Y/TS--390/2

DE92 002024

OCT 30 1989

CHESTNUT RIDGE SEDIMENT
DISPOSAL BASIN (D-025):
SUMMARY OF CLOSURE UNDER
RULES GOVERNING HAZARDOUS WASTE MANAGEMENT
IN TENNESSEE

Completion Date: July 1989

J. E. Stone

Environmental Management Department
Health, Safety, Environment, and
Accountability Division

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

Y/TS-390/2

CHESTNUT RIDGE SEDIMENT
DISPOSAL BASIN (D-025):
SUMMARY OF CLOSURE UNDER
RULES GOVERNING HAZARDOUS WASTE MANAGEMENT
IN TENNESSEE

Completion Date: July 1989

J. E. Stone
Project Manager

Environmental Management Department
Health, Safety, Environment
and Accountability Division

Prepared by the
Oak Ridge Y-12 Plant
P. O. Box Y, Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

TABLE OF CONTENTS

Introduction	1
Facility Description	1
Closure Plan Approval	1
Closure Performance Standard	4
Decontamination Procedures	4
Design Elements of Closure and Installation Procedures For Engineered Multilayer Cap	4
Runon- and Runoff- Control Structures	7
Construction Drawings	8
Construction Quality Assurance	8
Closure Schedule	8
Maintenance of Survey Benchmarks	8
Notice to Local Land Authority	8
Record of Wastes	8
Notice in Deed	9
Certification of Notice	9
References	11
Distribution	13

LIST OF TABLES

Table 1 Chestnut Ridge Sediment Disposal Basin Closure Schedule	10
---	----

LIST OF FIGURES

Figure 1 Location of Chestnut Ridge Sediment Disposal Basin	2
Figure 2 Chestnut Ridge Sediment Disposal Basin Topography	3
Figure 3 Components of Engineered Cap	5

CHESTNUT RIDGE SEDIMENT DISPOSAL BASIN (D-025):
SUMMARY OF CLOSURE UNDER RULES GOVERNING HAZARDOUS
WASTE MANAGEMENT IN TENNESSEE

INTRODUCTION

On February 29, 1988, the "Revised Closure Plan for Chestnut Ridge Sediment Disposal Basin," Y/TS-390 (Reference 1) was submitted to the United States Department of Energy (DOE) for review and transmittal to the Tennessee Department of Health and Environment (TDHE). The closure activities described in the closure plan have been performed. The purpose of this document is to summarize the closure activities for the Chestnut Ridge Sediment Disposal (CRSDB). The closure of CRSDB is a final closure.

TDHE correspondence identifies the facility as "Chestnut Ridge Sediment Disposal Basin, Y-12 Plant, TN 389 009 0001."

FACILITY DESCRIPTION

The Chestnut Ridge Sediment Disposal Basin (CRSDB), Unit D-025, was an unlined, man-made sediment disposal facility on Chestnut Ridge, south of New Hope Pond (NHP), as shown in Figure 1. The configuration of the CRSDB and site topography are shown on Figure 2. The CRSDB was constructed during 1972-73 for the disposal of sediments hydraulically dredged from NHP. It was designed to hold approximately 30,000 cubic yards of sediments. Since 1973, the basin had been used for the periodic disposal of sediments excavated from NHP and its appurtenant structures. NHP has previously received discharges from RCRA-related waste streams.

The CRSDB has received 7,000 cubic yards of sediment, of which 2,000 cubic yards were dredged from NHP. The other 5,000 cubic yards were relatively clean soil approved for disposal in November, 1987 by TDHE. This soil was excavated from the south side of the Plant in the vicinity of West Third Street and G Road. In 1975, the basin received approximately 100,000 gallons of liquid waste resulting from a leak in the Y-12 Plant Methanol-Brine System. This material consisted primarily of water, although some alcohol and toluene may have been included.

CLOSURE PLAN APPROVAL

The previously referenced closure plan was approved by TDHE on July 22, 1988. (Reference 2)

On June 17, 1988, a letter (Reference 3) was submitted to DOE to request from TDHE an extension of 55 days for the closure schedule for CRSDB. On August 3, 1988, TDHE granted approval of this extension by letter. (Reference 4)

On September 12, 1988, and October 21, 1988 letters (Reference 5 and 6), were submitted to DOE concerning the seeding, mulching, and fertilization specifications to be utilized for the CRSDB engineered cap. This information was forwarded to TDHE by DOE.

FIGURE 1. LOCATION OF CHESTNUT RIDGE SEDIMENT DISPOSAL BASIN

0 100
feet
SCALE 1:1000

FIGURE 2. CHESAPEAKE RIDGE SEDIMENT DISPOSAL BASIN BATHYMOGRAPHY

On October 21, 1988 and February 16, 1989, letters (Reference 7 and 8) were submitted to DOE for transmittal to TDHE requesting that the width of the seam for the PVC flexible membrane liner be modified to have a 6" seam instead of a 14" seam as indicated in the approved closure plan. This information was submitted to TDHE by DOE and was approved by TDHE by letter on March 15, 1989. (Reference 9)

On December 7, 1988 and December 30, 1988, letters (Reference 10 and 11) were submitted to DOE for transmittal to TDHE concerning the closure schedule for CRSDB. Due to the uncertainty of the permeability of the clay soil utilized for construction of the engineered cap, the closure activities for CRSDB would not be completed by the approved closure schedule.

On March 30, 1989, a letter (Reference 12) was submitted to DOE for transmittal to TDHE requesting a modification to the approved closure plan schedule. This schedule is presented in Table 1. of this report. TDHE approved the schedule modification by letter (reference 13).

On June 16, 1989, a letter (Reference 14) was submitted to DOE for transmittal to TDHE indicating the method to be utilized for the destructive testing of the flexibility membrane liner (FML) seams. The approved closure plan described a destructive testing procedure could adversely affect the integrity of the FML.

CLOSURE PERFORMANCE STANDARD

The CRSDB was closed in place. The CRSDB was backfilled with clean native soil up to the crest of the dikes. An engineered cap was placed above the backfilled material so as to minimize the infiltration through the contaminated sediments in the CRSDB. The cap consisted of the following components (Figure 3): a minimum of 2-ft. compacted clay layer, a flexible synthetic membrane liner, a geosynthetic drainage net, a geotextile filter fabric layer, and a 1.5-ft topsoil layer.

DECONTAMINATION PROCEDURES

Waste was not removed from the site during closure activities

DESIGN ELEMENTS OF CLOSURE AND INSTALLATION PROCEDURES FOR ENGINEERED MULTI-LAYERED CAP

The engineered multi-layered cap included (from bottom to top): a minimum of 24 inches of compacted clay over laying compacted native soil, a 30-mil flexible membrane liner, a geosynthetic drainage net overlain by a geotextile filter fabric, and 18 inches of topsoil with a vegetative cover. Design details and installation procedures of each layer are given below, starting with the clay layer at the bottom of the cap:

a. Clay Barrier and Fill

The clay barrier consisted of a minimum of 24 inches of clay compacted to a moisture content/dry density which correlates to a permeability of 1×10^{-7} cm/sec or less.

TYPICAL CROSS-SECTION OF CAP

GEOTEXTILE FABRIC: MIRAFI 140N OR EQUAL

DRAINAGE NET: NATIONAL SEAL PN 3000 OR EQUAL

MEMBRANE LINER: 30 MIL PVC LINER

COMPONENTS OF ENGINEERED CAP
FIGURE 3.

The Department of Energy demonstrated, with laboratory data, that the clay to be utilized for the bottom layer of the cover could be recompacted to achieve a permeability of 1×10^{-7} cm/sec or less. Additional laboratory data was developed which established a correlation between the density and moisture content of the clay cover material when a permeability of 1×10^{-7} cm/sec or less is achieved. The Department of Energy submitted these data to the TDHE prior to the construction of the cover. The laboratory testing was conducted by Dr. D. E. Daniel of the University of Texas and documented in report Y/SUB/89-TN526V "Permeability of Compacted Soil from the East and West Borrow Area." (Reference 15)

Field tests to determine the density and moisture content of the in-place clay cover material was conducted at a rate of at least one test per each 5,000 ft² of surface area after each 6-inch lift had been placed. The density and moisture content were within the range of values which were established in the laboratory testing to ensure that a permeability of 1×10^{-7} cm/sec or less is achieved. The test results are documented in reference 16.

b) Flexible Membrane Liner

The installation of the flexible membrane liner (FML) was critical to the integrity of the cover system. As part of the installation of the FML, the installer did:

- Provide a diagram indicating the intended alignment of the membrane panels. The design minimized seams and locate them at least 5 feet from toes of embankment slopes.
- Illustrate on a diagram locations of penetrations, and embankment abutments, etc. A methodology was employed to minimize water ponding on the liner surface during placement. Additionally, a 6-inch wide minimum seam was used.
- Determine the direction of installation, taking into account slope subgrade and prevailing winds. Specific techniques to protect against uplift (sand bags, tires) and rainwater intrusion (dikes) between the FML and subgrade were provided.
- Identify the seaming technique, nondestructive and destructive testing methods, and patching techniques.

In order to ensure consistent quality, the FML seams were inspected using nondestructive and destructive techniques. Nondestructive testing was performed on all seamed edges of the liner utilizing an air lance test.

Destructive testing was accomplished by preparing "representative or companion" samples of the FML seams for laboratory testing. A representative or companion sample was accomplished either by extending the seam beyond the perimeter of the cap area or by preparing a duplicate seam under the identical conditions as the seam to be represented (including, but not limited to, such conditions as time, personnel, weather, topography, material and technique).

The installation procedures and test results for the FML are documented in reference 17.

c) Drainage Layer

Drainage Net: The installation of the geosynthetic drainage net was installed so as to facilitate the flow of infiltrated water to the perimeter of the cap and to prevent any fine particles settling into the net.

Filter Fabric: It is permeable enough to convey the water draining from the soil; it will retain the overlying soil; it is be nonclogging over the lifetime of the system; it has sufficient tensile strength so as not to deform or creep into the net; and is resistant to rot, freeze/thaw and chemicals.

d) Vegetative Layer

Topsoil was carefully placed onto the drainage layer to minimize disturbance. Once a 6-inch continuous layer of topsoil was applied, the entire area was lightly compacted. Upon completion of the base layer, the remainder of the topsoil was applied. The cap was seeded, fertilized, and mulched to the following specifications:

<u>Material</u>	<u>Rate of Application</u>
Lime Disced Into the Soil	1.5 to 2.0 Tons/Acre (dependent of soil analysis)
Fertilization with 20-20-20 (19-19-19 was utilized)	600 Pounds/Acre (dependent on soil analysis)

Seeding Before April 15

Spring Oats	4 Bushels/Acre
Kobe or Korean Lespedeza	20 Pounds/Acre
kentucky 31 fescue	35 Pounds/Acre
Red Clover	10 Pounds/Acre
Ladino Clover	10 Pounds/Acre
Permanent Rye Grass	35 Pounds/Acre

Seeding after April 15 substitute the following for the Spring Oats:

Buckwheat	75 Pounds/Acre
Foxtail Millet	75 Pounds/Acre
Mulching	80 to 100 Bales

RUNON- AND RUNOFF-CONTROL STRUCTURES

The final grade of the capped basin is at a higher elevation than the surrounding area. Therefore, runon control is not necessary. Runoff is controlled by riprapped ditches tied into the existing area storm-drainage system.

CONSTRUCTION DRAWINGS

Construction drawings were prepared and submitted to the TDHE Commissioner on July 15, 1988. These drawings depicted the proposed final contours after cap placement; cross sections showing each layer of the cap, including slopes; and runoff-control structures. As built drawings and a summary report are documented in reference 18.

CONSTRUCTION QUALITY ASSURANCE

The closure of the basin was designed and constructed to protect human health and the environment. To assure that the closed basin meets or exceeds all projected design criteria, plans, and specifications, a construction quality assurance (CQA) program was prepared. The construction quality control procedures are documented in reference 19.

CLOSURE SCHEDULE

A closure schedule is presented in Table 1.

MAINTENANCE OF SURVEY BENCHMARKS

The survey benchmarks installed at CRSDB will be protected and maintained.

NOTICE TO LOCAL LAND AUTHORITY

Within 90 days after final closure is completed, a survey plat indicating the location and dimensions of the capped basin with respect to permanent survey benchmarks will be submitted to the local land authority and to the TDHE Commissioner. The plat will be prepared and certified by a professional land surveyor. The survey plat will contain the following prominently-displayed note, or a similarly worded note:

"The owner or operator of the property containing the Chestnut Ridge Sediment Disposal Basin, as shown on this plan, is obligated to restrict disturbance of the site in accordance with Rules Governing Hazardous Waste Management in Tennessee. Post closure use of the property on or in which hazardous wastes remain must never be allowed to disturb the integrity of the final cover, liner(s), or any other components of any containment system unless the owner or operator receives approval from the Commissioner of the Tennessee Department of Health and Environment under the previously referenced rules."

RECORD OF WASTES

A record showing the identification of the type, quantity and location of wastes disposed of within the closed areas of the facility will be submitted to the Commissioner and local land authority. The record showing the identification of the type, quantity, and location of wastes will be based upon best available knowledge and records.

NOTICE IN DEED

The note presented in the section entitled, "Notice to Local Land Authority", or a similarly worded note will be recorded on the facility property deed or on some instrument normally examined during a title search.

CERTIFICATION OF NOTICE

A certification by the Department of Energy will be submitted to the Commissioner stating that the required notices have been filled. A copy of the document in which the notation has been placed will be attached.

TABLE 1.

CHESTNUT RIDGE SEDIMENT DISPOSAL BASIN
Closure Schedule

<u>ACTIVITY</u>	<u>APPROVED SCHEDULEa</u> <u>DAYSb</u>	<u>DATES</u>	<u>ACTUAL</u> <u>DAYSb</u>	<u>DATES</u>
Closure Plan Approval	0	July 22 88A	0	May 15 88
Begin Backfill of Basin	37	June 21 88A	37	June 21 88
Submit Detailed Engineering Drawings	64	July 18 88A	64	July 18 88
Backfill Basin With Clean Native Soil to Crest of Dike	137	Sept. 29 88A	137	Sept 29 88
Install Compacted Clay Layer of Cap	372	May 22 89P	373	May 23 89
Install Synthetic Membrane Layer of Cap	375	May 25 89P	376	May 26 89
Install Drainage Layer of Cap	376	May 26 89P	380	May 30 89
Install Vegetative Layer of Cap	388	June 7 89P	406	June 26 88
Complete Closure Certification	416	July 5 89P	436	July 26 89 Proposed

Note a) Approved schedule per TDHE letter dated August 3, 1988

b) Calendar days from May 15, 1988

REFERENCES

1. Letter, Gordon G. Fee to R. J. Spence, dated February 29, 1988, "Revised RCRA Closure Plans for Sewer Sites at the Y-12 Plant".
2. Letter, Tom Tiesler to Robert J. Spence, dated July 22, 1988. "Closure of Chestnut Ridge Sediment Disposal Basin, Y-12 Plant, EPA Identification Number: TN 389 0090001".
3. Letter, Gordon G. Fee to R. J. Spence, dated June 17, 1988, "Revised Closure Plan for Chestnut Ridge Sediment Disposal Basin".
4. Letter, Tom Tiesler to Robert J. Spence, dated August 3, 1988, "Closure Plan, Chestnut Ridge Sediment Disposal Basin, Y-12 Plant, EPA Identification Number: TN3890090001.
5. Letter, Gordon G. Fee to R. J. Spence, dated September 12, 1988, "Revised Closure Plans for New Hope Pond (Y/TS-389) and Chestnut Ridge Sediment Disposal Basin (Y/TS-390)-Y-12 Plant".
6. Letter, Gordon G. Fee to R. J. Spence, dated October 21, 1988. "Closure Plans for the Closure and Post Closure Project - Y-12 Plant".
7. Letter, Gordon G. Fee to R. J. Spence, dated October 21, 1988, "Closure Plans for the Closure and Post Closure Project - Y-12 Plant".
8. Letter, Gordon G. Fee to R. J. Spence, dated February 16, 1989, "Closure Plan for the Closure and Post Closure Project - Y-12 Plant".
9. Letter, Jacqueline Ohoreeh - Back to Robert Spence, dated March 15, 1989, "Closure Plans for the Closure and Post Closure Project (Seam Width of Flexible Membrane Lenor) Y-12 Plant, EPA Identification Number: TN3890090001".
10. Letter, Gordon G. Fee to R. J. Spence, dated December 7, 1988, "Closure of Chestnut Ridge Sediment Disposal Basin - Y-12 Plant".
11. Letter, Gordon G. Fee to R. J. Spence, dated December 30, 1988, "Closed and Post Closure Activities (CAPCA) Project Y-12 Plant".
12. Letter, Gordon F. Fee to R. J. Spence, dated March 30, 1989, "Closure of Chestnut Ridge Sediment Disposal Basin and Chestnut Ridge Security Pits - Y-12 Plant".
13. Letter Tom Tiesler to Robert J. Spence, "Closure Plan, Chestnut Ridge Sediment Disposal Basin, Y-12 Plant, EPA Identification Number TN3890090001."
14. Letter, Gordon G. Fee to R. J. Spence, dated June 16, 1989, "Change Notices to Approved Resource Conservation and Recovery Act (RCRA) Closure Plans : Y-12 Plant".

15. Daniel, D. E., "Permeability of compacted soil from the East and West Borrow Areas," Prepared for Martin Marietta Energy Systems, Inc., Y-12 Plant, Y/SUB/89-TN526V (March 1989)
16. "Summary of Test Results Below Cap Fill/Low Permeability Fill Chestnut Ridge Sediment Disposal Basin, Oak Ridge, Tennessee Project No. 1401-88-013-C", prepared by Soil & Material Engineers (July 7, 1989)
17. "Summary Report Geomembrane Installation Chestnut Ridge Sediment Disposal Basin, Oak Ridge, Tennessee, S&ME Job No. 1401-88-013-C," prepared by Soil & Materials Engineers (July 7, 1989)
18. "CAPCA Chestnut Sediment Disposal Basin, Y-12 Plant, Oak Ridge Tennessee," Record Drawings Summary Report, prepared by Lockwood Greene Engineers, Inc., P.N. 87761.14, (July 17, 1989)
19. "Cap Construction Quality Control Procedures, RCRA Site Closure, Y-12 Plant, Oak Ridge, Tennessee," prepared by Soils & Materials Engineers for Martin Marietta Energy Systems, Inc., Y-12 Plant.

DISTRIBUTION

U.S. DOE-ORO

C. S. Gist
H. W. Hibbitts
R. A. Jump
R. C. Sleeman
R. J. Spence
T. S. Tison
M. A. Travaglini
J. S. Van Fossen
M. Wilson

HEALTH, SAFETY, ENVIRONMENT, AND ACCOUNTABILITY DIVISION

D. E. Bohrman
K. L. Brady
E. T. Collins
H. L. Fellers, Jr.
J. K. Greer
H. E. Harper
C. C. Hill
C. W. Kimbrough
D. E. Lind
L. L. McCauley
L. W. McMahon
J. L. Murphy
C. W. Snodgrass
J. E. Stone
L. O. Vaughan
S. H. Welch

ENVIRONMENTAL AND SAFETY ACTIVITIES

L. W. Long
T. P. A. Perry
C. L. Stair

ENVIRONMENTAL SCIENCES DIVISION

T. O. Early
R. R. Turner

HEALTH AND SAFETY DIVISION

R. K. White

PRODUCTION SUPPORT MAINTENANCE DIVISION

J. K. Bailey
I. W. Jeter
L. S. Jones

J. E. Keyes
Y-12 Central Files - RC

ENGINEERING DIVISION

R. O. Barnett
W. D. Barton, III
W. E. Manrod
J. K. Sibere11

END

**DATE
FILMED**

01/106/192