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**SPECIAL CONDITION NO. 3 - PERMIT TO INSTALL (PTI)
STORMWATER/SPILL RETENTION FACILITY**

01/15/88

DOE-361-88

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OEPA

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PTI



Department of Energy

Oak Ridge Operations

P. O. Box E

Oak Ridge, Tennessee 37831

6200

January 15, 1988

DOE-361-88

Mr. Thomas A. Winston, Chief
Ohio Environmental Protection Agency
Southwest District Office
Ninth Floor, 7 East Fourth Street
Dayton, Ohio 45402-2086

**SPECIAL CONDITION NO. 3 - PERMIT TO INSTALL (PTI)-
STORMWATER/SPILL RETENTION FACILITY - FEED MATERIALS PRODUCTION
CENTER (FMPC)**

Dear Mr. Winston:

On November 18, 1987, the Ohio Environmental Protection Agency issued the subject Permit to Install (PTI) with conditions to the U. S. Department of Energy (DOE), Feed Materials Production Center (FMPC). Special Condition No. 3 reads as follows:

"A copy of the flexible membrane installation plan that will be used for the new east stormwater retention basin shall be submitted to the Southwest District Office of the Ohio Environmental Protection Agency no later than December 31, 1987. This plan shall identify the membrane chosen, measures proposed to ensure the liner manufacturers installation directions are followed and the procedures to be used for seam testing and hydrostatic testing once the membrane is in place".

The following items are enclosed to satisfy the above condition:

1. Stormwater Retention Basin Expansion Specifications Section 10100 Flexible Membrane Liner.
2. Liner Inspection and Testing Plan for Stormwater Retention Basin Project.

Formal OEPA approval of the flexible membrane liner specification is desired by January 31, 1988. Federal government procurement regulations will not allow a purchaser to specify a product trade name or vendor. The specifications outlined in Attachment 1 will allow either chlorosulfonated polyethylene (Hypalon) or ethylene interpolymer alloy (XR-5)

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type liner materials. Numerous fabricators can furnish such liners. The material ultimately selected will have a minimum thickness of 30 mils.

Formal OEPA approval of the proposed leak test water discharge plan for the new east stormwater retention basin is also desired by January 31, 1988. The Liner Inspection and Testing Plan, Enclosure 2, for the purpose of hydrostatic testing, calls for the new basin to be filled with FMPC sanitary (portable) water from a fire hydrant. At the termination of the test program, and if necessitated for incremental liner leak repairs, this water will be pumped to the drainage trench east of the new basin. This trench discharges into the FMPC Stormwater Outfall Ditch downstream from any current or historical FMPC discharge points, and thence to Paddy's Run. No restriction disallowing the proposed discharge is known to exist. The proposed discharge will be sampled and reported in accordance with the monitoring requirements for NPDES Outfall 002. As can be seen in the Liner Inspection and Testing Plan, Table 1, the minimum time required to perform the hydrostatic test is nine (9) weeks. If the test water is not pumped to the drainage trench the test period will increase significantly. This will jeopardize our ability to meet the December 31, 1988, operating deadline mandated in Order No. 8 of the OEPA Findings and Orders.

If you have any questions or require additional information concerning this matter, please contact Barbara Wojtowicz of our Environmental Protection Division at (615)576-1181.

Sincerely,


James A. Reafsnider
Site Manager

SE-31:Wojtowicz

Enclosure:
As stated.

cc w/encl.

B. V. Wojtowicz, SE-31, ORO
L. C. Bogar, WMCO
D. J. Brettschneider, WMCO
R. F. Gimpel, WMCO
J. R. McDonald, WMCO

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**Westinghouse
Materials Company
of Ohio**

PO Box 398704
Cincinnati, Ohio 45239-8704

(513) 738 6200

WMCO:EH(EC):88-0021

January 13, 1988

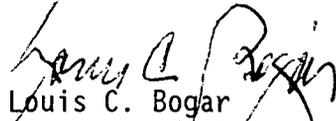
Mr. James A. Reafsnyder
Site Manager
U.S. Department of Energy
P.O. Box 398705
Cincinnati, Ohio 45239-8704

Dear Mr. Reafsnyder:

**SUBJECT: SPECIAL CONDITION NO. 3 - PERMIT TO INSTALL (PTI) - STORMWATER/SPILL
RETENTION FACILITY - FEED MATERIALS PRODUCTION CENTER**

Enclosed is one copy each of the revised "Stormwater Retention Basin Expansion Specifications Section 10100 Flexible Membrane Liner" and "Liner Inspection and Testing Plan for Stormwater Retention Basin Project." Revisions have been made in accordance with conference call between Ms. Barbara Wojtowicz, DOE/ORO, and Mr. Dave Brettschneider, WMCO Waste Remediation and Environmental Engineering. These enclosures are to be forwarded to the Southwest District Office of the Ohio Environmental Protection Agency. This submittal is to satisfy Special Condition No. 3 of the PTI.

Very truly yours,


Louis C. Bogar
Vice President and Manager
Environment, Safety and health

JRM/dsm

Enclosure

cc: M. F. Albert
M. B. Boswell
D. J. Brettschneider
W. H. Britton
L. Clausing
L. C. Dolan
R. F. Gimpel

R. C. Kispert
A. J. Macaulay
J. R. McDonald
K. A. Solomon
W. A. Weinreich
Central Files
EC Files

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ENCLOSURE 1

**STORMWATER RETENTION BASIN EXPANSION SPECIFICATIONS SECTION
10100 FLEXIBLE MEMBRANE LINER**

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PART 1 - GENERAL

1.01 SCOPE

This section includes furnishing all labor, equipment, supervision and materials necessary to install a flexible membrane liner in the New Stormwater Retention Basin.

1.02 QUALITY ASSURANCE

- A. The Contractor, prior to being approved to do the work, shall provide a list of successful installations and the name and telephone number of a knowledgeable person from each installation.
- B. The quality of the installation shall be verified by a competent testing laboratory selected by the Construction Manager. The Contractor shall cooperate to the fullest extent with representatives of the testing laboratory while the testing is being performed. The Contractor should have at least 10 years experience in this work.
- C. The Installation Contractor shall provide a site superintendent with five years experience installing like liners for large basins.

1.03 SUBMITTALS

A. Qualifications

- 1. The Contractor shall supply a history of satisfactory service which lists at least five installations over 200,000 square feet. Also included in the list will be the name and telephone number of a person on the Contractor's staff that is familiar with the project. The Contractor should have at least ten years experience in this work.
- 2. The Contractor shall provide the information requested on the Manufacturer's Data Required sheet (Attachment No. 1).

B. Field Seam Locations

- 1. The Contractor shall provide a drawing which shows the prefabricated panel details and the location of all field seams. The layout shall provide for a minimum number of field seams.
- 2. The Contractor shall provide a detailed description of the methods for making field seams.

PART 2 - PRODUCTS

2.01 DESCRIPTION

The flexible membrane lining material shall be one of the following types:

A. Chlorosulfonated polyethylene (CSPE)

The flexible membrane liner shall be made from a composition of chlorosulfonated polyethylene (CSPE) with an encapsulated reinforced fabric of 10 by 10-1,000 denier polyester scrim. The finished material shall conform to the minimum material properties of Type 3-45 as shown in Table 10A of the Standard Number 54 as prepared by the National Sanitation Foundation (Attachment No. 2).

B. Ethylene interpolymer alloy

The flexible membrane liner shall be made from a composition of ethylene interpolymer alloy with an encapsulated fabric, reinforced with polyester filament yarns. The total fabric shall contain not less than 45% (by weight) of the polymer coating. The finished material shall conform to the minimum material properties (Attachment No. 3).

2.02 FACTORY FABRICATION

- A. If CSPE is used, the flexible membrane lining shall consist of minimum 58-inch widths of sheeting fabricated into large sections by means of 1-1/2 inch (minimum) wide (heat/fusion) seams.

If ethylene interpolymer alloy is used, the flexible membrane lining shall consist of 56-inch widths of sheeting fabricated into large sections by means of two-inch (minimum) wide (heat/dielectric) seams.

- B. The fabricator shall certify that the seams are of sufficient strength that the parent material will break before seam separation occurs.
- C. The fabricated material will be packed in a manner to protect the product and to minimize handling in the field. The fabricator will notify the Contractor of the area required for storage during the construction of the liner. Normal section for sloped sides and bottom shall be approximately 20,000 square feet maximum. Corner sections shall be dependent upon packaging requirements.

2.03 INSTALLATION

- A. The Installation Contractor shall provide a site superintendent with five years experience installing like liners for large basins. Workers welding seams must (1) provide evidence from previous jobs or (2) perform before the Construction Manager successful welding of 100 feet of like liner material prior to making welds in the basin. The welds must pass (or have passed) a vacuum-box or probe test and be stronger than the parent lining material.

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B. Field Joints

If CSPE is used, lap joints shall be used to seal factory fabricated panels of the liner together in the field. All field joints between sections of the liner shall be made on a supporting smooth surface such as a board, and heat guns shall be used to make the sealing temperature at least 100°F. Lap joints shall be formed by lapping four inches (10 cm) minimum of the reinforced portion of the film. The contact surfaces of the panels shall be wiped clean to remove all dirt, dust, or other foreign materials. Scrub the mating surfaces at splices with trichloroethylene or approved equal. The surface shall be scrubbed in only one direction (away from the previous seam) and only clean towels or paper towels used. Apply bodied solvent adhesive (approved by the liner manufacturer) sufficiently that the entire bottom liner surface is covered and that a bead of the adhesive will extend beyond the seam edge. Immediately upon applying the adhesive, the two liner surfaces shall be joined together and rolled smooth with hand rollers.

If ethylene interpolymer alloy is used, lap joints shall be used to seal factory fabricated panels of the liner together in the field. All field joints between sections of the liner shall be made on a supporting smooth surface such as a board, and heat guns shall be used to make the manufacturer's sealing temperature. Lap joints shall be formed by lapping four inches (10 cm) minimum of the reinforced portion of the film. The contact surfaces of the panels shall be wiped clean to remove all dirt, dust, or other foreign materials. Scrub the mating surfaces at the splices with trichloroethylene or approved equal. The surface shall be scrubbed in only one direction (away from the previous seam) and only clean towels or paper towels used. Heat the two panels surfaces to be joined to manufacturer's suggested temperature. Immediately upon heating the two panels, the surfaces shall be joined together and rolled smooth with hand rollers.

C. Joints to Structures

Securing the lining to structures shall be in accordance with those 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 six inches in all directions from the puncture. Use field joint procedure.

E. The Contractor shall furnish a sufficient number of temporary anchors to prevent damage to the liner due to wind or other forces.

F. Quality of Workmanship

Upon completion of the installation, the liner shall be jointly inspected by the field engineer and the Operating Contractor's representative to determine the integrity of the field seams as well as the general condition of the lining. The Construction Manager at his discretion may conduct tests to the field seams that will demonstrate to his satisfaction that the parent lining material will break prior to separation of the field seams. Any lining surface injury due to scuffing, penetration by foreign objects, or distress from rough subgrade shall, as agreed to by the field engineer, be replaced or covered and sealed with an additional layer of the liner.

- G. Field testing of seams and repairs shall be done under the supervision of the Operating Contractor's testing laboratory. The procedures shall be in accordance with ASTM D4437-84, for the quality control test methods for determining the integrity of field seams. Vacuum-box testing and probe testing shall be performed according to ASTM.

H. Shipping and Storage of Liner Material

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

If CSPE is used, the Contractor must certify that the material delivered to the site will be uncured (not vulcanized) and stored indoors away from the dampness and sunlight. The new CSPE must be shielded from ultraviolet light and dampness to maintain seamability.

I. Liner Repairability

The liner material must be repairable. The south portion of the new basin may be expanded in the future. This will require welding new liner panels to then aged liner panels installed by this contract. Therefore, the panels must be weldable (fuseable) in the future. If CSPE is used, the liner material must not completely cure (vulcanize) allowing a fusion weld of the liner material (then aged) to be made to new CSPE liner material.

The Contractor shall certify that this will be possible and submit a procedure for liner repairs/modifications.

J. Testing of Basin Liner

Upon completion of the installation, the liner shall be hydraulically tested to confirm the liner integrity. The liner shall be accepted when the leakage rate is determined to be less than 20 gallons per acre per day under a maximum hydraulic head.

The Contractor shall provide the necessary personnel and equipment to perform the following:

1. The completed installation shall be cleaned of all debris, construction material, etc.
2. All field welds (not factory welds) and repair patches shall pass a vacuum-box or probe test performed by the Contractor and witnessed by the Operating Contractor's representative. A definitive log, with sign-offs, shall be maintained. The log shall show all seams and repairs that passed testing and shall be approved by the Operating Contractor prior to filling basin with water.
3. The Contractor shall install the first half-gate according to the Half-Gate Installation Sequence Diagram (Attachment No. 4).
4. The Contractor shall fill the basin with sanitary water from the parking lot fire hydrant in two-foot increments and inspect the liner for holes by "electrical conductivity probe" (ECP) testing. A booster pump with hose supplied by the Contractor will be required to increase the flow from the hydrant. The fire hydrant should supply 200 GPM sustained flow.

Water shall be pumped between the Bentonite-clay liner and the flexible membrane liner (FML) by flooding the collection sump and allowing the water to backup into the underdrain piping. The water is needed to complete the electrical circuit for the ECP. The water between the liners shall not be filled to a level higher than that in the basin to prevent the liner from floating. Sufficient time between each two-foot increment (24 hours) shall be allowed for the leaking water between the liners to complete the electrical circuit for the ECP.

Groundwater shall continue to be pumped to the old (West) basin via the temporary groundwater sump installed by the Contractor. See Section 02243 Dewatering For Excavations for details of the temporary groundwater sump.

5. If a leak(s) is detected, the Contractor shall drain the basin as low as required to patch the hole(s). The Contractor shall provide the equipment and labor necessary to pump the water at 600 GPM from the basin to the new drainage ditch located east of the basin. Each patch shall pass a vacuum-box or probe test before continuing.
6. When the basin is filled, the Operating Contractor reserves the right to have a separate, independent firm perform ECP testing of the entire basin. If a leak is detected, the Contractor shall be required to repeat Step 5 until the liner is deemed leak tight.
7. Pump water from between the liners via collection sump pumps to the existing (west) basin.

8. The Contractor shall drain the basin to the new drainage trench. The Contractor shall notify the Operating Contractor a minimum of two (2) hours prior to discharging any test water to the drainage trench so that appropriate monitoring of the discharge can be performed by the Operating Contractor. The Contractor shall record the total quantity of water discharged and provide this information to the Operating Contractor.
9. The Contractor shall install a temporary dam and the second half-gate according to the Half-Gate Installation Sequence Diagram (Attachment No. 4)

J. Electrical Conductivity Probe Inspection

The electrical conductivity probe inspection firm shall furnish proof that their techniques find one millimeter holes (leaks) consistently at one meter. The inspector shall mark the location of the hole on the liner and enter its location in a definitive log. Six copies of the log and a formal typed report shall be submitted to the Construction Manager.

2.04 WARRANTY

- A. The Installation Contractor shall provide a minimum of two years warranty covering installation of the liner.
- B. The fabricator shall provide a minimum of five years prorated warranty.
- C. The liner manufacturer shall provide a minimum of ten years prorated warranty.

PART 3 - EXECUTION

- 3.01 The installation crew shall use proper equipment to move the heavy rolls or bundles of liner material from truck to storage to the basin dike. No vehicles will be allowed in the basin.
- 3.02 A sufficient number of workers shall be used to easily unroll and unfold the liner material. Too few workers may cause overstressing sections of the liner.
- 3.03 Nothing contained herein relieves the Contractor of his responsibility to provide safe working conditions for his men in the area of work.
- 3.04 SUBMITTALS

The Contractor shall provide data requested on the Manufacturer's Data Required sheet (Attachment No. 1).

MANUFACTURER'S DATA REQUIRED

Description: Synthetic Liner	NUMBER OF COPIES			
	With Bids	For Info.	For Approval	CFC

The Contractor shall provide data below in quantities shown:				
1. Name of Sheeting Manufacturer	6			
2. Name of Liner Panel Fabricator	6			
3. Name of Liner Installation Firm	6			
4. Name of ECP Inspection Firm	6			
5. Reinforced Liner Sample Six-Inches Square	6	6		
6. Certification by Sheeting Manufacturer that Sheeting Material Contains at Least 45% Resin by Weight	6			
7. Certified Reinforced Liner Material Test Results		6		
8. Destructive test samples with report of representative factory and field welded seams			6	
9. Shop Drawings			6	6
A. Liner to Concrete Joints				
B. Sealing Around Pipes and Vents				
C. Anchoring of Liner				
D. Vents				
E. Field Seams				
10. Detailed description/procedure for making field seams and repairs			6	
11. Certification that ECP inspection firm's techniques find 1 mm holes consistently at 1 m			6	
12. Certification that membrane (if CSPE) delivered to site will be uncured (not vulcanized) and stored indoors until shipment			6	
13. Certification that liner material is repairable and weldable after aging.			6	

MANUFACTURER'S DATA REQUIRED (cont.)

GENERAL NOTES:

1. Within three weeks after award, the Contractor shall furnish the required data "for approval" as outlined above. Subsequent revisions shall also be submitted for approval.
2. CFC issues of drawings shall include two reproducible copies in addition to the number of copies required above.
3. Test reports and logs for vacuum-box (or probe) testing and electrical conductance probe testing shall be submitted at test completion.

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CHLOROSULFONATED POLYETHYLENE (CSPE)
(Excerpted From Table 10A, Standard No. 54,
National Sanitation Foundation [NSF])

PROPERTY	TEST METHOD	SUPPORTED (S) TYPE
<u>MATERIAL PROPERTIES</u>		
Gage ¹ (Nominal)	--	45
Plies, Reinforcing	--	1
Thickness (mils, min.)		
1. Overall	ASTM D751	41
2. Over Scrim	Optical Method (Reference Appendix A, NSF)	11
Breaking Strength-Fabric (pounds, min.)	ASTM D751 Method A	200
Tear Strength (pounds, min.)		
1. Initial	ASTM D751 (As modified in Appendix A, NSF)	
2. After Aging		
Low Temperature (°F)	ASTM D2136 (1/8-inch mandrel, four hours, pass)	-40
Dimensional Stability (each direction % change max.)	ASTM D1204 212°F, 1 hour	2
Volatile Loss (% loss max.)	ASTM D1203 Method A, 30 mil sheet	0.5
Resistance to Soil Burial (% change max. in original values)	ASTM D3083 30 mil sheet (As modified in Appendix A, NSF)	
a. Unsupported Sheet		
1. Breaking Strength		5
2. Elongation at Break		20
3. Modulus at 100% Elongation		20
b. Membrane Fabric Breaking Strength	ASTM D751 Method A	25
Hydrostatic Resistance (pounds/square inch, min.)	ASTM D751 Method A, Procedure 1	250
Ply Adhesion (each direction pounds/inch width, min.)	ASTM D413 Machine Method Type A	7

CHLOROSULFONATED POLYETHYLENE (CSPE) (cont.)
(Excerpted From Table 10A, Standard No. 54,
National Sanitation Foundation [NSF])

PROPERTY	TEST METHOD	SUPPORTED (S) TYPE
<u>FACTORY SEAM REQUIREMENTS²</u>		
Bonded Seam Strength (factory seam, breaking factor, pound, width)	ASTM D751 (As modified in Appendix A, NSF)	180
Peel Adhesion (pounds/inch, min.)	ASTM D413 (As modified in Appendix A, NSF)	Ply sep in plane of scrim or 10 pounds/inch
Resistance to Soil Burial (% change max. in original value)	ASTM D3083 (As modified in Appendix A, NSF)	
Peel Adhesion		-20
Bonded Seam Strength		-25

¹ Type 1 gage liner has two values. Coating is stronger than fabric and gives a breaking strength value of 100 pounds for nominal 30 mil and 120 pounds for nominal 45 mils with 150 percent minimum elongation at break for both.

² Factory seam requirements are the responsibility of the fabricator. Factory seams are further discussed in Item 4.2, NSF Document.

ETHYLENE INTERPOLYMER ALLOY

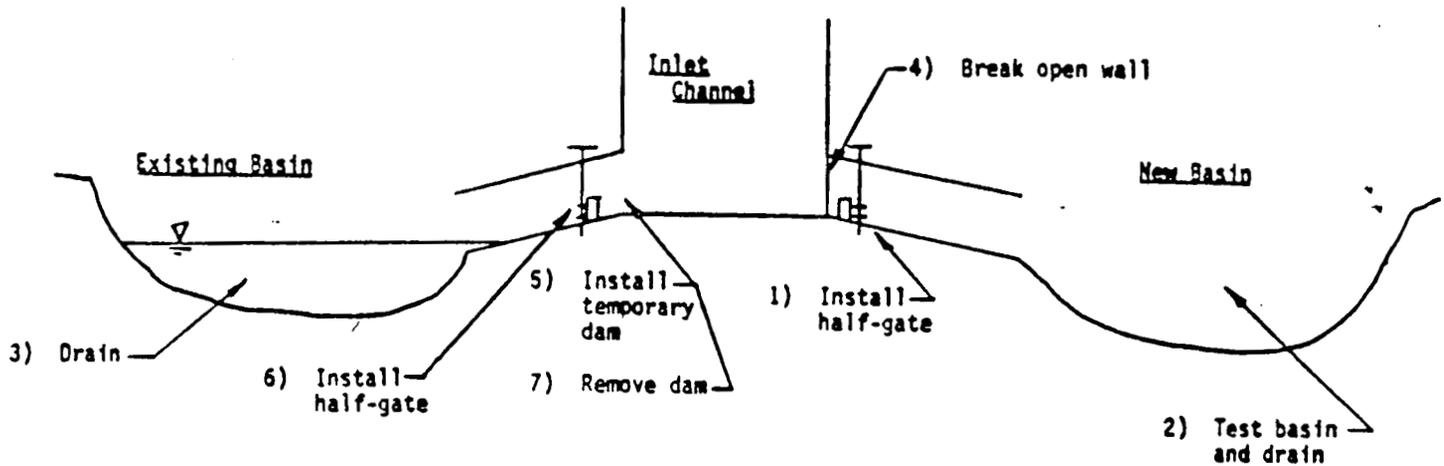
PROPERTY	TEST METHOD	VALUES
<u>MATERIAL PROPERTIES</u>		
Thickness (mil min.) (inches min.)	ASTM D751	30 to 34 0.030 to 0.034
Weight (oz/sq yd)	ASTM D751	30.0±2
Tear Strength (pounds, min.)	ASTM D751	125/125
Breaking Strength (pounds, min.)	ASTM D751 Grab Tensile	475/425
Low Temperature, °F	ASTM D2136 4 hrs, 1/8" mandrel	
Dimensional Stability (each direction, % change max.)	ASTM D1204 212°F, 1 hr	2
Hydrostatic Resistance (pounds/sq inch, min.)	ASTM D751 Method A	500
Blocking Resistance (180°F, max. rating #)	Method 5872 Fed. Std. 191a	2
Adhesion--Ply (pounds/inch of width)	ASTM D413, 2" per min.	9
Abrasion Resistance (Taber Method)	Method 5306, Fed Std. 191a H-18 wheel, 1000 gm load	
1. Cycles Before Fabric Exposure		2000
2. Maximum Wt. Loss/100 Cycles (mg)		50
Weathering Resistance (# hour with no appreciable changes, stiffening or cracking of coating)	Carbon-Arc Atlas Weather-0-Meter	8000
Water Absorption (max. % gain at 70°F, as 212°F)	ASTM D471 7 days	5, 12
Wicking (inches, max.)	Shelter-Rite Procedure	1/8
Puncture Resistance (pounds)	FTSMS 101B Method 2031	350

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ETHYLENE INTERPOLYMER ALLOY (cont.)

PROPERTY	TEST METHOD	VALUES
<u>FACTORY SEAM REQUIREMENTS</u>		
Adhesion-Heat Sealed Seam (pounds/inch, min.)	ASTM D751	10
Dead Load Seam Shear Strength (pounds/inch, min.)	(Mil-T-43211[GL]) Para. 4.4.4.(4 hrs) 2" overlap seam	
1. at 70°F		210
2. at 160°F		105

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NOTE: The top one-fourth of the temporary dam shall be removed at the end of the work day. This will allow use of the existing basin and spillway if a severe storm were to occur between periods of construction.

HALF-GATE INSTALLATION SEQUENCE DIAGRAM

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ENCLOSURE 2

**LINER INSPECTION AND TESTING PLAN
FOR STORMWATER RETENTION BASIN PROJECT**

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LINER INSPECTION AND TESTING PLAN
FOR STORMWATER RETENTION BASIN PROJECT

1. All field welds (not factory welds) and repair patches shall pass a vacuum-box or probe test performed by the Contractor and witnessed BY a WMCO QA Inspector. A definitive log, with sign-offs, shall be maintained.
2. The Contractor shall install the first half-gate according to the Half-Gate Installation Sequence Diagram (See Figure 1).

NOTE: Using the half-gates would require filling both basins during testing.

3. The Contractor shall fill the basin with sanitary water from the parking lot fire hydrant in two-foot increments and inspect the liner for holes with an "electrical conductivity probe (ECP)." A booster pump will be required to increase the flow from the hydrant.

Water shall be pumped between the Bentonite-clay liner and the flexible membrane liner (FML) by flooding the collection sump and allowing the water to backup into the underdrain piping. The water is needed to complete the electrical circuit for the ECP. The water between the liners shall not be filled to a level higher than that in the basin to prevent the liner from floating. Sufficient time between each two-foot increment (24 hours) shall be allowed for the leaking water between the liners to complete the electrical circuit for the ECP.

4. If a leak(s) is detected, the Contractor shall drain the basin as low as required to patch the hole(s). The Contractor shall provide the equipment and labor necessary to pump the water at 600 GPM from the basin to the drainage ditch relocated east of the new basin. Each patch shall pass a vacuum-box or probe test before continuing.
5. When the basin is filled, WMCO will have an independent firm perform ECP testing of the entire basin. If a leak is detected, the Contractor shall be required to repeat Step 4 until the liner is deemed leak tight.
6. Pump water from between the liners via collection sump pumps to the existing (west) basin.
7. The Contractor shall drain the basin to the drainage ditch. The Contractor shall notify the Operating Contractor a minimum of two (2) hours prior to discharging any test water to the drainage trench so that appropriate monitoring of the discharge can be performed by the Operating Contractor. The Contractor shall record the total quantity of water discharged and provide this information to the Operating Contractor.
8. The Contractor shall install a temporary dam and the second half-gate according to the Half-Gate Installation Sequence Diagram (See Figure 1).

9. The New Storm Water Basin is ready for turnover to Production Operations.

The total estimated time for testing the new basin is nine weeks (62 days) if no leaks are found. However, it could take as long as 13-1/2 weeks (94 days) if leaks are found in each two-foot increment. Tables 1 and 2 give a summary of the time elements used to estimate the total time for testing the new basin.

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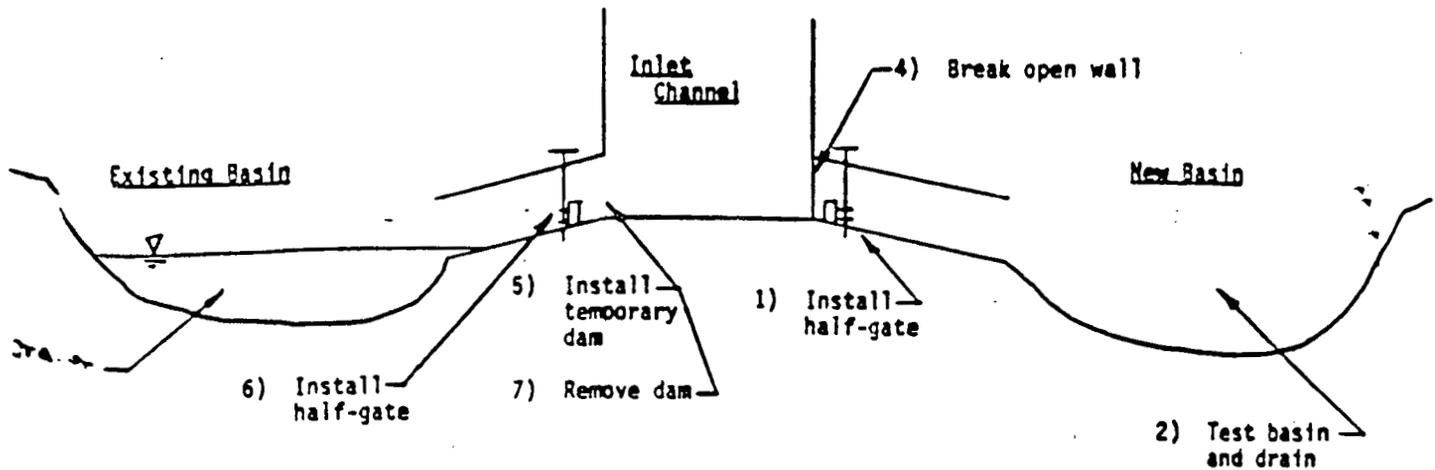
TABLE 1STORMWATER BASIN EXPANSION
INSPECTION AND TESTING PLAN

<u>STEP</u>	<u>DAYS TO COMPLETE</u>
1. Vacuum-box or probe test all liner field welds and repairs	Done with installation
2. Install half-gate at new basin	Done with installation
3. Wet Bentonite-clay under FML	2
4. Fill, test with electrical conductance probe (ECP), and make repairs in two-foot increments (See Table 2 for time elements)	32 to 64
5. Independent ECP firm inspection	1
6. Drain water from under FML	1
7. Drain basin	5
8. Install temporary dam and half-gate at old basin, remove dam	21
	<hr/>
TOTAL	62 to 94

TABLE 2

TWO-FOOT INCREMENT TIME ELEMENTS

	DAYS TO COMPLETE
<u>Fill and Test Two-Foot Increment</u>	
o Fill two-foot increment	2.5
o Allow leaks to migrate and complete circuit	1
o Inspect with ECP	0.5
	—
SUBTOTAL	4
<u>Repair Two-Foot Increment if Leaking</u>	
o Drain two-foot increment	1
o Repair holes and vacuum-box or probe test repairs	0.5
o Refill two-foot increment	2
o Reinspect with ECP	0.5
	—
SUBTOTAL	4
TOTAL	===== 4 to 8



NOTE: The top one-fourth of the temporary dam shall be removed at the end of the work day. This will allow use of the existing basin and spillway if a severe storm were to occur between periods of construction.

HALF-GATE INSTALLATION SEQUENCE DIAGRAM

Figure 1