collection systems above and between such liners for each new unit. These requirements apply to CECOS International, Aber Road Facility Secure Chemical Management Facility Cell No. 9, Clermont County, Ohio.

Section 3004(o)(2) of the SWDA and 40 CFR §265.301(c) provide that the above minimum technological requirements do not apply where the Regional Administrator finds for such landfill that alternative design and operating practices, together with location characteristics, will prevent migration of hazardous constituents to ground water and surface water at least as effectively as such liners and leachate collection systems. The Regional Administrator for Region 5 here finds that Cell Number 9 qualifies under the standards set out in Section 3004(o)(2) of the SWDA and 40 CFR §265.301(c) for a waiver from the minimum technological requirements to the extent specified below, upon the specific condition that CECOS incorporate the alternative design features and observe the alternative operating practices described below.

The design of CECOS' Cell Number 9 deviates from the requirements of Section 3004(o)(1) of the SWDA and 40 CFR §265.301(a) by the failure to have a secondary leachate collection system that covers all areas of the landfill between the top and bottom liners. This deficiency is compensated for, as documented by the CECOS AS-BUILT drawing, sheet number 7, dated January 31, 1985, by the inclusion of a primary sidewall contingency leachate collection system and a thicker compacted lower soil liner than is provided for in the interim statutory design contained in Section 3004(o)(5)(B) of the SWDA and 40 CFR §265.301(a).

To continue to qualify for this waiver, the alternative design and operation of the primary leachate collection system (including the contingency sidewall collection and removal system) must include:

Design - The leachate collection system must have:

- 1) A primary leachate collection sump conveyance system capable of automatic and continuous functioning.
- 2) A primary leachate collection system on the cell's sidewall consisting of the following components (see CECOS' AS-BUILT drawing, January 31, 1985, sheet No. 7) above the top liner:
 - ° 6-ounce protective geotextile.
 - ° 1-foot sidewall washed sand blanket with a hydraulic conductivity of 1×10^{-3} cm/sec or more.

- Contingency leachate collection piping consisting of 6-inch ABS schedule 80 pipe up the sidewall at 8 locations (at approximately 70-foot spacing). The pipes extend 5 feet into the primary leachate collection and removal system at the bottom of the cell. This 5-foot section is perforated and functions as a contingency leachate collection system (see CECOS' AS-BUILT drawing, January 31, 1985, sheet No. 9).
 - 16-ounce geotextile drainage media.
 - A minimum of two leachate collection pumps on site.
- 3) The ability to monitor leachate head levels within the landfill at the sidewalls during the active life and the post-closure care period.
 - 4) Been designed as specified in EPA guidance (e.g., "Permit Applicants Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities," EPA/530-SW-84-004) so as to withstand the stresses and disturbances from overlying wastes, waste cover materials, and equipment operation.
 - 5) Been designed as specified in EPA guidance (e.g., "Permit Applicants Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities," EPA/530-SW-84-004) so as to function without clogging through the active life and post-closure care period.

Construction - Components must be properly installed to assure that the specified performance of the leachate collection system is achieved. Future construction of the sidewall primary leachate collection system must be documented by a construction quality assurance (CQA) program prior to operation of that portion of the unit. The CQA program, as specified in EPA draft guidance documents entitled "Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments-- Design, Construction, and Operation", EPA/530-SW-85-014, May 24, 1985, and "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities", EPA/530-SW-85-021, October, 1985, must be used to monitor and document the quality of materials (e.g., liner, drainage, and piping) used and the conditions and manner of their placement. The program must be developed, administered, and documented by a registered professional engineer. The documentation must include a report containing a summary of construction activities, observations, test data sheets, deviations, and as-built drawings. The documentation for the CQA program must be kept available for review.

Operation - The following operational procedures must be followed:

- 1) The primary leachate removal system must be operated automatically and continuously during the active life and post-closure care period whenever leachate is present in the sumps (leachate standpipes) and must remove accumulated leachate at the earliest practicable time to minimize (produce very low or no) head of leachate on the top liner. The

leachate depth above the top liner shall not exceed one foot except temporarily (no longer than two days) after major storms during the active life and post-closure care period of the unit.

- 2) The contingency sidewall primary leachate removal system must be operated daily during the active life and post-closure care period whenever a pumpable quantity of leachate is present in the pipe and must remove accumulated leachate at the earliest practicable time to minimize the leachate head on the liner to a very low level. The leachate depth shall be maintained at or below a pumpable level in the contingency leachate collection pipes, except temporarily (no longer than two days) after major storms. There shall be an adequate number of leachate collection pumps on site to satisfy this removal requirement. At a minimum there must be two pumps on site.
- 3) Inspect for proper operation of the primary leachate (including contingency sidewall) collection and removal system, and for the presence of leachate in the removal sumps and the contingency leachate collection pipes, daily during the operating period and monthly during closure and the post-closure care period. A record of inspections and findings (e.g., log of leachate depth and daily volume of leachate pumped) must be incorporated into the on site operating record.
- 4) Repair of damaged primary leachate collection and contingency sidewall system components as soon as practicable during the

operating period.

5) During the active life and post-closure care period, notification of the Regional Administrator, in writing:

- a) within 7 days of the presence of a leachate depth of one foot or more above the top liner in the primary leachate collection and removal system.
- b) within 7 days of the presence of a pumpable quantity of leachate, except temporarily (no longer than 2 days) after major storms, in the contingency sidewall leachate collection and removal system;
- c) within 15 days of known damage to the primary leachate collection and contingency sidewall system components; the notification should outline procedures planned to repair the damage and a projected schedule.

6) Collected leachate must be removed to a storage, treatment, or disposal facility that is permitted under 40 CFR Part 264 or operating under interim status pursuant to 40 CFR Part 265.

Any modifications to plans and specifications following waiver approval must be approved in writing by the Regional Administrator prior to construction and operation.

Date: _____

Regional Administrator
US EPA, Region V

WAIVER EVALUATION FOR
CECOS INTERNATIONAL ABER ROAD FACILITY
SECURE CHEMICAL MANAGEMENT FACILITY NO. 9
CLERMONT COUNTY, OHIO
OCTOBER 1985

ACKNOWLEDGEMENT

The analysis for this report was conducted by Battelle Columbus
Laboratories for the U.S. Environmental Protection Agency
under Contract No. 68-03-3248.

TABLE OF CONTENTS

Tables	iii
Figures	iv
1.0 Introduction	1
2.0 General Description of the Landfill Designs	2
2.1 Interim Statutory Design	2
2.2 CECOS Cell No. 9 Design	2
3.0 Evaluation Approach	4
3.1 Performance Criteria	4
3.2 Failure Scenarios	5
3.3 Hydraulic Modeling Methodology	6
3.4 Model Simulation	8
4.0 Model Results	9
5.0 Conclusions	17
6.0 Findings and Recommendations	17
References.....	19

TABLES

1. Hydraulic Conductivities of Materials	8
2. Summary of Model Input Data	10
3. Flow Distribution Within the Sidewall Region	11
4. Drainage Time Factor, Volume Exiting Sidewall During Drainage Time, and Breakthrough Time	12

FIGURES

1. Schematic of Interim Statutory Design	3
2. Schematic of CECOS Cell No. 9 Design	3
3. Maximum Release Rate Comparison	13
4. Drainage Time Comparison	14
5. Breakthrough Time Comparison	15

WAIVER EVALUATION FOR
CECOS INTERNATIONAL ABER ROAD FACILITY
SECURE CHEMICAL MANAGEMENT FACILITY NO. 9
CLERMONT COUNTY, OHIO
OCTOBER 1985

1.0 INTRODUCTION

The Hazardous and Solid Waste Amendments (HSWA) of 1984, amends Section 3004 of RCRA by adding a new paragraph (o) imposing minimum technological requirements on owners and operators of certain landfills and surface impoundments seeking permits. HSWA also adds a new Section 3015 to RCRA imposing the minimum technological requirements set out in Section 3004(o) on certain interim status landfills and surface impoundments. Specifically, Section 3004(o)(1)(A) requires that affected units must install two or more liners, a leachate collection system above (in the case of a landfill) and between the liners, and ground water monitoring. Section 3004(o)(5)(B) allows the use of a particular type of liner design pending the issuance of EPA regulations implementing the double liner requirements. Section 3004(o)(2) provides for an exemption from the Section 3004(o)(1)(A) standards for liners and leachate collection systems if alternative design and operating practices, together with location characteristics, will prevent the migration of hazardous constituents as effectively as systems under Section 3004(o)(1)(A).

The Section 3015 requirements are applicable to the CECOS International Aber Road Facility, Secure Chemical Management Facility No. 9 (hereafter referred to as CECOS Cell No. 9) in Clermont County, Ohio. The main issue with the CECOS Cell No. 9 design is that a secondary leachate collection system does not cover all areas of the landfill between the upper and lower liners. CECOS International has requested a waiver for Cell No. 9 from EPA. The purpose of this report is to document the hydraulic evaluation of CECOS Cell No. 9. This evaluation compares the performance of CECOS Cell No. 9 with the interim statutory design contained in Section 3004(o)(5)(B) per Section 3004(o)(2) which allows alternative designs under certain circumstances.

In enacting HSWA, Congress has mandated the use of two or more liners and a leachate collection system above (in the case of a landfill) and between such liners. The need for this system is based on the experience that some existing, single lined landfills and surface impoundments have failed. The Congress intends that, for general protection of human health and the environment, hazardous waste facilities provide means to minimize the risk of waste migration out of the unit. The statutory design for landfills in Section 3004(o)(1) provides for liners and leachate collection systems covering all areas of the unit that are in contact with the wastes (See Federal Register, Vol. 50 No. 135, July 15, 1985, p.28,709). This means that the unit must have a leachate collection system above the top liner, two or more liners, and a secondary leachate collection and removal system between the liners on the landfill bottom and side walls.

The evaluation of the CECOS Cell No. 9 landfill design and operation was performed to compare its relative ability to prevent migration of any hazardous constituents into the ground water or surface water at least as effectively as the design contained in Section 3004(o)(5)(B) (hereafter referred to as the interim statutory design). In doing so, the evaluation focuses on conditions where functioning

of the lower liner and secondary leachate collection system are required, i.e., various failures of the upper liner and primary leachate collection system.

2.0 GENERAL DESCRIPTION OF THE LANDFILL DESIGNS

This evaluation compares the CECOS Cell No. 9 design to that of the interim statutory design contained in Section 3004(o)(5)(B), which satisfies the requirements of Section 3004(o). The general features of the interim statutory design and the CECOS Cell No. 9 design are provided in the following sections. Details for the interim statutory design are based on the design presented in Section 3004(o)(5)(B) of HSWA. Details for CECOS Cell No. 9 design are based on the AS-BUILT specifications (dated January 31, 1985) provided by CECOS International.

2.1 INTERIM STATUTORY DESIGN

The interim statutory design includes a primary leachate collection and removal system. The top liner in this design consists of a liner designed, operated, and constructed to prevent the migration of any constituent into such liner during the active life and post-closure care period (i.e., a flexible membrane liner (FML)). A secondary leachate collection system is between the two liners on the bottom and sidewalls to detect, collect, and remove liquids entering the collection system. The lower liner consists of a liner designed, operated, and constructed to prevent the migration of any constituent through such liner during the active life and post-closure care period. HSWA specifies that the bottom (lower) liner be deemed to satisfy this requirement if it is constructed of at least a 3-foot thick layer of recompacted clay or other natural material with a permeability of no more than 1×10^{-7} cm/sec. Figure 1 is a schematic of the interim statutory design.

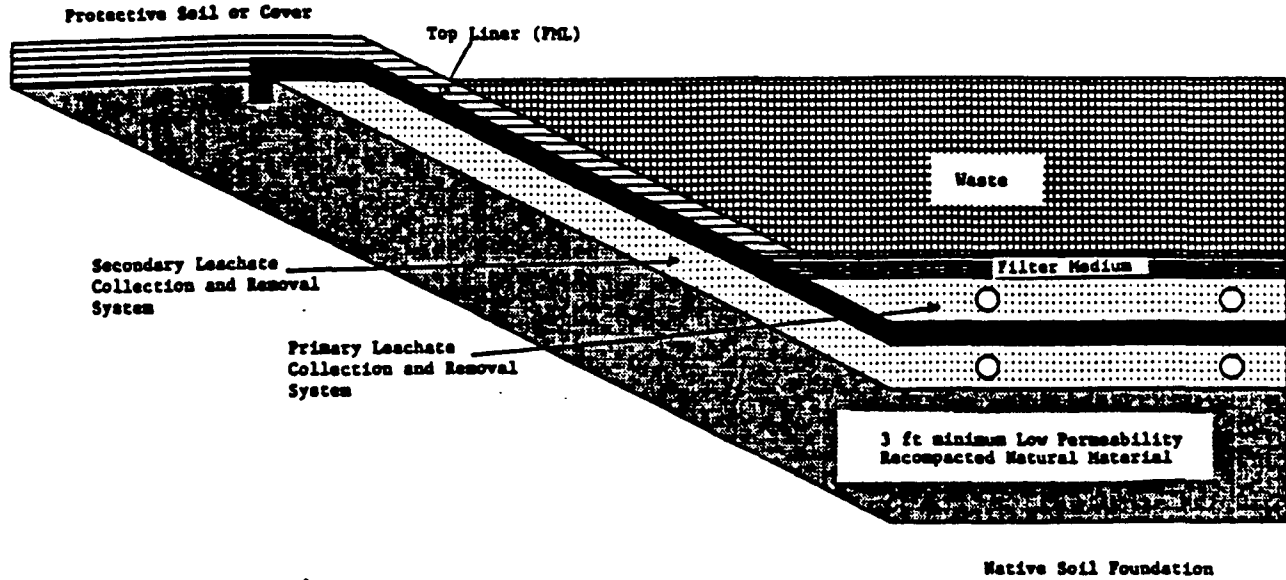
2.2 CECOS CELL NO. 9 DESIGN

A schematic representation of the CECOS Cell No. 9 is shown in Figure 2. The sidewall liner system consists of, from top to bottom, a protective soil layer, a geotextile, 1 foot of sand (leachate collection layer), a geotextile, the FML, and a 7.5-foot compacted soil liner (bottom or lower liner). The sidewall slope is 2:1 (horizontal to vertical). Eight 6-inch pipes, spaced approximately equally around the cell, are located in the sand layer on the sidewalls and extend 5 ft. into the primary leachate collection and removal layer at the bottom of the cell. These pipes are perforated in the bottom layer and function as a contingency leachate collection and removal system. This contingency leachate collection system is a very important element of Cell No. 9 because it is designed to provide additional and backup capability to remove liquids from the sidewall area.

The cell bottom liner system, from top to bottom, consists of a protective soil layer, a geotextile, 1 foot of sand (primary leachate collection and removal system), the FML, 4 feet of compacted clay, 1 foot of sand (secondary leachate collection and removal system), and 2.5 feet of compacted clay (secondary liner). The secondary leachate collection system is located below the 4 feet of compacted clay except near the sidewall/bottom interface and under a center berm. An additional leachate monitoring system is located below the 2.5 feet of clay layer as a requirement under Toxic Substance Control Act regulations (not shown in Figure 2). For specific details of the design see AS-BUILT Drawing.¹

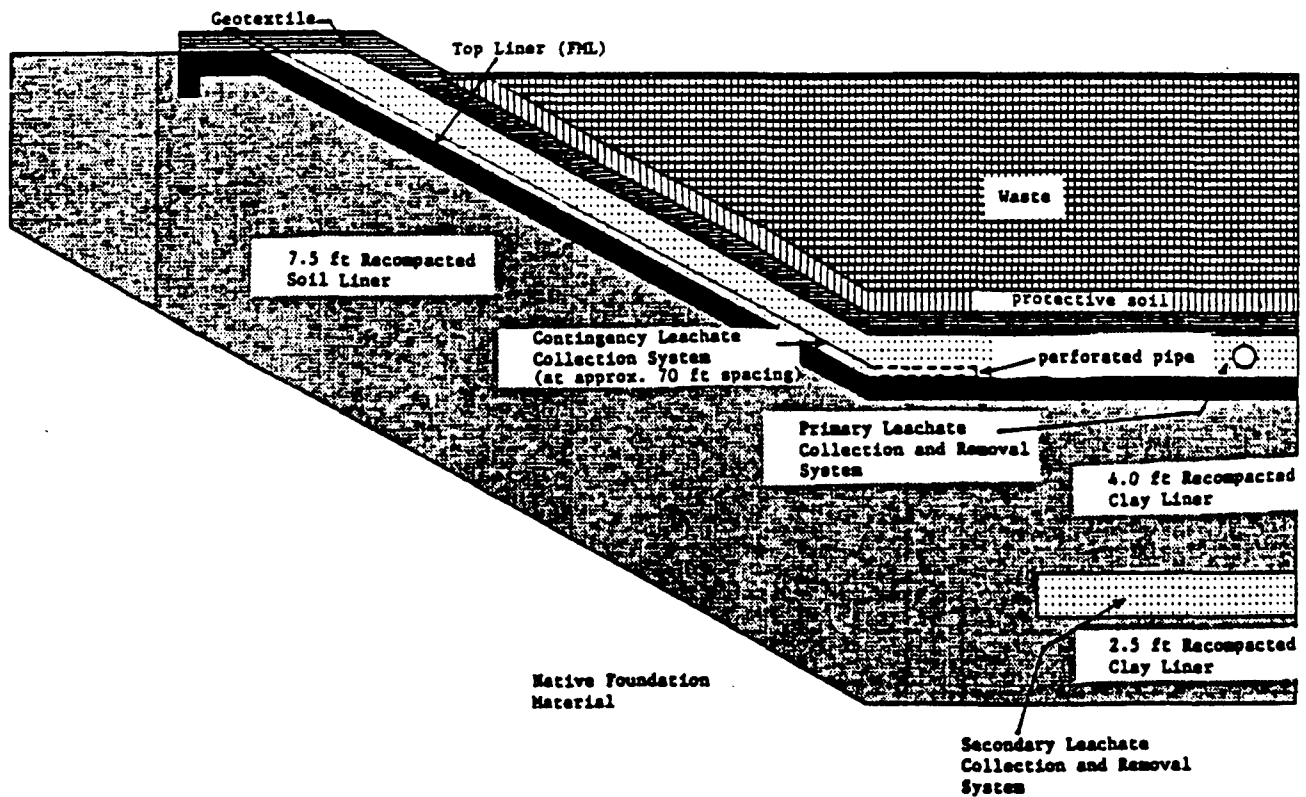
¹ AS-BUILT Drawing, sheet 7 of 10 by Soil and Material Engineers, Cincinnati, Ohio, dated January 31, 1985.

Figure 1. Schematic of Interim Statutory Design



(Not to Scale)

Figure 2. Schematic of CECOS Cell No. 9 Design.



(Not to Scale)

Cell No. 9 is located within a zone of saturation. To help maintain slope stability, a dewatering system is operated outside the unit until the cell becomes sufficiently full to offset the hydrostatic pressure. Because of the presence of ground water, the point of comparison for the CECOS Cell No. 9 facility and the interim statutory design is at the interface between the compacted soil liner on the sidewalls (or the compacted clay liner on the bottom) and the native material.

3.0 EVALUATION APPROACH

The evaluation approach was based on hydraulic modeling of the CECOS Cell No. 9 design and the interim statutory design. Performance criteria and failure scenarios were developed to characterize the ability of each design to prevent or minimize migration of hazardous constituents into the ground water and surface waters under conditions where functioning of the secondary leachate collection and liner systems would be needed. The performance criteria selected are (1) liner systems breakthrough times, (2) maximum leakage release rates, and (3) a drainage time factor related primarily to the leachate collection efficiency. The failure scenarios include various situations where primary design components are assumed to fail and the functioning of secondary systems becomes necessary to minimize releases to the environment. The performance criteria, failure scenarios, and hydraulic modeling methodology are described in more detail in the next sections.

3.1 PERFORMANCE CRITERIA

The legislative history to the waiver provision indicates that alternative designs should not only assure equivalent containment, but also provide for equivalent leachate removal or other means of controlling the volume of hazardous leachate. (Senate Report No. 284, 98th Congress, 1st Session, pp. 27-28, 1983.)

The performance criteria that were selected for this evaluation represent the factors affecting migration: (1) when breakthrough will occur, (2) the maximum rate of leakage, and (3) the drainage time factor. The first two factors consider the ability of the design to contain wastes within the unit while the third criterion primarily evaluates the efficiency of the leachate collection and removal system.

The three performance criteria were developed to establish a quantifiable definition of "effectiveness" for each design. The CECOS Cell No. 9 design and operation has to be at least as effective as the interim statutory design in terms of these three performance criteria. The three performance criteria taken together are conservative and will allow comparisons and ensure that the goals of the legislation and regulations, primarily section 3004(o)(5)(B), are met.

Criterion I -- Breakthrough Time: This is a measure of the time required for leachate or hazardous constituents to migrate through the bottom (lower) liner, following a failure of the primary (top) liner system. In the case of CECOS Cell No. 9, the facility is located within a zone of saturation and, therefore, any migration beyond the secondary liner is a release to the ground water. A section 3004(o)(2) waiver would require that this breakthrough time for the alternative design and operating condition be equivalent to or greater than the breakthrough time for the interim statutory design.

Criterion II -- Maximum Leakage Release Rate: The maximum leakage release rate is the maximum daily rate that liquids are released from the bottom (lower) liner on the sidewall. This maximum rate is based on the "worst-case" condition where the facility has developed a very large hydraulic head above the liner systems. This worst-case condition could occur if the primary leachate collection system became severely clogged (or was not operated) and the final cover system failed to prevent infiltration of water into the unit (i.e., the "bath tub" effect). A section 3004(o)(2) waiver requires that the alternative design along with operating practices has a maximum leakage release rate less than or equal to the interim statutory design.

Criterion III -- Drainage Time Factor: This is a measure of the time required to empty from the unit the volume of leachate being modeled, utilizing the secondary leachate collection systems. In this analysis the volume of leachate was assumed to be one pore volume (i.e., the landfill waste is saturated with leachate). While this analysis results in a measure of time, it is also a measure of the effectiveness of the design to collect and remove leachate, which is dependent on the rejection efficiency of the liner. The rejection efficiency is a measure of the liner's ability to prevent migration into the liner. In this analysis, the primary leachate collection and removal system was assumed to be non-functioning. This criterion is a drainage time factor calculated by dividing the volume of liquids stored in the unit by the removal rate of the secondary leachate collection systems for the interim statutory design. For the CECOS design, the volume of liquid is divided by the removal rate of both the secondary leachate collection system on the bottom of the unit and the contingency leachate collection and removal system on the sidewalls. Therefore, the drainage time factor is an evaluation of the efficiency of the drainage system to remove a given volume of liquid. The greater the efficiency of the leachate collection system, the greater the quantity of liquids that will be removed versus being absorbed into the liner. As a result, the drainage time factor is the period of time that liquids are potentially available for release into the liner. Even if an alternative design and operating practice has a longer breakthrough time (Criterion I) and a smaller rate of release than the interim statutory design (Criterion II), a larger total volume of hazardous constituents could be released to the environment unless this third criterion is also considered. If the alternative design along with operating practices has an equal or smaller value for this third criterion when compared to the interim statutory design and meets the other two performance criteria, it would provide an equivalent or better level of environmental protection.

3.2 FAILURE SCENARIOS

Failure scenarios were developed to provide conditions where the secondary systems would be needed. Since the main issue with CECOS Cell No. 9 is the sidewall, the failure scenarios focused on conditions in which liquids, hydraulic head driving forces, and leaks through the top FML are present at the sidewalls. The first failure assumption is that the primary leachate collection system on the bottom of the cell does not function. The second assumption is that infiltration into the waste cell results in the unit filling with liquids. These two assumptions allow liquids (hydraulic head) to build up in the unit. The third assumption is that the top liner, an FML, does not prevent migration. Three permeation rates (represented as effective hydraulic conductivities) are assumed for the FML on the sidewalls: 1×10^{-9} cm/sec, 1×10^{-7} cm/sec, and

1×10^{-4} cm/sec, which represent increasingly severe failures to the FML on the sidewall. The hydraulic conductivity of the FML on the bottom of the unit is assumed to have a very low hydraulic conductivity of 1×10^{-10} cm/sec.

An operational assumption in the failure scenarios is that the secondary leachate collection systems are functional and operated at design capacity for both the CECOS and interim statutory designs. Corrective measures are triggered by some circumstance, such as the presence of leachate in the secondary leachate collection systems, detection of leachate in the monitoring wells, or observation of high head levels within the waste cell. In the event that corrective measures have not been triggered and the secondary leachate collection systems are not operated, then the CECOS Cell No. 9 design would have a slightly smaller release rate due to the thicker liner on the sidewall (assuming that the interim statutory design has the same as-built soil liner properties as the CECOS Cell No. 9 soil liner). An operational assumption for the CECOS Cell No. 9 includes cases with and without the operation of the contingency leachate collection system above the top liner on the sidewall of the cell.

Worst-case assumptions were established for the hydraulic head for the failure scenarios. The head was held at 50 feet above the bottom of the secondary clay liner. A 50-foot head was selected since this is the approximate depth of the landfill cell. While the head is held at 50 feet, this head would not be transmitted through the secondary drainage layer because of the greater hydraulic conductivity of the drainage layer as compared to that of the waste. Therefore, in the case of the interim statutory design, the bottom liner is not subjected to the full head. However, for the CECOS design, if the contingency sidewall collection system is not operated, the bottom liner on the sidewalls will be subjected to the hydraulic head from the leachate in the landfill. The water table was generally assumed to be 10 feet below the bottom of the secondary clay liner except for one case where it was assumed to be 5 feet above the bottom of the secondary clay liner.

These two cases (i.e., water table 10 feet below and 5 feet above the bottom of the secondary clay liner) relate to CECOS Cell No. 9 (i.e., location characteristics as required under Section 3004(o)(2)). During most of the active life of the unit, the ground water is held below the unit by a dewatering system operated outside the unit (i.e., the need to evaluate the design with the water table 10 feet below the bottom of the secondary clay liner). After the unit becomes sufficiently full to offset the hydrostatic pressure on the sidewalls, the operation of the dewatering system will be stopped and the ground water will be allowed to rise outside of the unit (i.e., the case where the water table is 5 feet above the bottom of the secondary clay liner). The second case, where the ground water is assumed to be above the bottom of the unit, was used to demonstrate that the most critical period is while the ground water is at or below the unit.

3.3 HYDRAULIC MODELING METHODOLOGY

The performance of the CECOS Cell No. 9 and the interim statutory designs can be effectively evaluated using two-dimensional (cross-section), saturated ground-water flow, model analyses. Conceptually, each design is represented as a saturated system, somewhat like a full bath tub with the same amount of water flowing in as flowing out of the drain. The methodology and modeling approach are discussed below.

Engineered landfill facilities and failure scenarios are evaluated with CFEST (Gupta et al., 1982), a saturated ground-water flow model. CFEST is one of many ground-water models that could be used to conduct this study. It was selected because it is documented and has been tested. The authors also have experience with the application of CFEST. The failure scenarios can be conservatively evaluated using steady-state saturated flow analysis because the maximum amount of liquid will be forced through the system under saturated conditions. Under unsaturated conditions, hydraulic conductivities of the lower liner (including the sidewalls) could be an order-of-magnitude smaller, therefore, allowing less flow through the system. The landfill designs modeled all contain a lower liner that extends up the sidewall that is compacted with hydraulic conductivities of 1×10^{-6} cm/sec or 1×10^{-7} cm/sec. The materials overlying the lower liner are more permeable with the exception of the FML. The relatively "tight" lower soil liner, in contrast to the "native material" that underlies it down to the water table, provides an over-drained condition; therefore, the soil liner is the rate-limiting material at the base of the engineered facilities. The failure scenarios assume a constant saturated level in the waste cell. All failure scenarios presume some degree of leakage through the top FML and initial and steady-state saturated conditions.

The modeling analysis uses steady-state assumptions for material properties and constant head conditions to determine how much flow will go to the operating collection systems and how much flow will leak through the bottom soil liner. A constant head condition (i.e., the landfill remains filled with leachate) is used because there is an unlimited source of liquids to the overall system, so the resulting release rates and leachate collection rates are essentially the worst-case values. This methodology is conservative in that it will generally underestimate the efficiency of each design because unsaturated flow analysis would have large decreases in hydraulic conductivities of the various layers above the sidewall and bottom soil liner. More detailed flow analyses could be conducted, such as unsaturated flow analysis or transient saturated flow analysis, however, those modeling approaches are much more susceptible to unknown errors in the determination of basic parameters (e.g., unsaturated moisture characteristic curves).

Breakthrough times are calculated with the Green-Ampt equation. The Green-Ampt (Green and Ampt, 1911) equation can be used to estimate the time for a wetting front to advance in a soil column. In this study, the Green-Ampt equation was used to provide relative time estimates for water to pass through the bottom soil liner on the sidewall.

This equation approximates the wetting front as a square wave to which saturated Darcy flow analysis is applied. The equation captures the dynamics of a wetting front and is a conservative method for estimating breakthrough times (EPA, 1984). Heads above and below the soil liner on the sidewall (h_T and h_B) for this equation are determined from the CFEST model runs.

The Green-Ampt equation can be written as:

$$t = \frac{e_s - e_i}{K} \left[\frac{Z - (h_T - h_B) \ln \frac{h_T + Z - h_B}{h_T - h_B}}{h_T - h_B} \right]$$

where

t = time for the wetting front to advance through the liner;

e_s = saturated moisture content of the liner material (above the wetting front);

e_i = initial moisture content of the liner material (below the wetting front);

K = hydraulic conductivity of the liner material at some average moisture content (i.e., between e_s and e_i);

Z = liner thickness

h_T = head at the top of the liner; and

h_B = head at the base of the liner.

3.4 MODEL SIMULATION

The CFEST finite-element ground-water code was used to simulate CECOS Cell No. 9 and the interim statutory design under various failure scenarios. A finite element grid was set up to represent each layer within each design case. For all cases, the head at the top of the landfill was held at 50 feet above the bottom of the secondary liner which corresponds to a worst-case hydraulic head condition. By doing so, liquids are always available at the top to replace liquids that are removed by the leachate collection systems. The water table at the bottom of the region was held at either 10 feet below the secondary liner or 5 feet above the secondary liner, depending on the failure scenarios. Liquids flow from a higher to a lower head (i.e., from 50 feet to 5 feet or to -10 feet relative to the bottom of the secondary liner). The hydraulic conductivity (K) for all the materials simulated are shown in Table 1.

Table 1. Hydraulic Conductivities of the Materials

<u>Material</u>	<u>K (cm/sec)</u>
Waste	1×10^{-5}
Sand (Leachate Collection Layers)	1×10^{-2}
Compacted Soil*	1×10^{-6} and 1×10^{-7}
FML (Sidewall)**	1×10^{-4} , 1×10^{-7} , and 1×10^{-9}
FML (Bottom)**	1×10^{-10}
Native Material	1×10^{-3}

*CECOS Cell No. 9 is evaluated with both K values

**FML leaks are simulated using equivalent K values

Two values of hydraulic conductivity for CECOS Cell No. 9 compacted soil liner were used because of uncertainty in the as-built field hydraulic conductivity. However, the soil utilized on the sidewalls is a silty till material that has laboratory K values less than 1×10^{-7} cm/sec. In the construction of Cell No. 9, CECOS used what was considered at the time to be good quality control to assure that the unit was constructed as designed (i.e., hydraulic conductivity of the soil liner of less than 1×10^{-7} cm/sec). A complete description of the model input data in each case is shown in Table 2.

Five failure scenarios were evaluated for the interim statutory design and two versions of CECOS cell No. 9 design, version A with a soil liner K of 1×10^{-6} cm/sec and version B with a soil liner K of 1×10^{-7} cm/sec. A description of each case is as follows:

- Case 1 - Severe failure of the sidewall FML ($K = 1 \times 10^{-4}$ cm/sec). Water table below the cell.
- Case 2 - Moderate failure of the sidewall FML ($K = 1 \times 10^{-7}$ cm/sec). Water table below the cell.
- Case 3 - Severe failure of the sidewall FML ($K = 1 \times 10^{-4}$ cm/sec). Water table above the cell bottom.
- Case 4 - Severe failure of the sidewall FML ($K = 1 \times 10^{-4}$ cm/sec). Water table below the cell. Contingency leachate collection system operating in CECOS Cell No. 9.
- Case 5 - Minor failure of the sidewall FML ($K = 1 \times 10^{-9}$ cm/sec). Water table below the cell.

In all cases the primary leachate collection system on the bottom unit is not operating, the secondary leachate collection system is operating, and the hydraulic head in the waste is held at 50 feet above the bottom of the cell. The letter A designates CECOS Cell No. 9 with a sidewall soil liner K of 1×10^{-6} cm/sec, the letter B designates CECOS Cell No. 9 with a sidewall soil liner K of 1×10^{-7} cm/sec, and the letter S designated the interim statutory design with a sidewall soil liner K of 1×10^{-7} cm/sec.

Cases 1, 2, and 5 demonstrate the effects of different leakage rates through the top liner (FML). Case 1 versus Case 3 demonstrates the effect of different assumptions of the location of the water table under the worst-case FML failure condition. Case 1 versus Case 4 demonstrates the effect of operating the contingency leachate collection system in CECOS Cell No. 9 under the worst case FML failure condition. Cases 1 and 4 represent the most severe cases.

4.0 MODEL RESULTS

The model results are presented in Tables 3 and 4. Graphical comparisons of the three performance criteria for the failure scenarios are also presented in Figures 3, 4, and 5. Table 3 shows the distribution of flow within the sidewall region. Flow rates are expressed in units of $\text{ft}^3/\text{day}/\text{ft}$ (rate of flow in cubic

Table 2. Summary of Model Input Data

Design Case	Sidewall FML K (cm/sec)	Compacted Soil K (cm/sec)	Water Table* Elevation (ft)	Contingency Leachate Collection System
1A	1×10^{-4}	1×10^{-6}	-10.0	Not Operated
1B	"	1×10^{-7}	"	" "
1S	"	"	"	N/A
2A	1×10^{-7}	1×10^{-6}	"	Not Operated
2B	"	1×10^{-7}	"	" "
2S	"	"	"	N/A
3A	1×10^{-4}	1×10^{-6}	5.0	Not Operated
3B	"	1×10^{-7}	"	" "
3S	"	"	"	N/A
4A	1×10^{-4}	1×10^{-6}	-10.0	Operated
4B	"	1×10^{-7}	"	"
4S	"	"	"	N/A
5A	1×10^{-9}	1×10^{-6}	"	Not Operated
5B	"	1×10^{-7}	"	" "
5S	"	"	"	N/A

Cases 1A-5A and 1B-5B are CECOS Cell No. 9 simulations

Cases 1S-5S are Interim Statutory Design simulations

* Relative to the bottom of the secondary liner.

Table 3. Flow Distribution Within the Sidewall Region
(all values are in units of $\text{ft}^3/\text{d}/\text{ft}$)*

Design Case	Maximum Release Rate Through Sidewall	Flow Rate Through Secondary Leachate Collection System	Flow Rate Through Contingency Leachate Collection System
1A	1.91	0.54	N/A
1B	0.23	0.07	N/A
1S	0.07	4.98	N/A
2A	1.79	0.41	N/A
2B	0.23	0.07	N/A
2S	0.07	3.67	N/A
3A	1.33	0.53	N/A
3B	0.16	0.07	N/A
3S	0.06	2.76	N/A
4A	0.43	-0-	9.73
4B	0.05	-0-	10.03
4S	0.07	4.98	N/A
5A	0.16	0.02	N/A
5B	0.10	0.01	N/A
5S	0.004	0.178	N/A

* Rate of flow in cubic feet per day from a one-foot slice of the landfill sidewall from top to bottom.

Table 4. Drainage Time Factor (Volume of Liquids in the Landfill Divided by Leachate Collection Rate), Volume Exiting Sidewall During Drainage Time, and Breakthrough Time

Design Case	Drainage Time (days)	Volume Exiting Sidewall During Drainage Time (ft ³ /ft)	Breakthrough Time (days)
1A	876	1,672	19
1B	7,045	1,637	157
1S	390	27	253
2A	974	1,744	20
2B	7,158	1,640	170
2S	525	37	312
3A	1,151	1,535	25
3B	9,231	1,509	204
3S	700	42	372
4A	211	91	98
4B	213	10	947
4S	390	27	253
5A	12,596	1,950	81
5B	19,391	1,894	234
5S	10,808	43	899

Figure 3. Maximum Release Rates

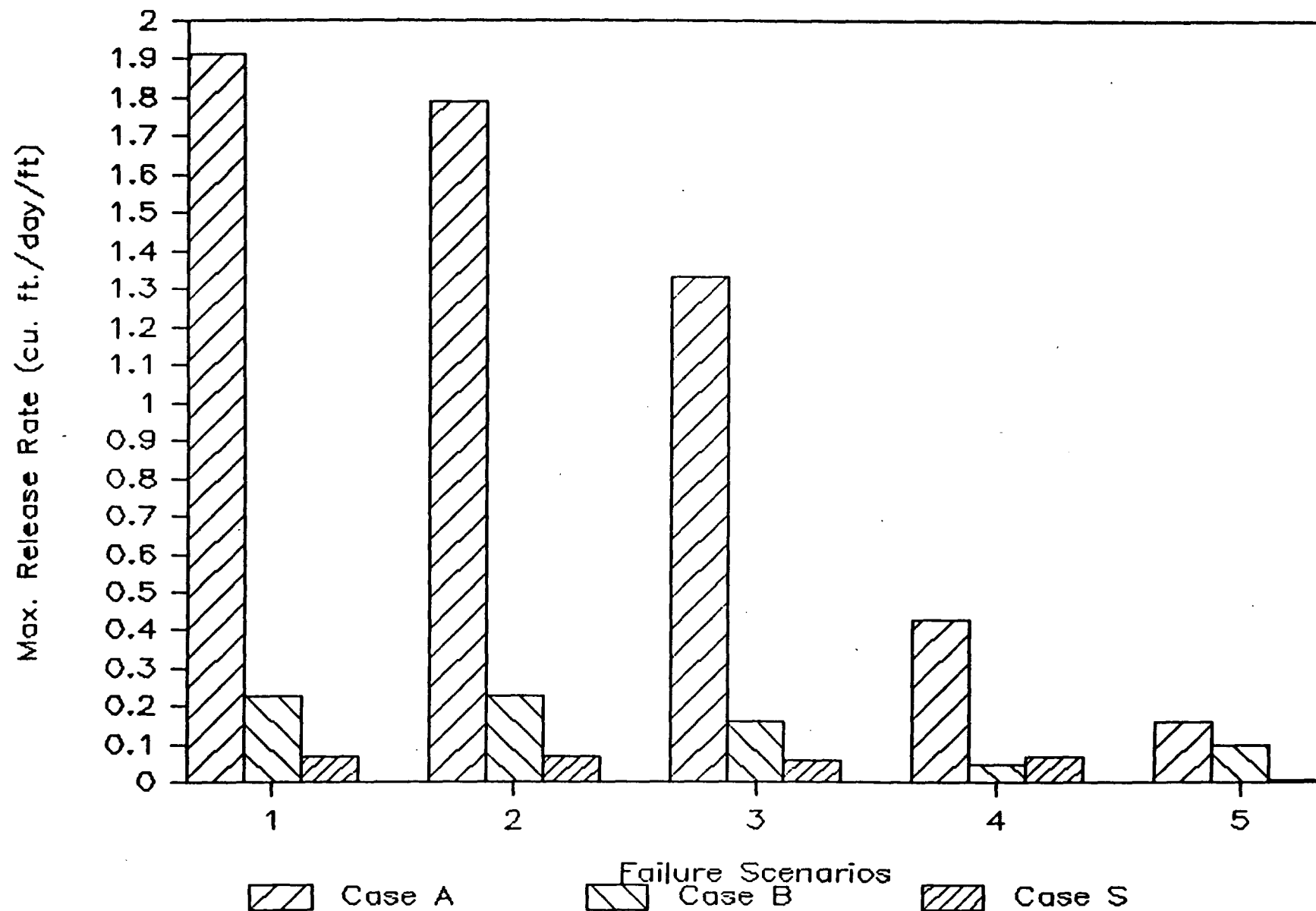


Figure 4. Drainage Time (days)

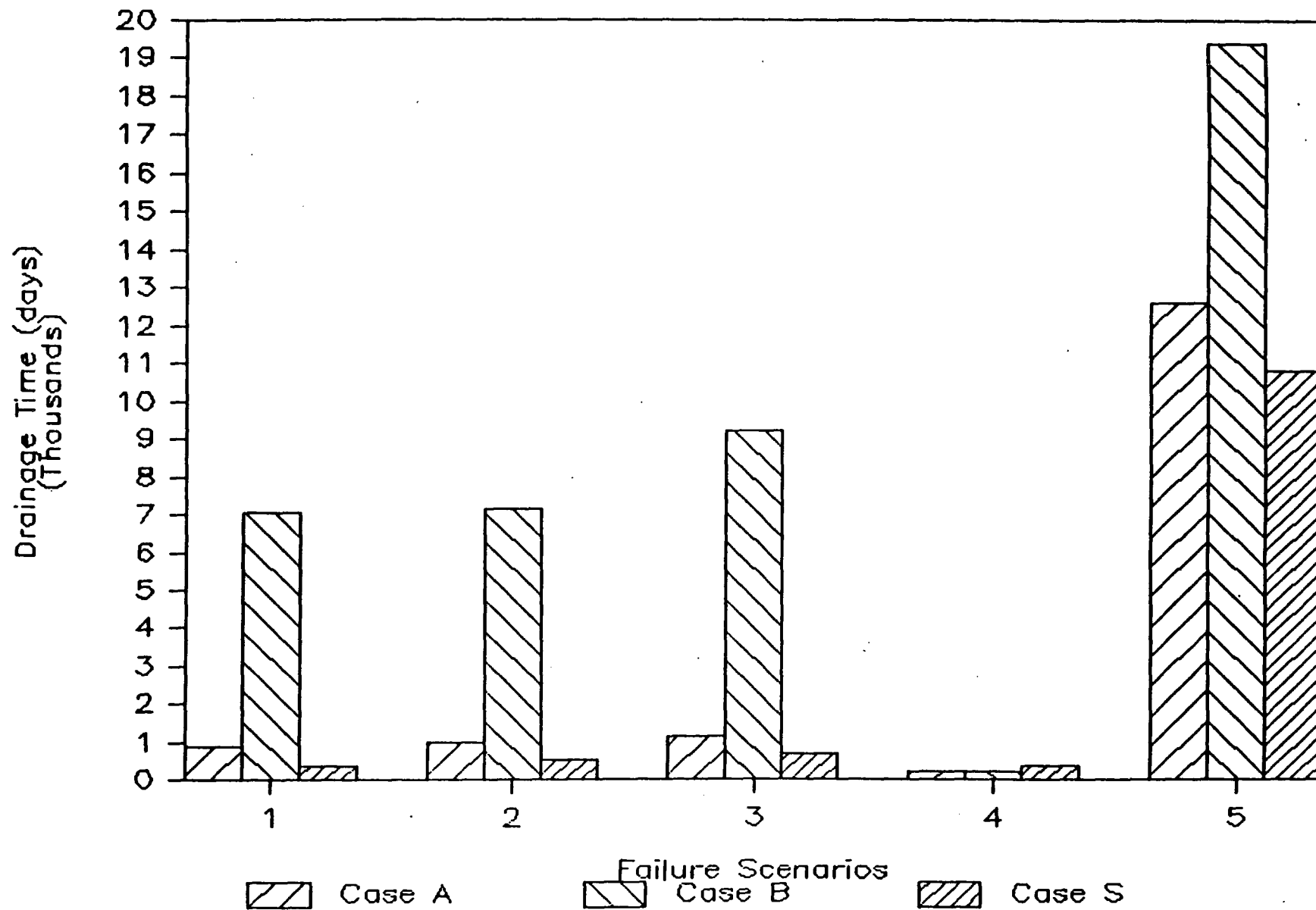
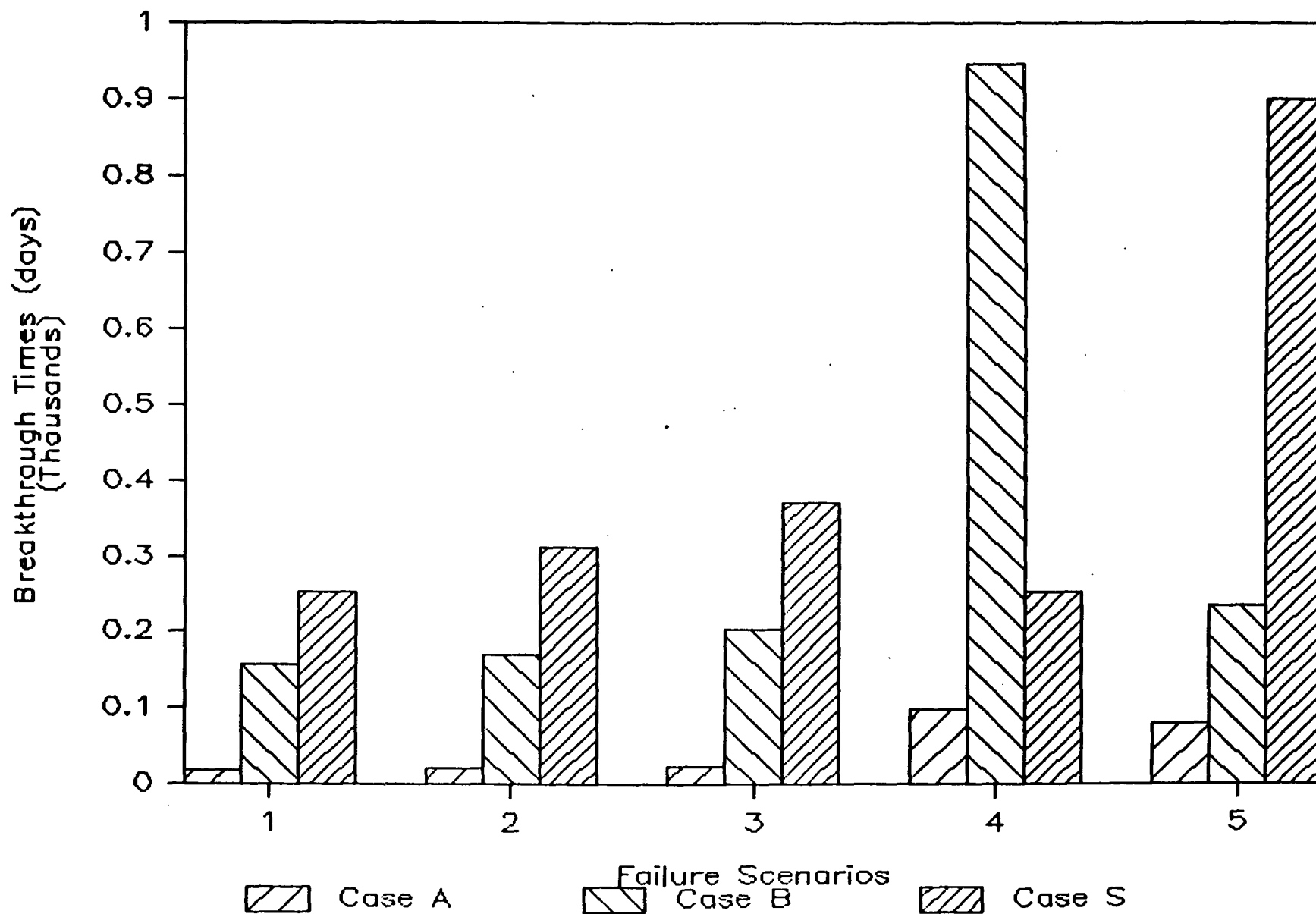


Figure 5. Breakthrough Times (days)



feet per day from a one-foot slice of the landfill sidewall from top to bottom) because the CFEST model analysis is based on a cross-section of each design. Flows at or near the sidewall are either released through the sidewall (i.e., maximum release rate through sidewall) or collected by the secondary or contingency leachate collection systems. These rates are maximum values because of the high constant head conditions assumed in this analysis. Because CECOS' Cell No. 9 only has a secondary leachate collection system on the bottom of the cell (i.e., no sidewall secondary leachate collection system), very little flow from the sidewall reaches the secondary leachate collection system.

The drainage times presented in Table 4 and Figure 4 are calculated by dividing the total amount of liquids within each design by the flow rate through the secondary and/or contingency leachate collection systems. The drainage time factor relates directly to the length of time a release could occur given that the secondary or contingency leachate collection systems were being operated to remove all liquids from the landfill. Remember, however, that this analysis has a constant head, while under normal field conditions, the head would be declining eventually to zero if all liquid input into the cell were eliminated. Table 4 also contains the volume exiting the sidewall during the drainage time. These values are determined by multiplying the maximum release rates by the drainage time. These volumes are another measure of the effectiveness of each design. The physical significance of these volumes is that while liquids are being removed by the secondary or contingency leachate collection systems, releases through the sidewall will occur; thus, more effective collection systems will reduce the volume of liquids released to the environment.

Breakthrough times are presented in Table 4 and Figure 5. Breakthrough times represent another measure of performance of each design but because of the drastic head conditions and conservative breakthrough equation, these values have little resemblance to breakthrough times that would occur under less severe conditions (i.e., normal field conditions). The relative relationship between breakthrough times for various designs and operating conditions should, however, be similar with the smaller heads that are more likely to occur in an actual landfill.

The results generally indicate that the interim statutory design is not significantly affected by various failure scenarios. Cases 1S-4S all have almost identical maximum release rates through the sidewall. This result is due to the secondary leachate collection system's ability to reduce the head on the sidewall soil liner to a very small value. Case 5S has a much smaller release rate because the moderate failure of the sidewall FML still significantly reduces the flow of liquids into the secondary collection system. The drainage time factor, and breakthrough times are also similar for each statutory case (except case 5S).

A comparison of A and B cases shows that different assumed hydraulic conductivity values for the sidewall in Cell No. 9 have a major effect on performance of this design. Maximum release rates are about a factor of 8 higher in Cases 1A-4A than Cases 1B-4B while drainage times and breakthrough times are about a factor of 8 lower for Cases 1A-4A than Cases 1B-4B. Cases 5A and 5B are not as different because flow rates are restricted by the top FML.

Cases 1A, 1B, and 1S versus 3A, 3B, and 3S indicate the effects of water table location. Because the location of the water table affects the net head gradient on the sidewall, a lower water table gives more conservative results (i.e., a worst case). CECOS Cell No. 9, after completion, will have a water table located above the cell bottom along the sidewall, so Cases 3A, 3B, and 3S are more representative of this situation. However, a lower water table assumption, such as during the construction of Cell No. 9, gives more conservative results. The lower water table assumption was preferred in the modeling analysis because a small amount of liquid could enter the secondary leachate collection system from outside of the cell (i.e., ground water) in several cases. This ground water could not be distinguished from liquids entering the collection system from within the cell (i.e., leachates) by this modeling analysis.

A comparison of Cases 1B-3B and 5B with Cases 1S-3S and 5S illustrate that CECOS Cell No. 9 is not equivalent to the interim statutory design when the contingency leachate collection system is not operated. Maximum release rates are about a factor of 3 higher in Cases 1B-3B as compared to 1S-3S and a factor of 25 higher in Cases 5B than interim statutory case 5S. Drainage times and volumes exiting the sidewall during drainage times are drastically higher in the CECOS Cases 1-3 and 5 versus the interim statutory design cases 1-3 and 5.

Cases 4A and 4B illustrate the effect of operating the contingency leachate collection system. Case 4B demonstrates that the CECOS Cell No. 9 is more effective, by all three criteria, than the interim statutory design when the contingency leachate collection system is operated and the sidewall soil liner hydraulic conductivity is at least 1×10^{-7} cm/sec. The maximum release rate through the sidewall is 0.05 ft³/day/ft for Case 4B versus 0.07 ft³/day/ft for Case 4S. The drainage time and volume exiting the sidewall during the drainage time are smaller for Case 4B than Case 4S. The breakthrough time is larger for Case 4B than Case 4S.

Since the CECOS Cell No. 9 design and operation (Case 4B) is better than the interim statutory design under catastrophic failure conditions for all three performance criteria (i.e., breakthrough time, maximum release rate through the sidewall, and drainage time), the CECOS Cell No. 9 design and operation will be more effective than the interim statutory design for the other failure conditions. For example, under a moderate failure mode of the FML, the CECOS design would exceed the performance of Case 5S if the contingency leachate collection system is operated.

5.0 CONCLUSION

The results of Section 4 demonstrate that the CECOS Cell No. 9 design and operation can be considered to be as effective as the interim statutory design ONLY WITH THE OPERATION OF THE CONTINGENCY LEACHATE COLLECTION SYSTEM.

6.0 FINDINGS AND RECOMMENDATIONS

The modeling evaluation was based on properties of various materials as reported by CECOS. CECOS implemented a construction quality assurance program to assure that the compacted soil liner was constructed as designed. EPA

used the 1×10^{-7} cm/sec hydraulic conductivity value for the sidewall comparison based on the demonstration by CECOS that they complied with regulations and guidance available at the time of construction.

If CECOS is granted a waiver for Cell No. 9, it is strongly recommended, based on this analysis, that leachate heads within the cell be kept to an absolute minimum at all times by operating the primary leachate collection system and the contingency leachate collection system to keep leachate away from the sidewalls. Future placement of the one-foot sand layer above the top liner on the sidewalls should be inspected during placement in accordance with current EPA guidance. During the post-closure care period the head levels should be monitored very frequently on the sidewalls. The permit should have provisions for immediate response to any head build-up in the cell.

REFERENCES

- Green, W.H. and G.A. Ampt. Studies in Soil Physics I: The Flow of Air and Water Through Soils, Journal of Agricultural Science 4, 1911.
- Gupta, S.K., C.T. Kincaid, P.R. Meyer, C.A. Newbill, and C.R. Cole. A Multi-Dimensional Finite-Element Code for the Analysis of Coupled Fluid Energy and Solute Transport (CFEST), PNL-426, Pacific Northwest Laboratories, Richland, WA, 1982.
- U.S.EPA, Procedures for Modeling Flow Through Clay Liners to Determine Required Liner Thickness, EPA/530-SW-84-002, OSW, Washington, D.C.

Appendix 1

DEFENDANT'S/RESPONDENT'S FACILITIES

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.

PENALTY SCHEDULE

<u>RCRA Violation</u>	<u>Penalty</u>
I. Groundwater Monitoring 40 C.F.R. §§ 264.91 and 265.91	\$22,500.00 per missed sampling event
II. Unsaturated Zone Monitoring 40 C.F.R. §§ 264.97 through 264.100 and 265.92 through 265.94	\$22,500.00 per missed sampling event
III. Waste Analysis Plans: Content and Implementation 40 C.F.R. §§ 264.13(a) and (b), and 265.13(a) and (b)	\$25,000.00
IV. Bulk Liquids in Landfill 40 C.F.R. §§ 264.314(a) and 265.314(a)	\$22,500 per day of occurrence
V. Containerized Liquids Disposal in Landfill 40 C.F.R. §§ 264.314(b) and 265.314(b)	\$22,500.00 per day of occurrence
VI. Waste Tracking within TSD facility 40 C.F.R. § 264.222	\$25,500.00
VII. Maintenance of Minimum Freeboard level for Surface Impoundment 40 C.F.R. § 264.226(c)	\$6,500.00 per freeboard violation
VIII. Ignitable/Reactive Disposal in Landfill 40 C.F.R. §§ 264.312 and 265.312	\$9,500.00 per cell, per day
IX. Land Disposal (direct application to unlined surface soils) of non- biodegradable wastes 40 C.F.R. §§ 264.272(a) and 265.272(a)	\$22,500.00 per day

	<u>RCRA Violation</u>	<u>Penalty</u>
X.	Trial test of waste compatibility prior to discharge into surface impoundment 40 C.F.R. § 265.225	\$22,500.00 per day of event
XI.	Trial test of waste solidification process prior to landfill 40 C.F.R. §265.402	\$22,500.00 per day
XII.	Failure to control wind dispersal of land treatment waste disposal zones 40 C.F.R. §§ 264.272(e) and 265.273(f)	\$22,500.00 per unit
XIII.	Incompatible wastes placed into surface impoundment 40 C.F.R. §§ 264.230 and 265.230	\$22,500.00 per day
XIV.	Unauthorized expansion of TSD facility during Interim status 40 C.F.R. §270.72	\$20,000.00 per day or as needed to recapture all profits gained
XV.	Closure of Units w/o demonstration of compliance with facility closure plan 40 C.F.R. §§ 264.113 and 265.113	\$25,000.00 per unit
XVI.	Inadequate closure/post-closure inspection/maintenance plans 40 C.F.R. §§ 264.112 and 265.112	\$15,000.00 per unit
XVII.	Absence of post-closure groundwater monitoring program 40 C.F.R. §§ 264.117(a)(1) and §265.117(a)(2)	\$22,500.00 per day

	<u>RCRA Violation</u>	<u>Penalty</u>
XVIII.	Failure to update closure/ post closure plan cost estimates 40 C.F.R. §§ 264.144(c) and 265.114(c)	\$3,000.00 per day
XIX.	No schedule included for closure activities 40 C.F.R. §§ 264.112(a) and 265.112(a)	\$6,500.00 per plan milestone omitted
XX.	Inadequate Part A Applications, absence of identified operating units 40 C.F.R. §270.13	\$9,500.00 per unit not properly identified
XXI.	Inadequate Part B Application 40 C.F.R. §270.14	\$9,500.00 per unit not properly identified
XXII.	Absence of complete facility Inspection Plan, units omitted 40 C.F.R. §§ 264.15(b) and 265.15(b)	\$2,250.00 per unit emitted, per day
XXIII.	Failure to record on facility inspections reports repairs or remedial measures taken 40 C.F.R. §§ 264.15(b) and 265.15(d)	\$2,250.00 per omission
XXIV.	Failure to inspect freeboard levels of surface impoundments 40 C.F.R. §§ 264.226(b), (c) and 265.226(a)	\$2,250.00 per occurrence
XXV.	Operating Record Omissions failure complete grid maps of landfilled lifts of waste 40 C.F.R. §§ 264.309 and 265.309	\$2,250.00 per omission

<u>RCRA Violation</u>		<u>Penalty</u>
XXVI.	Failure to record on-site generated hazardous wastes i.e. truck washing facility 40 C.F.R. § 262.41(b)	\$9,500.00 per unrecorded event
XXVII.	No training provided to employee assigned to do waste analyses 40 C.F.R. §§ 264.16 and 265.16	\$3,000.00 per untrained employee
XXVIII.	No analyses performed on materials added to on-site waste piles 40 C.F.R. § 265.252	\$22,500.00 per event
XXIX.	Records not provided to Agency within 48 hours of request. 40 C.F.R. §§ 264.74 and 265.74	\$6,500.00 per day of delay
XXX.	Fence not installed around all operating areas of TSD facility 40 C.F.R. §§ 264.14 and 265.14	\$1,000.00
XXXI.	Emergency Contingency Plan Inadequacies 40 C.F.R. §§ 264.52 and 265.52	\$2,225.00 per component deficiency
XXXII.	Failure to Meet Financial Responsibility Requirements 40 C.F.R. Part 264, Subpt. H and Part 265, Subpt. H	\$25,000.00 per day of delay
<u>TSCA Violation</u>		<u>Penalty</u>
XXXIII.	Improper Disposal of PCBs 40 C.F.R. §§ 761.60 (a)-(d).	
	--1,100 or more gallons or 750 or more cubic feet of PCB contaminated material.	\$25,000.00 per day, per violation

<u>TSCA Violation</u>	<u>Penalty</u>
--220-1,000 gallons or 150-750 cubic feet of PCB contaminated material	\$17,000.00 per day, per violation
--less than 220 gallons or 150 cubic feet of PCB contaminated material	\$5,000.00 per day, per violation
XXXIV. Failure to Dispose of PCBs by Jan. 1, 1984. 40 C.F.R. § 761.65(a)	
--1,100 or more gallons or 750 or more cubic feet of PCB contaminated material.	\$25,000.00 per day, per violation
--220-1,100 gallons or 150-750 cubic feet of PCB contaminated material.	\$17,000.00 per day, per violation
--less than 220 gallons or 150 cubic feet of PCB contaminated material.	\$5,000.00 per day, per violation
XXXV. Failure to Dispose of PCBs within one year of removal from service. 40 C.F.R. § 761.65(a)	
--1,100 or more gallons or 750 or more cubic feet of PCB contaminated material.	\$25,000.00 per day, per violation
--220-1,100 gallons or 150-750 cubic feet of PCB contaminated material.	\$17,000.00 per day, per violation
--less than 220 gallons or 150 cubic feet of PCB contaminated material.	\$5,000.00 per day, per violation
XXXVI. Improper Processing of PCBs 40 C.F.R. § 761.20(a)	\$20,000.00 per day, per violation

<u>TSCA Violation</u>	<u>Penalty</u>
XXXVII. Improper Distribution of PCBs (sale) in commerce. 40 C.F.R. § 761.20(a)	\$20,000.00 per day, per violation
XXXVIII. Improper treatment and testing of waste oils. 40 C.F.R. §§ 761.60(g)(2)(i) and (ii)	\$25,000.00 per day, per violation
XXXIX. Improper Use of PCBs 40 C.F.R. § 761.20(a)	\$25,000.00 per day, per violation
XXXX. Improper use of PCBs (road oiling; dust control; sealants) 40 C.F.R. § 761.20(d)	\$25,000.00 per day, per violation
XXXXI. Improper use of PCBs - Transformers 40 C.F.R. § 761.30(a) - Capacitors 40 C.F.R. § 761.30(1) - Heat transfer systems 40 C.F.R. § 761.30(d)	\$20,000.00 per day, per violation
XXXXII. PCB Storage Violations - 40 C.F.R. § 761.65(b) (facility criteria) - 40 C.F.R. § 761.65(c)(7)(ii) (spill plan development) - 40 C.F.R. § 761.65(c)(8) (management of liquids in storage)	\$15,000.00 per day, per violation
XXXXIII. Recordkeeping Violations (storage for disposal) 40 C.F.R. § 761.180(a)	\$10,000.00 per day, per violation
XXXIV. Recordkeeping violations (disposal facilities) Incinerators 40 C.F.R. § 761.180(c) Chemical waste landfills 40 C.F.R. § 761.180(d)	\$15,000.00 per day, per violation

	<u>TSCA Violation</u>	<u>Penalty</u>
XXXXV.	Marking Violations 40 C.F.R. § 761.40(a)	\$15,000.00 per day, per violation
XXXXVI.	Failure to Date PCB Items placed into storage 40 C.F.R. § 761.180(a)	\$5,000.00 per day, per violation
XXXXVII.	Violation of any condition of a PCB chemical waste landfill (40 C.F.R. § 761.75) or incinerator (40 C.F.R. § 761.70) application approval.	\$25,000.00 per day, per violation
XXXXVIII.	Failure to decontaminate PCB container, tanker trucks, etc. 40 C.F.R. § 761.79	\$25,000.00 per day, per violation

CORPORATE MANAGEMENT SYSTEMS REPORT PROTOCOL

The Corporate Management Systems Report shall:

(1) Identify and describe the existing facility waste management operations and the Environmental Management Department's systems, policies and prevailing practices as they affect Defendant's/Respondent's corporate compliance with RCRA and TSCA.

(2) Evaluate such operations, systems, practices, and policies and identify and describe fully the perceived weaknesses in such operations, systems, practices, and policies by comparing them, to the extent practicable, to the existing practices, programs and policies of other RCRA and TSCA waste management corporations operating within the continental United States and to generally accepted corporate management practices.

(3) Based on the evaluation required in paragraphs (1) and (2) above, the consultant shall identify and describe fully with supporting rationales the perceived areas, if any, where Defendant's/Respondent's inter- and intra-facility waste management operations and corporate to operating level environmental management systems, practices and policies may be improved. The Corporate Management Systems Report shall list specific options for improvements in the following areas:

(a) Corporate data management practices pertaining to the following items:

- i. compliance budgets;
- ii. staffing;
- iii. training;
- iv. auditing;
- v. incident reporting, including but not limited to manifest exception reports and any unpermitted disposal, release, or discharge;
- vi. quality assurance test reporting;
- vii. quality control reporting;
- viii. generator waste profile reports, facility pre-acceptance reports, and acceptance analysis as these items compare to each facility's stated basis for accepting or rejecting individual waste loads; and

- ix. facility mass balance records reflecting the internal disposition of all wastes received for final disposal.

(b) Corporate data evaluation practices, capabilities and policies pertaining to reports to and from compliance officers, internal and external environmental audits, regulatory agency notices of violation and all other compliance data documents which when evaluated may lead to changes in TSD operating procedures or directives by corporate management to modify any individual or multi-facility TSD facility operating procedures.

MODEL EMERGENCY ENVIRONMENTAL MANAGEMENT REORGANIZATION PROVISION
FOR CONSENT DECREES OR AGREEMENTS

E.1. The objective of this provision is to provide a management structure at the corporate headquarters level that will ensure that comprehensive environmental policies and procedures are developed by top management and fully implemented company-wide at all facilities.

2. Defendant/Respondent shall propose to EPA's [name of EPA office overseeing compliance with Decree/Agreement] by written submittal to [name of Agency contact] within thirty (30) days of the effective date of this Decree/Agreement, a plan for reorganization of the corporate management structure with respect to environmental affairs. This reorganization proposal shall be agreed upon by EPA and Defendant/Respondent in writing, prior to implementation of the reorganization.

a. The management plan shall provide for the creation of a new position of Director, Environmental Affairs [or other appropriate title] to exercise the responsibilities set forth herein. The Director, Environmental Affairs shall report directly to [a corporate Vice President or other appropriate top management official not directly responsible for manufacturing/production activities]. The position shall at all times be filled by an experienced executive with a background in [appropriate industrial field] and in environmental management and compliance.

b. It shall be the responsibility of the Director, Environmental Affairs to develop appropriate corporate environmental policies and procedures and to oversee their implementation at all company facilities to ensure compliance with applicable Federal, State and local environmental statutes and regulations. In the development of such policies and procedures, the recommendations of the environmental audit conducted at the [facility] by an outside consultant as described herein shall be given full consideration.

c. Defendant/Respondent shall also establish such additional technical and support positions reporting directly to the Director, Environmental Affairs as are necessary to meet the objective of this provision. Neither the Director nor staff shall be assigned additional responsibilities not related to environmental compliance. Defendant/Respondent shall provide adequate budgetary support to the environmental staff.

3. Within ninety (90) days of EPA's approval of the environmental management plan, the company shall appoint the Director, Environmental Affairs and appropriately qualified staff.

4. Within two hundred seventy (270) days of EPA's approval of the environmental management plan, the Director, Environmental

Affairs shall complete development and begin the implementation of appropriate corporate environmental policies and procedures to meet the objective of this provision.

5. Within eighteen (18) months of the effective date of this Decree/Agreement, Defendant/Respondent shall fully implement the corporate environmental policies and procedures at all company facilities. This shall include any necessary organizational or personnel changes at the individual facility level.

6. Recognizing the corporate responsibility to maintain compliance with all applicable environmental statutes and regulations, Defendant/Respondent agrees to maintain a permanent corporate environmental management staff. The organization, makeup and functions of this staff may be modified from time to time as dictated by changes in corporate facilities or operations or the requirements of environmental statutes and regulations.

MODEL ENVIRONMENTAL COMPLIANCE AUDIT PROVISION FOR CONSENT
DECREEES OR AGREEMENTS

A.1. Defendant/Respondent shall, within sixty days after the effective date of this Decree/Agreement [and where a continuing audit requirement is appropriate, add: and not less often than annually thereafter for a five-year period], audit the status of [applicable statutory] compliance at the [site of facility(ies)] and take prompt remedial action against all violations found.

A.2. Defendant/Respondent shall, within sixty days after completion of the compliance audit required by paragraph 1, submit to EPA's [name of EPA office overseeing compliance with Decree/Agreement] a certification that, to the best of its knowledge, Defendant/Respondent is in compliance with all [applicable statutory and regulatory] requirements or has developed a schedule for achieving compliance subject to EPA approval.

A.3. Nothing in this Decree/Agreement shall preclude EPA from instituting enforcement actions against Defendant/Respondent for any violations of [applicable statutory and regulatory] requirements which are not cited within the Complaint giving rise to this Decree/Agreement.

MODEL ENVIRONMENTAL MANAGEMENT AUDIT PROVISION FOR CONSENT
DECREEES OR AGREEMENTS

B.1. Defendant/Respondent shall propose to EPA's [name of EPA office overseeing compliance with Decree/Agreement] by written submittal to [name of Agency contact] within thirty (30) days of the effective date of this Decree/Agreement, the scope of work for the services of a [third party or internal] auditor who shall be expert in environmental auditing, environmental management systems and [applicable statutory program(s)] management operations. Such auditor shall be independent of and in no way responsible to production management. This scope of work and auditor shall be agreed upon by EPA and Defendant/Respondent in writing, prior to the auditor's commencing the performance of the professional services more fully set forth below. The auditor will be retained and the scope of work will be designed to review and make recommendations regarding the improvement of Defendant's/Respondent's environmental compliance and management policies, practices, and systems at the [site of facility(ies)] and in the Defendant's/Respondent's corporate offices having responsibility for supervision of compliance activities at such facility(ies).

2. Within one hundred twenty (120) days after agreement upon the scope of work and the auditor, the auditor shall submit a written Environmental Audit Report to the Defendant/Respondent. This Report shall:

a. Identify and describe the existing facility environmental management operations and the corporate offices responsible for overall company-wide environmental compliance and management systems, policies and prevailing practices as they affect [applicable statutory and regulatory] compliance at the [site of facility(ies)].

b. Evaluate such operations and systems, practices and policies and identify and describe fully the perceived weaknesses in such operations and systems, practices and policies by comparing them, to the extent practicable, to:

i. their ability to promote compliance with [applicable statutory and regulatory] requirements;

ii. the existing practices, programs and policies of other [applicable industry] corporations operating within the continental United States, including consideration of the available literature and consultant's experience pertinent to regulatory compliance programs, practices and policies currently operative in the [applicable industry] in the continental United States;

iii. the history of [facility] operations in terms of the facility's(ies') compliance programs, compliance record

and environmental management practices over the previous five years [or longer if necessary or relevant].

The auditor shall apply its expertise and judgment to the foregoing information, using such factors as the auditor believes to be relevant and appropriate, which factors shall be stated in the report.

c. Based on the evaluation required in paragraphs 2.a. and b. above, the auditor shall identify and describe fully with supporting rationales the perceived areas, if any, where Defendant's/Respondent's environmental management systems, practices and policies may be improved as they affect the [facility(ies)] regarding [applicable statutory] compliance obligations, listing specific options for any improvements at the [facility(ies)] in the following areas:

i. environmental compliance program management operation, staffing, education and experience requirements.

ii. compliance management budget, lines of authority to Defendant's/Respondent's corporate offices responsible for overall company-wide environmental compliance and management systems, policies, and practices, and relationship to the operating facility(ies) manager.

iii. personnel training for individual employee compliance obligations and [applicable medium-specific activities].

iv. Operations and Maintenance (O&M) procedures for [applicable medium-specific pollution control] equipment.

v. evaluation of [applicable industry] operations and pollution control equipment in terms of adequacy of design and compatibility with [applicable medium-specific substances] being passed through such equipment.

vi. quality and thoroughness of implementation of all waste and wastewater [or other pollutant source] analysis plans for both incoming and outgoing waste [or other pollutant] streams, whether directly discharged, emitted, released to the ambient environment, or conveyed off-site in bulk shipments.

vii. preparation of Quality Assurance and Quality Control programs for sampling and analysis and for environmental testing procedures, including [facility(ies)] laboratories and contract laboratories for [facility(ies)].

viii. preparation of records needed to provide the [facility(ies)] management with an adequate data base to accurately determine compliance with all applicable statutory and regulatory requirements, with particular attention to waste [or other

pollutant] generation (including quantity and chemical composition), movements, treatment, and ultimate disposition by location of waste [or other pollutant] source, handling points and final disposition. This evaluation shall encompass proposals for state-of-the-art data management systems providing timely access to all of the above records to be maintained by an onsite computer.

ix. preparation of self-monitoring reports required to be filed with the State and EPA.

x. preparation and review of Incident Reports evaluating causes of [applicable medium-specific pollution control] equipment malfunctions, improper [applicable medium-specific substances] handling, or breakdowns, with specific recommendations for corrective steps and preventive O&M, along with procedures for reporting these recommendations to corporate headquarters.

3. Within 30 days after Defendant's/Respondent's receipt of the Audit Report, Defendant/Respondent shall submit to EPA that portion of the Audit Report which contains the recommendations of the auditor, together with a report of Defendant's/Respondent's good faith evaluation of each option it has selected for adoption and the reasons for rejecting other options. The report by Defendant/Respondent shall set forth the specific actions the company shall take and a schedule, not to exceed sixty (60) days [or longer if necessary] from the date that EPA receives and evaluates the schedule, for implementation of the recommendations adopted by Defendant/Respondent.

4. Any failure by Defendant/Respondent to meet the schedule for implementing the audit program set forth in this Decree/Agreement shall result in stipulated penalties of [\$_____] (in addition to whatever sanctions the court/ALJ may impose for contempt), payable by Defendant/Respondent to the U.S. Treasury, for each day such schedule is not met.

B. Nothing in this Decree/Agreement shall preclude EPA from instituting enforcement actions against Defendant/Respondent for any violations of [applicable statutory and regulatory] requirements which are not cited within the Complaint giving rise to this Decree/Agreement.

MODEL ENVIRONMENTAL COMPLIANCE AND MANAGEMENT AUDIT PROVISION
FOR CONSENT DECREES AND AGREEMENTS

C.1. Defendant/Respondent shall conduct environmental audits of its facility(ies) [of appropriate frequency and duration] in accordance with the Audit Workplan attached hereto as Exhibit B [company specific; not included]. The first such audit shall commence on or about three months from the effective date of this Decree/Agreement. Each of the audits shall be completed in accordance with the schedule set forth in the Audit Workplan.

2. The performance standard of each such audit is to complete a detailed and professional investigation as set forth in the Audit Workplan of the facility's recordkeeping practices and environmental management operations during the [applicable period]. In accordance with the Audit Workplan, the following audit reports shall be prepared and submitted, with copies of supporting documentation, to EPA within thirty days following the initiation of each such audit:

a. A report on all [pollutants] whose locations (as reported in the facility records) differ from their observed physical location or whose physical locations cannot be corroborated by existing records kept at the facility.

b. A report of all quantity variations (of 10% or more by volume or weight, or any variation in piece count) between [pollutants] received and [pollutants] disposed of at the facility.

c. A report on Defendant's/Respondent's activities at the facility in terms of whether or not they comply with the procedures required under the [Pollutant] Analysis Plan for [pollutant] acceptance. Defendant/Respondent shall include with this report the results of a minimum of three laboratory (including Defendant's/Respondent's laboratory) analyses of blind standards (i.e., pre-analyzed samples whose concentrations are unknown to the laboratories participating in the audit) to be provided by the audit team to evaluate Defendant's/Respondent's ability to quantify representative hazardous constituents in various media.

d. A report of any observed deviations from Defendant's/Respondent's written operating procedures, including documentation on any untimely response to the repair and/or replacement of deteriorating or malfunctioning [pollutant] containers, structures, or equipment.

e. Recommendations as to potential significant improvements and/or modifications which should be made to Defendant's/Respondent's operating procedures to achieve compliance with [applicable statutory and regulatory] requirements.

3. Nothing in this Decree/Agreement shall preclude EPA from instituting enforcement actions against Defendant/Respondent for any violations of [applicable statutory and regulatory] requirements which are not cited within the Complaint giving rise to this Decree/Agreement.

MODEL ENVIRONMENTAL COMPLIANCE AND MANAGEMENT AUDIT PROVISION
FOR CONSENT DECREES AND AGREEMENTS*

TABLE OF CONTENTS

	<u>Page</u>
I. PRELIMINARY STATEMENT	
Purposes of Consent Decree/Agreement.....	1
II. DEFINITIONS.....	1
III. GENERAL AUDIT PROCEDURES	
Preliminary Matters	
Scope of Work.....	6
Establishment of Trust.....	6
Selection of Audit Firm.....	7
Audit Seminar.....	7
Observation of EPA Protocols.....	7
Review of Work Plan.....	7
Facilities to be Audited.....	8
IV. FACILITY COMPLIANCE AUDITS	
Records to be Examined.....	9
Records Relevant to Compliance with RCRA.....	9
Records Relevant to Compliance with TSCA.....	9
Records to be Examined by the Audit Firm.....	9
Access to Documents.....	10

* This provision is only appropriate for a party with an extensive history of noncompliance. It requires a high level of Agency oversight. As an internally developed document that has not been subjected to the negotiation process, the provision is more susceptible than other model provisions to the give and take of negotiation. While the provision only addresses requirements under RCRA and TSCA, audit provisions under other statutes may be crafted by using as a framework the headings contained in this provision.

TABLE OF CONTENTS (Continued)

	<u>Page</u>
Tentative Observance of CBI Claims.....	11
Preservation of Records.....	11
Examination of Groundwater Monitoring Information.....	11
Audit Schedule/Agency Access to Defendant's Facilities.....	11
Facility Audit Reports.....	11
Correction of Violations/Submission of Compliance Plans.....	12
V. PENALTIES AND CORRECTIVE ACTION	
For Missed Audit Deadlines.....	12
For Violations of RCRA/TSCA	
Payment of Penalties.....	12
Unlisted Violations.....	13
Uncorrected or New Violations.....	13
VI. RESERVATION OF RIGHTS	
Reservation of States' and Local Govern- ments' Right to Inspect.....	13
Reservation of Agency's Right to Relief.....	14
VII. MANAGEMENT SYSTEMS AUDIT	
Corporate Management Systems Report.....	14
Corporate Management Report and Plan.....	14
VIII. MISCELLANEOUS TERMS	
Submission of Reports.....	14
Effective Date of Decree/Agreement.....	15

TABLE OF CONTENTS (Continued)

	<u>Page</u>
Notice.....	15
Modification.....	15
Dispute Resolution.....	15
Continuing Jurisdiction of the District Court/Administrative Law Judge.....	15
Relation to RCRA Permitting Process.....	15
Violations Not Covered by RCRA or TSCA....	16
Continuing Audit Requirement.....	16
 DEFENDANT'S/RESPONDENT'S FACILITIES.....	 Appendix 1
PENALTY SCHEDULE.....	Appendix 2
CORPORATE MANAGEMENT SYSTEMS REPORT PROTOCOL.....	Appendix 3

MODEL ENVIRONMENTAL COMPLIANCE AND MANAGEMENT AUDIT PROVISION
FOR CONSENT DECREES AND AGREEMENTS*

TABLE OF CONTENTS

	<u>Page</u>
I. PRELIMINARY STATEMENT	
Purposes of Consent Decree/Agreement.....	1
II. DEFINITIONS.....	1
III. GENERAL AUDIT PROCEDURES	
Preliminary Matters	
Scope of Work.....	6
Establishment of Trust.....	6
Selection of Audit Firm.....	7
Audit Seminar.....	7
Observation of EPA Protocols.....	7
Review of Work Plan.....	7
Facilities to be Audited.....	8
IV. FACILITY COMPLIANCE AUDITS	
Records to be Examined.....	9
Records Relevant to Compliance with RCRA.....	9
Records Relevant to Compliance with TSCA.....	9
Records to be Examined by the Audit Firm.....	9
Access to Documents.....	10

* This provision is only appropriate for a party with an extensive history of noncompliance. It requires a high level of Agency oversight. Based on a draft settlement document, the provision reflects a pro-Agency bias and thus is more susceptible than other model provisions to the give and take of the negotiation process. While the provision only addresses requirements under RCRA and TSCA, audit provisions under other statutes may be crafted by using as a framework the headings contained in this provision.

TABLE OF CONTENTS (Continued)

	<u>Page</u>
Public Access to Records.....	10
Assertion of Confidential Business Information Claims.....	10
Tentative Observance of CBI Claims.....	11
Preservation of Records.....	11
Examination of Groundwater Monitoring Information.....	11
Audit Schedule/Agency Access to Defendant's Facilities.....	11
Facility Audit Reports.....	11
Correction of Violations/Submission of Compliance Plans.....	12
V. PENALTIES AND CORRECTIVE ACTION	
For Missed Audit Deadlines.....	12
For Violations of RCRA/TSCA	
Payment of Penalties.....	12
Unlisted Violations.....	13
Uncorrected or New Violations.....	13
VI. RESERVATION OF RIGHTS	
Reservation of States' and Local Govern- ments' Right to Inspect.....	13
Reservation of Agency's Right to Relief.....	14
VII. MANAGEMENT SYSTEMS AUDIT	
Corporate Management Systems Report.....	14
Corporate Management Report and Plan.....	14

TABLE OF CONTENTS (Continued)

	<u>Page</u>
VIII. MISCELLANEOUS TERMS	
Submission of Reports.....	14
Effective Date of Decree/Agreement.....	15
Notice.....	15
Modification.....	15
Dispute Resolution.....	15
Continuing Jurisdiction of the District Court/Administrative Law Judge.....	15
Relation to RCRA Permitting Process.....	15
Violations Not Covered by RCRA or TSCA....	16
Continuing Audit Requirement.....	16
 DEFENDANT'S/RESPONDENT'S FACILITIES.....	 Appendix 1
PENALTY SCHEDULE.....	Appendix 2
CORPORATE MANAGEMENT SYSTEMS REPORT PROTOCOL.....	Appendix 3

1. Purposes of Consent Decree/Agreement. In order to achieve the mutual goal of ensuring full compliance with applicable environmental laws, regulations, and permits by Defendant's/Respondent's active facilities in an efficient and coordinated manner, Defendant/Respondent and EPA hereby enter into a Consent Decree/Agreement under which:

- (1) independent auditors to be retained by EPA and paid for by Defendant/Respondent shall, subject to EPA oversight, audit each facility and report to both parties on their assessment of Defendant's/Respondent's compliance with RCRA and TSCA and their implementing permits, rules and regulations;
- (2) the independent auditors shall perform an analysis of Defendant's/Respondent's environmental management systems, practices and policies, as they affect inter-facility and intra-facility transactions (as defined in Paragraphs 5(11) and 5(12) of this Decree/Agreement);
- (3) Defendant/Respondent shall pay penalties for violations of the aforementioned statutes, permits, rules and regulations according to the Penalty Schedule set forth as Appendix 2 to this Decree/Agreement; and
- (4) EPA shall accept the penalties provided in Appendix 2 as full and complete settlement and satisfaction of any of its civil claims for violations detected by the audit firm (with certain exceptions as set forth in Paragraphs 23, 24, and 25 of this Decree/Agreement).

TERMS OF SETTLEMENT

DEFINITIONS

5. Whenever the following terms are used in this Decree/Agreement, the definitions specified herein shall apply:

- (1) Compliance Report and Plan: A document to be submitted by Defendant/Respondent to EPA, pursuant to Paragraph 19 of this Decree/Agreement, which:
 - (a) describes in full detail every corrective action taken in response to a Facility Audit Report;
 - (b) in the case of violations which are not corrected within 60 days of submittal of the Facility Audit Report, describes every action to be taken in response to any

violations or findings in the Facility Audit Report; and

- (c) certifies under oath the accuracy of information contained in the Compliance Report and Plan.

(2) Confidential Business Information (CBI)

- (a) Information/Documents Determined Not to Be Entitled to CBI Protection. It is agreed between the parties that portions of documents containing the following information shall not be eligible for CBI treatment:
 - (i) The fact that any chemical waste was disposed of at any Defendant/Respondent facility.
 - (ii) The location of disposal of any chemical waste at any Defendant/Respondent facility.
 - (iii) Any information contained or referred to in any manifest for any chemical waste disposed of at any Defendant/Respondent facility.
 - (iv) The identity and quantity of any chemical waste disposed of at any Defendant/Respondent facility.
 - (v) Any monitoring data or analysis of monitoring data pertaining to disposal activities at any Defendant/Respondent facility, including monitoring data from any well, whether or not installed pursuant to 40 C.F.R. Part 265, Subpart F, or 40 C.F.R. Part 254, Subpart F (RCRA Groundwater Monitoring Requirements).
 - (iv) Any permit applications submitted to EPA or to any state pursuant to federal or state statute or regulation.
 - (vii) Any information regarding planned improvements in the treatment, storage or disposal of chemical wastes at any Defendant/Respondent facility.
 - (viii) Any hydrogeologic or geologic data.
 - (ix) Any groundwater monitoring data.

- (x) Any contingency plans, closure plans, or post-closure plans.
 - (xi) Any waste analysis plans.
 - (xii) Any training and/or inspection manuals and schedules.
 - (xiii) Any point source discharge or receiving water monitoring data.
- (b) The status of information not listed in Section (a) above shall be determined in accordance with 40 CFR Part 2, which provides for CBI treatment of information where:
- (i) Defendant/Respondent has taken reasonable measures through the issuance and observance of companywide policies and procedures to protect the confidentiality of the information, and that it intends to continue to take such measures;
 - (ii) The information is not, and has not been, reasonably obtainable without Defendant's/ Respondent's consent by other persons (other than governmental bodies which are bound by and observing Defendant's/ Respondent's claims of CBI as to that information) by use of legitimate means (other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding);
 - (iii) Disclosure of the information is likely to cause substantial harm to Defendant's/ Respondent's competitive position.
- (3) Corporate Management Report and Plan: A document submitted by Defendant/Respondent to EPA, pursuant to Paragraph 27 of this Decree/Agreement, describing in full detail what actions Defendant/Respondent has taken or will take to implement the findings of the Corporate Management Systems Report.
- (4) Corporate Management Systems Report: A fully integrated separate report prepared pursuant to the Corporate Management Systems Report Protocol set forth in Appendix 3 of this Decree/Agreement and submitted by Defendant/Respondent to EPA pursuant to Paragraph 26 of this Decree/Agreement.

(5) Corrective Action: Any action taken by Defendant/Respondent in order to come into compliance with any federal, state or local statutory or regulatory requirement for the treatment, storage, or disposal of any Hazardous Substance.

(6) Facility Audit Reports: Reports to be submitted by the Audit Firm to EPA, pursuant to Paragraph 19 of this Decree/Agreement, which:

- (a) describe in detail the procedures followed in the facility audit, the facility itself, the regulatory history of the facility, and the facility's current compliance status;
- (b) describe in detail each violation detected during the audit;
- (c) provide any other information which, in the judgment of the Audit Firm, merits Agency review;
- (d) for each violation reported, provide the relevant statutory or regulatory section; the particular area of the facility where the violation was found (if appropriate); the dates during which the violation occurred or existed (if it can reasonably be determined); and any other relevant or appropriate information.

(7) Hazardous Substances: Those materials meeting the definition contained in the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§9601 et seq., §9601(14).

(8) Hazardous Wastes: Those materials meeting the definition contained in 42 U.S.C. §6903(5) and the regulations promulgated at 40 C.F.R. Part 261.

(9) Independent Audit Firm ("Audit Firm"): A firm selected by EPA, pursuant to Paragraph 6 of this Decree/Agreement, for the purpose of performing the Facility Compliance and Management Systems Audits described herein. For the purpose of this Decree/Agreement, the Independent Audit Firm must exercise the same independent judgment that a Certified Public Accounting firm would be expected to exercise in auditing a publicly held corporation. In addition, the Independent Audit Firm must:

- (a) not own stock in Defendant/Respondent or any parent, subsidiary, or affiliated corporation;
 - (b) have no history of participation in any previous contractual agreement with Defendant/Respondent or any parent, subsidiary, or affiliated corporation; and
 - (c) have no other direct financial stake in the outcome of the Facility Compliance or Management Systems Audits outlined in this Decree/Agreement.
- (10) Inter-facility Transactions: Any letters, contracts, memoranda, or other communications between two or more offices or facilities owned or operated by Defendant/Respondent.
- (11) Intra-facility Transactions: Any letters, contracts, memoranda, or other communications between two or more locations or offices at a single Defendant/Respondent Facility.
- (12) Manifest: The shipping document EPA form 8700-22 and, if necessary, EPA form 8700-22A (as required by 40 C.F.R. Part 262) or equivalent.
- (13) New Violation: Any statutory or regulatory violation not reported in the Facility Inspection Report.
- (14) Plaintiff: The United States of America, for the Administrator of the United States Environmental Protection Agency (collectively, "the Agency" or "EPA").
- (15) Records: Any Defendant/Respondent or consultant report, document, writing, photograph, tape recording or other electronic means of data collection and retention which bears upon Defendant's/Respondent's compliance with EPA, state and local rules and regulations.
- (16) Facility: Any facility which treats, stores, or disposes of hazardous waste as those terms are defined at 42 U.S.C. §§6903(3), 6903(33), and 6903(34).
- (17) Uncorrected Violation: Any violation reported in a Facility Inspection Report which remains uncorrected for 60 days or more after the completion and submission of the Facility Inspection Report pursuant to Paragraph 19 of this Decree/Agreement.

GENERAL AUDIT PROCEDURES

6. Preliminary Matters

(1) Scope of Work

(a) Defendant/Respondent shall submit to the Agency within thirty (30) days of the effective date of this Decree/Agreement the Scope of Work for audits of the Defendant/Respondent facilities listed in Appendix 1 for RCRA and TSCA violations. EPA shall have thirty (30) days from the date of receipt of this Scope of Work and proposed Audit Firm to submit to Defendant/Respondent in writing any proposed modifications in the scope of work.

(b) Defendant/Respondent shall have fifteen (15) days from the date of receipt of EPA's proposed modifications within which to submit in writing its comments upon those proposed modifications.

(b) Within ten (10) days of receipt of Defendant's/Respondent's comments, the Agency shall issue its final decision as to the Scope of Work, which shall be binding upon Defendant/Respondent.

(2) Establishment of Trust

(a) Within thirty (30) days of the date of this Decree/Agreement, Defendant/Respondent shall establish an irrevocable trust fund ("Trust"), the form and text of which shall be approved by EPA. If no fund is approved by EPA within thirty (30) days of the date of this Decree/Agreement, a form supplied by EPA shall be used. The Trustee shall be a bank selected by Defendant/Respondent, which must be approved by EPA.

(b) The Administrator of EPA shall have special power of appointment (and the only power of appointment) over all income and all assets of the Trust. That power may be exercised only to make appointments of funds in accordance with this Decree/Agreement. If, at the conclusion of all tasks set forth in this Decree/Agreement, there remains trust income or assets which have not been appointed by exercise of such special power, then all such remaining unappointed assets shall be delivered forthwith to Defendant/Respondent. Defendant/Respondent shall fund the Trust by placing \$ _____ in the hands of the Trustee within forty-five (45) days after the date of this Decree/Agreement.

(3) Selection of Audit Firm

(a) Within forty-five (45) days after the date of this Decree/Agreement, EPA shall notify Defendant/Respondent of its selection of a proposed Audit Firm. Defendant/Respondent shall have fifteen (15) days from the date of receipt of EPA's proposed Audit Firm to accept, reject, or comment upon this selection. Reasons for which Defendant/Respondent may reject the proposed Audit Firm are limited to lack of sufficient national reputation; inexperience in performing environmental compliance and management audits; inadequate staffing levels; and failure to qualify as an Independent Audit Firm as defined in Paragraph 5(10) of this Decree/Agreement.

(b) In the event EPA and Defendant/Respondent are unable to agree on selection of an Audit Firm, the parties shall submit to Dispute Resolution as set forth in Paragraph 32 of this Decree/Agreement.

7. Audit Seminar. Before the Audit Firm begins the audits, and within 60 days of the date EPA and Defendant/Respondent agree upon the Scope of Work and Audit Firm as described above, the Agency shall conduct a seminar for employees of the Audit Firm who are to conduct the audits. This seminar shall serve the purpose of assuring that the Audit Firm employees who will be conducting the audits are familiar with all protocols required by Agency policies and procedures to be utilized in conducting compliance audits. The Agency may conduct the audit seminar at the National Enforcement Investigations Center (NEIC) near Denver, Colorado or at the Audit Firm's office. The Agency shall not be responsible for transportation, lodging or other costs associated with attendance by the audit firm employees at the seminar.

8. Observation of EPA Protocols. The Audit Firm shall be required by contract with Defendant/Respondent to observe the protocols presented at the audit seminar. Such protocols include but are not limited to: (1) NEIC's Multi-Media Compliance Audit Procedures; (2) the EPA Office of Administration's Environmental Auditing Protocol; (3) the NEIC Policy and Procedure Manual; and (4) the Corporate Management Systems Report Protocol provided in Appendix 3 of this Decree/Agreement (See Paragraph 26 below).

9. Review of Work Plan.

(1) Within 30 days of the Audit Seminar, the Audit Firm shall submit to Defendant/Respondent and EPA a proposed Work Plan which shall specify the Audit Firm's plan for implementing the Scope of Work. Said

Work Plan shall include the auditing protocols to be used by the Audit Firm; a schedule for conducting facility audits and completion of all other tasks set forth in the Scope of Work; and the names and resumes of those Audit Firm employees who will be primarily responsible for performance of the tasks set forth in the Scope of Work. The proposed Work Plan shall not specify the order of audits or otherwise provide Defendant/Respondent with advance notice of specific audits.

(2) EPA and Defendant/Respondent shall have 30 days from the date of receipt of the proposed Work Plan to submit in writing any proposed revisions to the proposed Work Plan.

(3) The Audit Firm shall have fifteen (15) days from the date of receipt of these revisions within which to submit in writing its comments on these proposed revisions.

(4) Within ten (10) days of receipt of the Audit Firm's comments, EPA shall issue its final decision as to the work plan, which shall be binding on both Defendant/Respondent and the Audit Firm.

(5) The provisions of this Paragraph shall also be set forth as provisions of the contract between Defendant/Respondent and the Audit Firm for the performance of the subject audits.

10. Facilities to be Audited. The Audit Firm shall, subject to the provisions set forth herein, conduct comprehensive RCRA/TSCA Compliance Audits (see Paragraphs 11 through 25) and a Management Systems Audit (see Paragraphs 26 and 27) of the facilities listed in Appendix 1 of this Decree/Agreement. The designation of RCRA/TSCA as the primary areas of audits shall not prohibit the Audit Firm from auditing and reporting violations of any other environmental statutes or regulations should those violations come to the attention of the Audit Firm audit team during the inspections. Notice of individual facility audits shall be provided to NEIC at least thirty (30) days prior to scheduled visits. Advance notice of individual facility inspections shall not be provided to Defendant/Respondent.

FACILITY COMPLIANCE AUDITS

Review of Records

11. Records to be Examined.

a. Records Relevant to Compliance with RCRA.

Facility audits may include a review of any facility record of Defendant/Respondent or its predecessors from November 1980. Other records pre-dating November 1980 which bear on the facility's compliance after November 1980 may also be examined, but only to the extent that they are necessary to render judgment regarding any event occurring after November 1980.

b. Records Relevant to Compliance with TSCA.

Facility audits may include a review of any facility record of Defendant/Respondent or its predecessors from April 1978 which is relevant to compliance with TSCA and its implementing regulations. Other records pre-dating April 1978 which bear on the facility's compliance after April 1978 may also be examined, but only to the extent that they are necessary to render judgment regarding any event occurring after April 1978.

c. Records to be Examined by the Audit Firm. Records to be examined include but are not limited to:

(1) all records required by federal, state or local law to be maintained by Defendant/Respondent.

(2) facility operating records, including but not limited to waste profile sheets, containing waste pre-acceptance data, receiving logs, analytical verification data, waste tracking data for intra-facility movement of received wastes or wastes generated on-site, waste storage data, waste treatment data, and data reflecting the disposition of received wastes.

(3) corporate and facility guidelines, policies and internal operating rules pertaining to facility operations, inspections, personnel training, and recordkeeping procedures.

(4) corporate guidelines, policies and internal operating rules pertaining to emergency response, site closure, and postclosure activities.

- (5) applications, licenses, permits and approvals (including state permits and approvals), RCRA operation plans, or other regulatory documents pertaining to on-site activities at the facility.
- (6) environmental monitoring plans for the facility.
- (7) waste treatability studies.
- (8) PCB operations plans, letters of approval, pumping logs, and records pertaining to the processing or handling of transformers, capacitors, and/or any other PCB articles, items and containers.
- (9) manifests for wastes entering or leaving any Defendant/Respondent facility.
- (10) records of use, maintenance and decommissioning of vehicles used on-site and/or off-site for the transportation of RCRA/TSCA wastes to, from, and within any Defendant/Respondent facility.
- (11) vehicle washing records.
- (12) any effluent data, including data on any direct discharge to surface water or any discharge to a publicly owned treatment facility, which Defendant/Respondent is required to keep pursuant to any federal, state, or local permit or regulation.

12. Access to Documents. The Audit Firm and representatives of the Agency, including contractors, shall have full, unfettered access to all documents bearing upon compliance with RCRA or TSCA kept at each facility or at Defendant's/Respondent's corporate headquarters, regardless of whether these records are deemed by Defendant/Respondent to constitute CBI or deemed by the Audit Firm to indicate or support a violation. The Defendant/Respondent shall retain and make available to EPA copies of any Defendant/Respondent document(s) examined by the Audit Firm which indicate or support any violation detected during the audit program. The Audit Firm shall prepare and provide to EPA a full and complete index of all documents that it examines to ensure that the Defendant/Respondent retains these records for subsequent EPA inspection.

13. Public Access to Records. Each document submitted by Defendant/Respondent to the Audit Firm or EPA pursuant to this Decree/Agreement shall be subject to public inspection unless it is determined by EPA (following a claim made by Defendant/Respondent) to be CBI in accordance with Paragraphs 5(2) and 14 of this Decree/Agreement.

14. Assertion of Confidential Business Information Claims.

a. Defendant/Respondent recognizes that EPA will treat as TSCA CBI only that information claimed confidential which EPA uses for purposes related to TSCA.

b. Claims that information is CBI shall be made on or before the date on which such information is provided to the Audit Firm or EPA.

15. Tentative Observance of CBI Claims. Any information claimed by Defendant/Respondent and asserted to meet the criteria set forth in Paragraph 5(2) will be treated by EPA as confidential in accordance with 40 C.F.R. §§2.201 through 2.215 and any relevant special confidentiality regulations at 40 C.F.R. §§2.301 et seq. pending any final determination that the information is not CBI.

16. Preservation of Records. Defendant/Respondent shall preserve all Records examined by the Audit Firm for three years after submission of its Corporate Management Report and Plan to EPA (See Paragraph 27 below). Nothing in this provision shall authorize destruction of any document required by law or regulation to be preserved for any period of time in excess of three years.

17. Examination of Groundwater Monitoring Information. The Audit Firm shall be required to examine and submit to EPA groundwater monitoring plans and data for each Defendant/Respondent facility listed in Appendix 1 of this Decree/Agreement.

18. Audit Schedule/Agency Access to Defendant's/Respondent's Facilities. All audits by the Audit Firm of the sites listed in Appendix 1 of this Decree/Agreement shall be completed within 180 days of EPA approval of the Work Plan as described in Paragraph 9 above. Representatives of the Agency, including contractors, may accompany audit teams from the Audit Firm on site audits performed by the Audit Firm and oversee the performance of the audits by the audit teams for the purpose of ensuring that the audit procedures and protocols required by the contract are followed.

19. Facility Audit Reports. As each separate facility audit is completed, the Audit Firm shall, no later than 30 days thereafter, simultaneously submit to Defendant/Respondent and the Agency a copy of a Facility Audit Report as defined in Paragraph 5(7). The failure of the Facility Audit Report to include all of the required information for any violation specified in the report shall not be grounds for avoidance of any penalty which is payable under the Penalty Schedule set forth in Appendix 2. The Agency shall not be bound by any

determination of the Audit Firm indicating that Defendant/Respondent is in compliance with any applicable statutory or regulatory requirement.

20. Correction of Violations/Submission of Compliance Plans. In addition to paying the penalties set forth in the Penalty Schedule below, Defendant/Respondent shall:

- (1) correct any violation indicated within a Facility Audit Report as soon as is physically possible.
- (2) No later than 60 days after it has received an individual Facility Audit Report, submit to the Agency a Compliance Report and Plan.

The Agency shall not be bound by any Defendant/Respondent determination that it has achieved compliance, that the compliance was physically impossible to achieve, or that the times for corrective actions proposed by Defendant/Respondent to achieve compliance are reasonable. All corrective actions mandated by this Decree/Agreement shall be undertaken in accordance with applicable federal, state and local law.

PENALTIES AND CORRECTIVE ACTION

21. For Missed Audit Deadlines. Defendant/Respondent shall pay the following stipulated penalties for any failure by Defendant/Respondent to comply with any time requirement set forth in this Decree/Agreement:

<u>Period of Failure to Comply</u>	<u>Penalty per Day of Delay</u>
1st day through 14th day	\$ 5,000.00
15th day through 44th day	\$10,000.00
45th day and beyond	\$15,000.00

For Violations of RCRA/TSCA

22. Payment of Penalties. For every violation of RCRA or TSCA reported in each Facility Audit Report, Defendant/Respondent shall pay a penalty based on the Penalty Schedule provided as Appendix 2 of this Decree/Agreement. The listing of the violation in a Facility Audit Report shall be conclusive and binding on Defendant/Respondent, and the amount set forth in the Penalty Schedule shall be due and payable by certified check to the "Treasurer of the United States." The check shall be remitted to:

[appropriate EPA lockbox address]

within 30 days of receipt of the applicable Facility Inspection Report. Penalties shall accrue from the date the violation is determined to have begun to the date such violation is corrected

or abated. Subject to the rights reserved in Paragraph 25 below, EPA will not take further enforcement action on those violations for which penalties are paid and corrective action taken in compliance with this Decree/Agreement.

23. Unlisted Violations. In the event that the audit firm reports statutory or regulatory violations other than those listed in Appendix 2, Defendant/Respondent shall correct such violations as soon as is physically possible. In addition, the parties will, for a period of 60 days following receipt of the Facility Audit Report in which such unlisted violations are contained, attempt to settle by negotiation the appropriate remedy and penalties Defendant/Respondent shall pay for such unlisted violations. In such negotiations, the parties will compare each unlisted violation to the most similar listed violation, if possible. In the event of failure of the parties to achieve settlement of unlisted violations within 60 days, EPA shall be free to take any enforcement measure authorized by law.

24. Uncorrected or New Violations. Beginning on the date EPA receives a Facility Audit Report, Defendant/Respondent shall have sixty (60) days to correct violations cited therein. For any previously reported violation discovered to be uncorrected at the end of such sixty (60)-day-period, Defendant/Respondent shall pay a civil penalty of \$25,000 per day for each day of continued noncompliance unless, within sixty (60) days, Defendant/Respondent has notified the Agency in accordance with Paragraph 20 that compliance is physically impossible and has obtained a final decision from the Agency verifying such physical impossibility. If, during the audit period or during the first post-audit inspection, the Agency discovers violations which were not reported to the Agency by the Audit Firm, for such violations Defendant/Respondent shall pay a civil penalty as set forth in the Penalty Schedule (Appendix 2). In addition, the Agency reserves the right to initiate civil or criminal action (or both) with regard to any previously reported and uncorrected violation and any violation not previously reported.

25. Reservation of Rights.

a. Reservation of States' and Local Governments' Right to Inspect Defendant's/Respondent's Facilities.

Nothing in this Decree/Agreement shall limit the authority of EPA or any state or local government to enter and inspect any Defendant/Respondent facility.

b. Reservation of Agency's Right to Seek Relief.

Except as provided in Sections 21 through 24 above, nothing in this Decree/Agreement shall be construed to limit the ability of the United States to take any enforcement action authorized by law.

MANAGEMENT SYSTEMS AUDIT

26. Corporate Management Systems Report. No later than 60 days after the last Facility Audit Report is submitted to Defendant/Respondent and EPA, the Audit Firm shall submit to Defendant/Respondent and EPA a Corporate Management Systems Report as defined in Paragraph 5(4) of this Decree/Agreement.

27. Corporate Management Report and Plan. No later than 90 days after it has received the Corporate Management Systems Report, Defendant/Respondent shall submit to the Agency its own Corporate Management Report and Plan describing in full detail what actions it has taken or will take to implement the findings of the Corporate Management Systems Report.

MISCELLANEOUS TERMS

28. Submission of Reports. Any reports produced by the Audit Firm, including Facility Audit Reports and the Corporate Management Systems Report, shall be submitted simultaneously to EPA and Defendant/Respondent. The Audit Firm shall not share draft copies of such reports with Defendant/Respondent unless such drafts are simultaneously submitted to EPA. The requirements of this Paragraph shall be set forth as a requirement in the contract between Defendant/Respondent and the Audit Firm for the performance of the audits described herein.

29. Effective Date of Decree/Agreement. This Decree/Agreement shall be considered binding and in full effect upon approval by the Federal district court judge/administrative law judge to whom this matter has been assigned.

30. Notice. All submissions and notices required by this Order shall be sent to the following address(es):

[insert address(es) of EPA office(s) overseeing Decree/Agreement]

31. Modification. This Decree/Agreement may be modified upon written approval of all parties hereto, and concurrence of the Federal District Court Judge/administrative law judge assigned to this matter.

32. Dispute Resolution.

(1) The parties recognize that a dispute may arise between Defendant/Respondent and EPA regarding plans, proposals or implementation schedules required to be submitted, regarding tasks required to be performed by Defendant/Respondent pursuant to the terms and provisions of this Decree/Agreement, or regarding whether Defendant/Respondent has incurred liability to pay stipulated penalties under Paragraphs 19 through 24. If such a dispute arises, the parties will endeavor to settle it by good faith negotiations among themselves. If the parties cannot resolve the issue within a reasonable time, not to exceed thirty (30) calendar days, the position of EPA shall prevail unless Defendant/Respondent files a petition with the court/administrative law judge setting forth the matter in dispute. The filing of a petition asking the court/administrative law judge to resolve a dispute shall not extend or postpone Defendant's/Respondent's obligations under this Decree/Agreement with respect to the disputed issue.

(2) In presenting any matter in dispute to the court/administrative law judge, Defendant/Respondent shall have the burden of proving that EPA's interpretation of the requirements of this Decree/Agreement are arbitrary, capricious, or otherwise not in accordance with the law.

33. Continuing Jurisdiction of the District Court/Administrative Law Judge. The district court/administrative forum in which this Decree/Agreement is entered shall retain jurisdiction until all obligations set forth herein are satisfied.

34. Relation to RCRA Permitting Process. Notwithstanding any other provision of this Decree/Agreement, EPA hereby reserves all of its rights, powers and authorities pursuant to the provisions of 42 U.S.C. §§6901 et seq. (RCRA) governing permits for facilities, and the regulations promulgated thereunder.

35. Violations Not Covered by RCRA or TSCA. No stipulated penalty or other remedy agreed to shall cover or apply to non-RCRA, non-TSCA violations. The parties shall be left to their respective rights, liabilities and defenses with regard to these matters.

36. Continuing Audit Requirement. For the five-year-period beginning on the date that Defendant/Respondent submits to the Agency the Corporate Management Report and Plan required by Paragraph VII. 27. of this Decree/Agreement, Defendant/Respondent shall conduct comprehensive audits not less often than annually of the compliance of its facilities with [applicable statutory and regulatory requirements]. After the initial audit by a third party consultant (as required by this Decree/Agreement), such audits may be conducted by such a consultant or by an independent audit staff of the company not responsible to production management. Reports of the results of such audits shall be furnished to the [appropriate corporate environmental official and plant manager]. Within thirty (30) days after completion of each final annual audit report, Defendant/Respondent shall submit to EPA a report of incidents of noncompliance identified by the audit and steps that will be taken to correct any continuing noncompliance and prevent future incidents of noncompliance.