Y-12

**OAK RIDGE
Y-12
PLANT**

MARTIN MARIETTA

Industrial Waste Landfill IV Upgrade Package

**Prepared by
Martin Marietta Energy Systems, Inc.
Engineering Division**

October 14, 1994

**Prepared Under
Contract No. DE-AC05-84R-21400**

**MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY**

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**Y/TS-399/R1, "DESIGN AND OPERATING PROCEDURE FOR THE Y-12 INDUSTRIAL WASTE
LANDFILL IV:**

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Design Drawing:

C2E-900000-A034 Rev A to replace C2E-900000-A034 Rev 0

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Y/TS-399/R2

**DESIGN AND OPERATING
PROCEDURE FOR THE
Y-12 INDUSTRIAL LANDFILL IV**

Date of Revision: September 1994

Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831-8169
managed by
Martin Marietta Energy Systems, Inc.
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

220 feet segment as shown on Drawing C2E900000A034.

Proposed Landfill Development

Further development of the IWLF-IV disposal areas will be sequenced as shown on Drawing C2E900000A034, and the section and details shown on Drawing C2E900000A036. The development of each disposal area will occur so as to promote drainage of runoff away from the working face. Temporary roads will be built as each area is developed. They will be located such that at least one road is available for traffic into a working face that can be accessed during all weather.

The excavations will not exceed 35 feet for that part of the site above the elevation of 1180 feet and will not extend below the elevation of 1160 feet. Excavations will not exceed 25 feet for that part of the landfill between 1140 and 1180 feet and there will be no excavations for landfilling below the elevation of 1140 feet.

The proposed final contours, shown on Drawing C2E900000A035, create a small, relatively flat top area with a five percent slope and a maximum elevation of approximately 1200.5 feet. The closed landfill will slope downward from this flat top with a minimum of four percent and a maximum of 3:1 side slopes.

Seismic Analysis

A site-specific seismic study entitled "Seismic Hazard Evaluation for the DOE Oak Ridge Reservation" (document Y/EN-4683) has been submitted to TDEC for review. The site-specific study indicates that the maximum horizontal acceleration at the site is 0.068g with an annual exceedance probability of 0.2 percent in 500 years. The site study results for horizontal acceleration are less than the regulatory requirement of 0.1g with an annual exceedance of 10 percent in 250 years. Therefore the landfill does not reside in a seismic impact zone. With consideration for the referenced site-specific seismic study, it will not be necessary to address seismic design for the landfill components in the Landfill IV permit documents.

Soil Balance and Cover Material

All soil cover material to be used for the IWLF-IV, for both Area 1 and Area 2, is available on-site (i.e. East Borrow Area, West Borrow Area, Industrial Landfill V, Construction/Demolition Landfill VI, and Construction/Demolition Landfill VII). The total soil requirement for the entire IWLF-IV cover is estimated to be 52,203 cubic yards (includes daily, intermediate, and final soil cover). The landfill will be an area fill operation. Detailed plans of the landfill construction are provided in the drawings.

In order to develop Area 2, excavation will begin on the toe of the permanent berm and progress westward. The site will be excavated in stages to minimize land disturbance, control erosion and minimize leachate bed infiltration from stormwater flow. There will be an access/drainage way which will extend to the west end of the site from the working face.

Both areas of the landfill will operate concurrently and solid waste disposed of in the IWLF-IV will be covered at the end of each day with a minimum of 6" of soil. If deliveries become infrequent and cause covered surfaces to be exposed for more than 30 days, an intermediate cover of 12 inches will be used in lieu of daily cover of 6 inches.

Upon fill of the entire landfill grade, final cover will be placed. Final cover will be applied to minimize infiltration of precipitation into the waste, to provide a pleasing appearance, and to provide a growing surface for vegetation. Final cover on the side slopes and landfill top will consist of 42 inches of soil that includes a 24-inch compacted, low permeability layer, (1×10^{-7} centimeters per second or less) placed over the waste and overlain by a 30 or more mil FML, followed by a geonet, then a geotextile fabric and an 18 inch protective layer of soil that will support vegetative growth. Placement of the final cover will be according to procedures outlined in the construction quality assurance/quality control (CQC) plan.

Sign

A sign is located at the facility which can be viewed at both entrances and will provide the following information:

1. Facility Name
2. Emergency Phone Numbers
3. Restricted Users
4. Permitted Users
5. Standard Operating Hours

Equipment

The Principal pieces of equipment used at the landfill will include:

1. Landfill compactor.
2. Endloader for compaction and cover.
3. Scraper for providing cover materials.
4. Second endloader as backup to the endloader for compaction and cover.
5. Water trailer for dust control.

Other support equipment available for use at the site includes graders, dump trucks and bulldozers. Replacements for equipment are scheduled and procured with capital funds as approved by the DOE.

Placement of Waste Material

All waste material is subject to analysis under the Radioactive and Hazardous Constituents Screening Plan for Industrial Waste Landfill IV (Y/IA-215/Rev. 1). If the waste is acceptable for disposal at IWLF IV the collection vehicles will enter the site from the West Patrol Road or Old Mt. Vernon Road and unload the waste on the working face of the landfill as directed by the landfill operator. The waste is unloaded and placed on the working face in a confined area. The volume of in-place compacted waste and soil cover as constructed for each disposal shall constitute a cell. The top surface of the cell will be approximately square to facilitate compaction and to minimize the cover material required at the end of the day. The actual dimensions of a cell depends upon the waste received on any given day. Access roads from the perimeter road to the working face shall be moved or modified as required for proper operations. Personnel will immediately pick-up any litter scattered during disposal.

Before initial placement of waste, windows (minimum 3' x 3') shall be cut through the protective soil layer to expose the geotextile filter fabric. A rubber tired backhoe, tracked highlift or similar equipment will excavate the windows. The geotextile filter fabric will then be cut several times with a knife or removed to enhance leachate flow to the gravel drainage and leachate pipe collection system. No. 57 stone will be placed in the window excavation (approximately 12 inches thick) prior to placement and compaction of waste in the cell. The cutting of windows and backfilling with No. 57 stone will be repeated on successive horizontal layers of protective cover as waste cells are placed within the landfill.

During placement of the initial waste layer, equipment and vehicles will utilize long radius turns and operate in a "straight line manner" to the extent possible to protect the underlying leachate system and geomembrane from damage.

Cover Materials

Soil obtained during trench excavation, along with soil from the East Borrow Area, West Borrow Area, Industrial Landfill V, Construction/Demolition Landfill VI, and Construction/Demolition Landfill VII will be used as daily, and final cover for the compacted solid waste. Any soil stockpiled at the landfill will be contoured and seeded to minimize erosion. A minimum of twelve inches of compacted clay soil, will be distributed on the exposed edges of the solid waste at the end of each operating day. A landfill compactor or endloader will be used to spread and compact the cover material. Intermediate cover will be applied as the final lifts are completed. The top of the final cover will consist of a 18 inch vegetative cover to prevent erosion and surface deterioration. Sandwiched between the vegetative and the covered waste from the top down is a geotextile fabric, a geonet for drainage, a 30 mil or greater polyvinyl FML, and 24 inches of compacted clay. Side slopes will be maintained

DIVISION 2 - SITE WORK

SITE WORK

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<u>SECTION NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
* 02220	Excavating, Backfilling and Compacting	02220-1
02223	Excavating, Backfilling and Compacting for Structures	02223-1
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02270	Slope Protection and Erosion Control	02270-1
02276	Geotextile Filter Fabric	02276-1
02505	Stabilized Aggregate Base Course	02505-1
* 02598	Synthetic Liner	02598-1
02605	Leachate and Sanitary Manholes	02605-1
02610	Leachate Pipe System	02610-1
02720	Storm Drains	02720-1
02936	Seeding	02936-1

* *These sections have been revised and changes are shown in italics on pages listed below:*

Section 02220, page 02220-8, Rev. 1, September 30, 1994

Section 02598, page 02598-8, Rev. 1, September 30, 1994

Section 02598, page 02598-12, Rev. 1, September 30, 1994

previous compacted lift shall be scarified with a disk to a minimum depth of 1 inch to ensure good bonding between lifts.

3.07 GRANULAR DRAINAGE LAYER

After the geomembrane, geonet and geotextile layers have been placed on the compacted clay liner, a twelve inch thick granular drainage layer shall be placed on the bottom of the landfill. The granular material shall be placed in a manner to preclude damage to the geosynthetic layers. Low ground pressure equipment, wide tracked shall be used to distribute the granular material over the geosynthetic layers. Pneumatic tired equipment shall not be used. Wide tracked equipment shall be no larger than a D-4 or D-5 dozer.

A minimum of twelve inches of granular drainage material shall be kept between the equipment tracks and the uppermost geotextile layer at all times. To the extent possible tracked equipment shall be operated in a straight line manner.

3.08 PROTECTIVE SOIL COVER

A twelve inch thick protective soil cover layer shall be placed on the bottom and side slopes of the landfill after the geotextile has been placed on the drainage layer. The protective soil cover shall be placed in one loose lift, spread to a uniform thickness while maintaining a minimum of 12 inches of soil between the construction equipment and the geotextile. Low ground pressure equipment, wide tracked shall be used to distribute the material over the geotextile. The material shall be compacted with a smooth steel drum roller to prevent damage to the geotextile. Equipment shall utilize long radius turns while placing and compacting the protective soil cover.

END OF SECTION

Extreme care should be taken throughout the work to avoid fishmouths, wrinkles, folds or pleats in the seam area. Where fishmouths do occur, they should be slit out far enough from the seam to dissipate them, lapped, seamed together in the lapped area and patched.

If field seams are made using the hot wedge thermal fusion technique, a test seam, approximately 6 ft. long shall be made prior to production seaming. The test seam shall be tested for bonded seam strength in accordance with ASTM D751, and peel adhesion in accordance with ASTM D413 (machine method). The minimum acceptable value for the bonded seam strength test is 200 pounds/inch width. The minimum acceptable value for the peel adhesion test is 30 pounds/inch width. Production seaming shall then be performed using the same machine setting as for the test seam.

Test seams shall be made at least twice per day or whenever there is a major change in the weather conditions. Test seams shall be made by each seamer prior to using each seaming machine, or whenever a machine has been shut down and restarted.

C. Joints to Structures

Securing the lining to structures shall be in accordance with those details shown on the drawings submitted by the Contractor and approved by the Construction Manager.

D. Repairs to the Liner

Any necessary repairs to the liner shall be patched with the liner material itself. Use a patch with rounded corners, large enough to extend 6 inches in all directions from the puncture. Apply as above for lap joints.

- E. The Contractor shall furnish a sufficient number of temporary anchors to prevent damage to the liner due to wind or other forces. The liner shall be secured at all times to hold it down during high winds.

3.03 QUALITY ASSURANCE

A. Shipping and Storage of Liner Material

The liner material shall be kept dry and out of direct sunlight until installation.

B. Liner Repairability

The liner material must be repairable. This will require welding new liner panels to the then aged liner panels installed by this contract. Therefore, the panels must be weldable (fusible) in the future. The Contractor shall certify that this will be possible and submit a procedure for liner repairs.

manufacturer's or supplier's testing laboratory shall not be accepted for compliance with these specifications. Failed seams shall be recorded as to location and seaming crew. The data should be reviewed for possible patterns. Repairs should be made in accordance with approved techniques and retested to verify their integrity. Any doubtful areas shall be tested with a vacuum seam tester or other device as approved by the Construction Manager.

- G. All field seams and repair patches shall be tested using a vacuum box at a negative pressure of 5 psi. A Geomembrane Installation Inspection Report, with signoffs, shall be maintained.
- H. *One test coupon must be taken from the interior portion of each field seam to provide sufficient material and seam length for destructive testing by an independent laboratory for bonded seam strength in accordance with ASTM D751, and peel adhesion in accordance with ASTM D413 (machine method). The field sample shall be taken at the same time the field seam is being constructed. The minimum acceptable value for the bonded seam strength test is 200 pounds/inch width. The minimum acceptable value for the peel adhesion test is 30 pounds/inch width. Field samples shall be forwarded to the laboratory on the same day they are prepared.*

If a seam test fails, an additional test specimen shall be prepared from the same coupon as the failed test specimen. If the retest fails to achieve adequate strength, the Construction Manager shall be notified and a suitable remedy shall be determined.

End of Section
Except for Attached Exhibit

N 28800

E 51900

E 52000

N 28700

10'x30' PAD
(FUTURE)

N 28600

25'x37' INSIDE
CONTAINMENT AREA
T.W. EL. 1181.0

FORCE MAIN TO
LEACHATE HOLDING
TANKS

GR.EL.
1180.5

24" CMP
INV EL. 1172.54

N 28500

E 52100

E 52200

E 52300

E 52400

WASTE BOUNDARY (TYP.)

GR. EL.
1180.5

24" CMP
INV. 1175.48

AREA 2
PHASE III

6" L
COL

1180

AP
PH

E 52900

AREA 1

WEST PATROL

SITE ACCESS

NOTES:

1. AREA 1 (EXISTING OPERATIONAL PORTION) MATERIAL TO NEW CULVERT ELEVATION CONSTRUCTION OF SEPARATOR BERM. IN AREA 1 WILL BE DONE BY THE OWNER.
2. BORE AND JACK STEEL CASING PIPE (0 SHOWN. CARRIER PIPE SHALL BE 6"Ø MECHANICAL JOINTS. STRAP WOOD SKID WITHIN CASING AND PROVIDE CLOSEST F CARRIER PIPE TO MH-3 AND MH-4 (PL
3. EXISTING SECURITY FENCE SHALL BE RE TANK DIKE STRUCTURE AND FOR PIPE L FENCE SEGMENT REMOVAL AND REPLACE ONE WORKING DAY.
4. EXISTING TOPOGRAPHY BASED ON FIELD SU DATED JUNE 6, 1993.
5. FINAL GRADING PLAN SHOWS BOTTOM F DEVELOPED PHASES I, II, AND III WITHI
6. STORM DRAINAGE FROM THE LANDFILL ALONG THE WEST AND SOUTH SIDES C 24" CULVERT AND THEN TO THE EXIST EXISTING 24" STORM DRAIN CULVERT A LANDFILL AREA IS NO LONGER REQUIRE BACK APPROXIMATELY FOUR (4') FEET WITH CONCRETE, THE DISTURBED AREA ACCORDANCE WITH THE SPECIFICATIONS AREA.

LEGEND

EXISTING UTILITY P

(EXISTING OPERATIONAL PORTION) WILL BE FILLED WITH WASTE AND COVER TO NEW CULVERT ELEVATION 1183.0 PRIOR TO COMPLETION OF CONSTRUCTION OF SEPARATOR BERM. WASTE AND COVER FILLING OPERATIONS WILL BE DONE BY THE OWNER.

AND JACK STEEL CASING PIPE (0.31" THK.) UNDER ROAD WITHIN LIMITS. CARRIER PIPE SHALL BE 6"Ø DUCTILE IRON PIPE, CLASS 51 WITH FLANGED JOINTS. STRAP WOOD SKIDS ON CARRIER PIPE TO CENTER CASING AND PROVIDE CLOSEST POSSIBLE FIT. EXTEND DUCTILE IRON PIPE TO MH-3 AND MH-4 (PUMP STATION).

SECURITY FENCE SHALL BE REMOVED AND RESET FOR GRADING AT EXISTING STRUCTURE AND FOR PIPE LINE EXCAVATIONS AS REQUIRED. SEGMENT REMOVAL AND REPLACEMENT MUST BE COMPLETED WITHIN ONE WORKING DAY.

TOPOGRAPHY BASED ON FIELD SURVEY BY ADAMS CRAFT HERZ WALKER ON JUNE 6, 1993.

GRADING PLAN SHOWS BOTTOM FINISH GRADES FOR FULLY DEVELOPED PHASES I, II, AND III WITHIN THE AREA 2 PORTION OF LANDFILL IV.

DRAINAGE FROM THE LANDFILL SITE WILL BE DIRECTED TO A DITCH ON THE WEST AND SOUTH SIDES OF THE ACCESS ROAD TO AN EXISTING CULVERT AND THEN TO THE EXISTING SEDIMENT BASIN. WHEN THE EXISTING 24" STORM DRAIN CULVERT AT THE SOUTHWEST CORNER OF THE LANDFILL AREA IS NO LONGER REQUIRED FOR DRAINAGE, IT IS TO BE CUT OFF APPROXIMATELY FOUR (4') FEET INTO THE EMBANKMENT, PLUGGED WITH CONCRETE, THE DISTURBED AREA BACKFILLED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS PRIOR TO WASTE PLACEMENT IN THIS

LEGEND

EXISTING UTILITY POLE W/ANCHOR

N 28400

E 51900

E 52000

N 28800

N 28700

STORAGE
TANK DIKE

GR. EL.
1180.5

2
ING PLAN

- x -

+

GW-52

WEST PATROL ROAD

SITE ACCESS

1170

A034
A036

24" CMP

- x - - - - x - - - - x -

EXISTING FENCE

- - - - 24" CMP - - - -

EXISTING CULVERTS

- - - - -

LEACHATE COLLECTION PIPE (PERFORATED)

- - - - -

NEW FORCE MAIN

- - - - -

LEACHATE COLLECTION PIPE

- - - - -

FUTURE LEACHATE COLLECTION PIPE (PERFORATED)

- - - - -

MANHOLE

- - - - -
15" Ø

NEW CULVERT

- - - - -

CONTROL LINE

GW-521

GW-217

MONITORING WELLS

B-1

BORINGS

- - - - -

DITCH

- - - - -

LIMITS OF RIP-RAP

- - - - -

WASTE BOUNDARY

	EXISTING UTILITY POLE W/ANCHOR
	EXISTING FENCE
	EXISTING CULVERTS
	LEACHATE COLLECTION PIPE (PERFORATED)
	NEW FORCE MAIN
	LEACHATE COLLECTION PIPE
	FUTURE LEACHATE COLLECTION PIPE (PERFORATED)
	MANHOLE
	NEW CULVERT
	CONTROL LINE
	MONITORING WELLS
	BORINGS
	DITCH
	LIMITS OF RIP-RAP
	WASTE BOUNDARY

E

D

N 28600

+ 2"Ø FORCE MAIN TO LEACHATE STORAGE TANKS +

EXISTING SILT FENCE 1180

N 28500

1170

N 28400

EXIST. SEDIMENT BASIN

MODIFY EXISTING SEDIMENT
BASIN RISER PIPE.
SEE DETAIL

1155

1150

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GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

						TOLERANCES UNLESS OTHERWISE SPECIFIED		DES A.A. BERKES		2/94			
						FRACTIONS $\pm$ X/XX XX DECIMALS $\pm$ .XXX XXX DECIMALS $\pm$ .XXX ANGLES $\pm$ XXX BREAK SHARP EDGES XXX FINISH XXXRMS		DRW O.R. WOMBLE		2/94			
								CHK TERESA J. PIERCE		2/14/94			
								SECT TERESA J. PIERCE		2/14/94			
								DEPT & PLANT					
								TERESA J. PIERCE		2/14/94			
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GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

C

A034

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BLE	2/94										
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PIERCE	2/14/94										
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		INDUSTRIAL WASTE LANDVILL IV GRADING PLANS									TYPE P
		1	48	49	50	PLANT	BLDG	FL	SHEET OF	CLASS	
		3	C	P	T	Y-12	AREA	—		U	
		SCALE 1"=50'			ID SY580509		C2E9000000			A034	REV A
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