NYSERDA **New York State Energy Research and Development Authority**

Vincent A. DeIorio, Esq., ***Chairman***
Toll Free: 1 (866) NYSERDA
www.nyserda.org • info@nyserda.org

April 22, 2009

Mr. Robert J. Phaneuf, P.E.
Acting Bureau Director
Bureau of Hazardous Waste and Radiation Management
New York State Department of Environmental Conservation
625 Broadway, 9th Floor
Albany, New York 12233-7258

Dear Mr. Phaneuf:

SUBJECT: Geomembrane Cover Wind Damage at the State-Licensed Disposal Area (SDA) on March 11, 2009

As requested in your March 24, 2009 letter (Reference 1) regarding the subject event, NYSERDA is providing the Department with the attached response report. This report includes the following specific details:

- Response Timeline and Description of the Event
- Temporary Mitigation of the Damage
- Analysis of the Event
- Factors Contributing to the Event
- Plans for Geomembrane Cover Repair and Replacement
- Photographs (Appendix A)
- Engineering Drawings (Appendix B)
- Engineering Change Notice 9 (Appendix C)
- Work Plan for Repair of the Damaged Geomembrane Cover (Appendix D)
- Proposed Timeline and Approach for Replacement of the Very-Low Density Polyethylene Cover (Appendix E)
- Development of a Contingency Plan for the Geomembrane Covers (Appendix F)

NYSERDA is currently working on specific tasks described in Appendices D-F. In addition, NYSERDA is limiting foot traffic on the Very-Low Density Polyethylene (VLDPE) to activities necessary for compliance with existing regulatory requirements and/or for the safe management of the SDA.

Please let me know if you have any questions or require further information.

Sincerely,

WEST VALLEY SITE MANAGEMENT PROGRAM

Paul J. Bembia

Paul J. Bembia, Director

PJB/09amd020.amd

Main Office
Albany
17 Columbia Circle
Albany, NY 12203-6399
Toll Free: 1 (866) NYSERDA
Phone: (518) 862-1090
Fax: (518) 862-1091

West Valley Site Management Program
10282 Rock Springs Road
West Valley, NY 14171-9799
Phone: (716) 942-9960
Fax: (716) 942-9961

New York City
485 Seventh Ave., Suite 1006
New York, NY 10018
Phone: (212) 971-5342
Fax: (212) 971-5349

Buffalo
Larkin at Exchange Building
726 Exchange Street, Suite 821
Buffalo, New York 14210
Phone: (716) 842-1522
Fax: (716) 842-0156

/amd

Attachment:

1. *Response Report on the March 11, 2009 Geomembrane Cover Wind Damage at the State-Licensed Disposal Area*, dated April 24, 2009 including Appendices A-F.

Reference:

1. Letter, Robert J. Phaneuf, P.E. to Paul J. Bembia, *Geomembrane Tear at the State-Licensed Disposal Area (SDA)*, dated March 24, 2009.

cc: E. E. Dassatti, NYSDEC, Albany (w/att.)
T. B. Rice, NYSDEC, Albany (w/att.)
L. M. Winterberger, NYSDEC, Albany (w/att.)
D. O'Hehir, NYSDEC, Albany (w/att.)
P. W. Concannon, NYSDEC, Region 9 (w/att.)
P. A. Giardina, USEPA, Region 2 (w/att.)
A. Park, USEPA, Region 2 (w/att.)
K. I. McConnell, USNRC (w/att.)
B. C. Bower, DOE-WVDP (w/att.)
J. M. Dundas, DOE-WVDP (w/att.)
G. H. Baker, NYSDOH (w/att.)
W. T. Varcasio, NYSDOH (w/att.)
C. A. Biedermann, WVES (w/att.)
D. P. Klenk, WVES (w/att.)
H. Brodie, NYSERDA-Albany (w/att.)
D. A. Munro, NYSERDA-Albany (w/att.)
T. H. Attridge, NYSERDA-WV (w/att.)
J. C. Kelly, NYSERDA-WV (w/att.)
A. L. Mellon, NYSERDA-WV (w/att.)
File #10000-0002 (w/att.)

Response Report on the March 11, 2009 Geomembrane Cover Wind Damage at the State-Licensed Disposal Area (SDA)

April 24, 2009

1.0 INTRODUCTION

On March 11, 2009, a small portion of the XR-5 geomembrane cover at the State-Licensed Disposal Area (SDA) was damaged during a strong wind event. West Valley site Management Program (WVSMP) staff responded immediately to the event and, with the assistance of additional on-site manpower, temporarily secured the damage with sandbags. The event was not classified as an emergency by WVSMP's Emergency Coordinator (EC); however, later that day, NYSERDA made courtesy notifications to the New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH) and the U.S. Environmental Protection Agency (EPA) to inform them of, and the response to, the event.

2.0 RESPONSE TIMELINE AND DESCRIPTION OF THE MARCH 11 EVENT

9:00 a.m. WVSMP staff conducted the SDA weekly inspection of the interior and exterior of the Frac Tank and T-1 Buildings, and did not observe anything unusual at the SDA, which would indicate that the event likely took place between 9:30 and 11:15 a.m.

11:20 a.m. WVSMP's Director was contacted by the Supervisor of the on-site Environmental Laboratory, who stated that his field monitoring team reported to him that there was an extensive tear in the geomembrane cover.

11:30 p.m. WVSMP's Director and another WVSMP staff member immediately traveled from the NYSERDA offices at the Ashford Office Complex (AOC) to the SDA to inspect the tear.

12:00 p.m. The two WVSMP staff arrived at the SDA and loaded six (60 pound) bags of concrete and a wheelbarrow (stored in the Frac Tank Building) into the NYSERDA van, and drove closer to the damaged area. Two on-site Environmental Laboratory staff joined them at the SDA to help secure the damaged section of the cover. The four-person team was unsuccessful in resecuring the damaged section of the cover (using the six concrete bags) as the force of the wind was too powerful; therefore, the Environmental Laboratory staff left to obtain additional sandbags and manpower.

12:05 p.m. WVSMP staff at the SDA called the AOC office, and directed them to dispatch NYSERDA's maintenance contractor (Ecology & Environment [E & E]), along with Radiation Protection support) to the SDA. A request was also made to send two more WVSMP staff out to the SDA to assist in restoring and securing the cover to the ground surface.

12:10 p.m. WVSMP staff at the SDA contacted the WVSMP's EC, who was off-site that day. Upon being informed of the events, the EC said he would review NYSERDA's emergency procedures to determine if the event was an emergency. The EC was also advised of the mobilization of E & E, and additional WVSMP staff to the SDA.

12:15 p.m. The EC called the WVSMP's Safety and Health Supervisor (SHS) to confer on the status of the event. The EC indicated that the event did not meet the conditions of an emergency. The SHS informed the EC that E & E's geomembrane subcontractor (AEG) was being contacted to come out to the SDA as soon as possible to assess the damage and plan for permanent repairs.

12:30 p.m. Seven staff from the Environmental Laboratory arrived at the SDA with additional sandbags to help NYSERDA secure the cover.

1:00 p.m. The damaged section of the geomembrane cover was temporarily secured with sandbags. The seven Environmental Laboratory staff left the SDA.

1:10 p.m. WVSMP staff at the SDA contacted the EC. The EC inquired about the condition of the soil (which appeared dry) and if there was evidence of a release (there was not). The EC declared that this event was not an emergency and requested that a debrief be conducted with all involved WVMSP staff upon their return to the office.

1:30 p.m. WVSMP staff contacted the SHS to inquire about the status of E & E's response to the event. The SHS indicated that E & E's estimated arrival was ~2:00 p.m.

1:45 p.m. E & E's maintenance subcontractor, SLR, arrived at the SDA with 100, 50-pound bags of sand to provide additional weight for securing the cover. After unloading the 100 bags onto the cover, one SLR staff person made an additional trip to obtain more sandbags. The SLR team continued moving the sandbags onto areas of the cover that were observed to be billowing.

2:15 p.m. Three E & E employees arrived on site and WVSMP staff turned the SDA Gate 16 key over to E & E. E & E communicated to NYSERDA that the Radiation Protection contractor would be at the SDA between 4:00 – 5:00 p.m. to conduct precautionary radiological surveys of the damaged area.

2:20 p.m. E & E held a short safety briefing to review safety hazards.

2:40 p.m. Additional E & E staff arrived at the SDA.

2:45 p.m. WVSMP's Director, WVDP Program Manager, and the involved WVSMP staff contacted the EC (by telephone) for a debrief of the day's events. The four discussed what notifications and follow-up activities needed to be completed.

2:55 p.m. Two staff from MJW, E & E's Radiation Protection subcontractor, arrived at the SDA.

3:00 p.m. WVSMP's Director contacted the United States Department of Energy (DOE)'s WVDP Director with a "courtesy call notification" of the events of the day.

3:05 p.m. SLR and E & E staff attempted to reposition the damaged section of the cover by pulling edges and moving sandbags to remove the wrinkles. The section was repositioned, but gaps remained between the damaged and undamaged sections (Photographs 1-4, Appendix A).

3:15 p.m. WVSMP's Director and involved staff contacted WVSMP's Deputy Counsel in Albany and provided him with notification of the day's events. Deputy Counsel stated that he would notify NYSERDA's General Counsel and NYSERDA's Officers of the day's events.

3:20 p.m. WVSMP's Director and involved staff contacted Patrick Concannon, NYSDEC's Region 9 Representative, for the site with a "courtesy notification" of the day's events. Mr. Concannon stated that he would notify the NYSDEC staff in Albany of the events, and would be at SDA the next morning to view the extent of the damage. WVSMP staff offered to escort Mr. Concannon to the SDA.

3:25 p.m. MJW completed a confirmatory radiological survey of the damaged area. The two Radiation Control Technicians reported they measured nothing above background radiation levels from their direct checks of the damaged area and exposed soil, as well as from the swipes from the underside of the damaged geomembrane.

3:30 p.m. SLR and E & E placed an impermeable concrete curing blanket over the gaps that remained between the damaged and undamaged sections of the cover, securing the blanket in place with additional sandbags (see Photograph 5, Appendix A).

3:35 p.m. To reduce billowing of the undamaged geomembrane, SLR and E & E moved sandbags to the north and east of the damaged section.

3:40 p.m. WVSMP's Director and involved staff contacted Bill Varcasio of NYSDOH with a "courtesy notification" of the day's events. Mr. Varcasio asked what agencies had been contacted and was provided a list of agencies that were notified. Mr. Varcasio thanked NYSERDA for the notification and asked to be kept apprised of the follow-up events.

3:45 p.m. WVSMP's Director and involved staff left a voice mail message for Andy Park at the U.S. Environmental Protection Agency. The voice message was a "courtesy notification" about the day's events and stated that the event was not considered an "emergency."

4:15 p.m. SLR staff arrived at SDA with a truckload of additional sandbags. SLR and E & E staff continued placement of the additional sandbags.

4:30 p.m. The last of the sandbags were placed on the geomembrane by SLR and E & E.

4:45 p.m. All staff responders exited the SDA, and the gate was locked and secured.

5:00 p.m. E & E returned to the AOC to debrief WVSMP's Director.

3.0 TEMPORARY MITIGATION OF THE MARCH 11 EVENT

The temporary mitigation of the geomembrane damage includes the following:

- The damaged triangular section has been pulled back into place, to the extent practical, and is being held in place with sandbags (Photograph 6, Appendix A).
- The gaps between the exposed edges of the damaged geomembrane and the undamaged geomembrane have been covered with concrete curing blankets, and secured with sandbags (Photograph 5, Appendix A).
- Sandbags have been placed on the undamaged geomembrane, to the north and east of the damaged section, where billowing under the cover was observed.
- Sandbags have been placed on the outward side of the Jersey barriers to prevent air flow under the geomembrane.

Since the event, NYSERDA has performed routine weekly inspections of the damaged area and the results are documented on inspection forms. Non-routine inspections are also conducted after severe weather events. NYSERDA also completed its annual geomembrane inspection, a detailed walk-down of the SDA cover system on April 7, 2009, to identify peripheral damage and any other areas needing repair.

4.0 ANALYSIS OF THE MARCH 11 EVENT

NYSERDA has completed an analysis of the likely sequence of events that occurred on March 11. The analysis relies heavily on field observations by the initial responders, discussions with the geomembrane consultants, and interviews with two former WVSMP employees who managed the XR-5 geomembrane installation. In addition, staff reviewed photographs, design and installation reports, and project-related correspondence to help inform the analysis.

The likely sequence of events for this event is as follows:

- Strong northwesterly winds, including periodic gusts, moved across the Nuclear Regulatory Commission-Licensed Disposal Area (NDA) geomembrane surface, over the Hardstand area, and beneath and between the Jersey barriers located just inside the SDA fence (Photographs 7, 8, and 9, Appendix A).

- The strong winds moved into the gaps between and beneath the Jersey barriers (on the windward side), and forced the attached XR-5 membrane (on the leeward side) to bulge (Photograph 8, Appendix A). This bulging increased the available area for air to continue to flow underneath the geomembrane. Continuous sustained winds perpetuated the accumulation of air under the XR-5 geomembrane. The accumulating air began lifting the geomembrane cover off the ground surface on the leeward side of the barriers. As identified above, sand ballast bags were never installed at the base of the leeward side of the Jersey barriers to prevent geomembrane cover uplift from below, and wind-lift from above.

- As more wind was captured under the XR-5 geomembrane, the cover continued to lift off the ground surface creating additional area for air flow beneath the cover. This lifted area grew until it reached the wind anchor trench located between Trenches 12 and 13.

- At the northern end of the wind anchor trench, where the XR-5 and Very-Low Density Polyethylene (VLDPE) covers meet, the covers overlap and are buried under stone for drainage. The accumulating air mass lifted the XR-5 edge out of the stone, and the most northern section of the sand ballasted sack of the XR-5 was moved several feet out of place (Photograph 10, Appendix A). NYSERDA surmises that the tear along the welded seam and panel of the XR-5 occurred when the XR-5 was lifted out of the wind anchor trench, and a much larger area of the cover was then lifted by the strong winds.

- With both the tear of the welded seam and the edge of the XR-5 (in the wind anchor trench) now free, a triangular shaped section of XR-5 began accumulating air underneath it and flapping in the wind. Vibrating wire piezometer cables that ran across this section of cover kept the geomembrane

cover from completely folding back. At this point, NYSERDA arrived at the site to respond to the event.

5.0 FACTORS CONTRIBUTING TO THE MARCH 11 EVENT

NYSERDA has completed an event assessment to identify factors that may have contributed to the event. The assessment included initial responder observations; review of wind data; discussions with the geomembrane consultants; and review of the SDA geomembrane design, installation and performance reports. The following contributing factors were identified:

A. Strong wind gusts
B. Exposed air spaces beneath and between the Jersey barriers
C. Sand ballast bags not installed along inside of Jersey barriers
D. Different cover materials not attached at the seam between Trenches 12 and 13
E. Recent physical changes at the NDA and Hardstand

Each contributing factor is discussed below.

A. Strong Wind Gusts:

Staff responding to the event consistently reported intense wind gusting on the surface of the SDA geomembrane cover. On March 11, the highest wind speed recorded from the on-site meteorological tower was 31.2 miles per hour (at 10 meter height). The Buffalo International Airport recorded the highest sustained wind speed (over two minutes) as 35 miles per hour, and also measured a high gust at 55 miles per hour. The strong wind condition at the SDA was a contributing factor to this event.

B. Exposed air space beneath and between the Jersey barriers:

The initial responders to the event observed air flow (billowing) beneath the XR-5 geomembrane, starting at the Jersey barriers located just inside the SDA fence (next to the Hardstand) and flowing towards the damaged section of the geomembrane (Photograph 8, Appendix A). The XR-5 geomembrane covers the inward face of the barriers and is fastened to the top to prevent water from running off the SDA into the Hardstand Area. The prevailing wind direction on March 11 was out of the northwest. The initial responders walking on top of the undamaged geomembrane, in the area between the Jersey barriers and the damage, noted that gusts of wind were lifting them off the ground, temporarily. Billowing underneath the cover was observed, and rippling pockets of air moved across the SDA in a southeasterly direction. Observations on the windward side of the Jersey barriers revealed open spaces beneath and between the individual sections of the barriers (Photograph 9, Appendix A). Large air pocket bulges under the geomembrane on the leeward side of the Jersey barriers were also observed (Photograph 8, Appendix A). These observations suggest the primary route of entry for air flow beneath the cover during this event was at the Jersey barriers.

C. Sand ballast bags not installed along inside of Jersey barriers:

A thorough review of the design and installation information for the XR-5 project was conducted by NYSERDA immediately after the event. Staff reviewed the "As-Built" drawings, engineering change notices (modifications to the project) and other reports related to the project. One deficiency was identified during this review that is thought to be the primary contributor to the event. An engineering change notice (ECN-9, Appendix C) and As-Built drawings (Drawings 1-2, Appendix B) reference the hand-placing of sand-filled ballast bags along the base of the Jersey barriers on top of the geomembrane cover. This additional ballast weight was intended to keep the cover tight to the ground and prevent wind uplift. For unknown reasons, the sand ballast bags were never placed on top of the cover at the base of the Jersey barriers. NYSERDA has interviewed two former employees who managed the installation and maintenance of the XR-5 cover to find out why this was never completed. Both individuals do not recall this as part of the final design or part of the installation. ECN-9 does suggest an alternative to the sand ballast bags (Page 3, ECN-9, Appendix C), but this alternative was not implemented. It is clear that had they been installed as designed, the sand ballast bags would have prevented the damage that occurred on March 11.

D. Different cover materials not attached at seam between Trenches 12 and 13:

The geomembrane cover at the SDA is made up of two different materials. NYSERDA placed a VLDPE cover over Trenches 14, 13, and half of 12 in 1992 to prevent water from infiltrating into the trenches (Photograph 11, Appendix A). The effectiveness of this action prompted NYSERDA to place another cover over the remaining trenches in 1995. NYSERDA used a hypalon geomembrane cover, XR-5, based on a review of the three-year performance of the VLDPE cover as well as performance data of other available cover materials (Photograph 11, Appendix A). The different properties of the two covers prevented NYSERDA from welding the materials along the seam where they meet. To ensure an impermeable seal where the covers meet, the end of the XR-5 cover was extended over Trench 12, terminating atop the existing VLDPE membrane at the anchor trench between Trenches 12 and 13. The ends of the XR-5 membrane were ballasted with sand, folded back in teardrop fashion, and welded to retain the ballast (Drawing 3, Appendix B). At the northern-most end between Trenches 12 and 13, the ballasted edge of the XR-5 is discontinued. Where the sand ballast edge ends, the XR-5 overlaps the VLDPE within a wind anchor trench, and is buried under stone. This part of the anchor trench directs run-off into a catch basin located on the northern end of Trench 13. NYSERDA believes increased air accumulating underneath the XR-5 loosened and pulled the geomembrane out of the anchor trench. Because the two different materials were overlapped, the accumulating air underneath the cover was allowed to escape.

E. Recent physical changes at the NDA and Hardstand:

DOE recently installed an XR-5 geomembrane cover over the five-acre NDA to prevent precipitation from infiltrating into the disposal area. During the cover project, the Hardstand immediately adjacent to the SDA was also reconfigured, including the removal of an old pump house. The Hardstand area was graded with stone and now serves as a turnaround for vehicle traffic. The NDA is located northwest of the area where the wind damage event occurred. Northwesterly winds, like those on March 11, move across the NDA before reaching the southern SDA trenches. Frictional forces at the ground surface have

been decreased since the cover was placed over the grass on top of the NDA (Photograph 7, Appendix A). The removal of the pump house and regrading of the vehicle turn-around at the Hardstand has also reduced ground level frictional forces. NYSERDA believes the recent change in the physical topography of the NDA, reduced ground-level frictional forces, and possible funneling effects may increase air flow and velocity during westerly and northwesterly winds.

6.0 PLANS FOR GEOMEMBRANE COVER REPAIR AND REPLACEMENT

On April 6, 2009, NYSERDA met with representatives of E & E and AEG to assess the damaged area of the SDA, and to begin formulating a strategy for repair. AEG is a subcontractor to E & E for geomembrane work. Upon completion of the assessment, AEG committed to preparing and submitting a work plan, schedule and cost estimate to E & E and NYSERDA later that week. The detailed work plan and repair schedule for damaged area of the geomembrane is found in Appendix D.

NYSERDA will be initiating replacement of the VLDPE geomembrane cover at the SDA in the near future as it is near the end of its useful life (based upon recent testing results). A proposal and general timeframe for replacement of this VLDPE geomembrane is found in Appendix E.

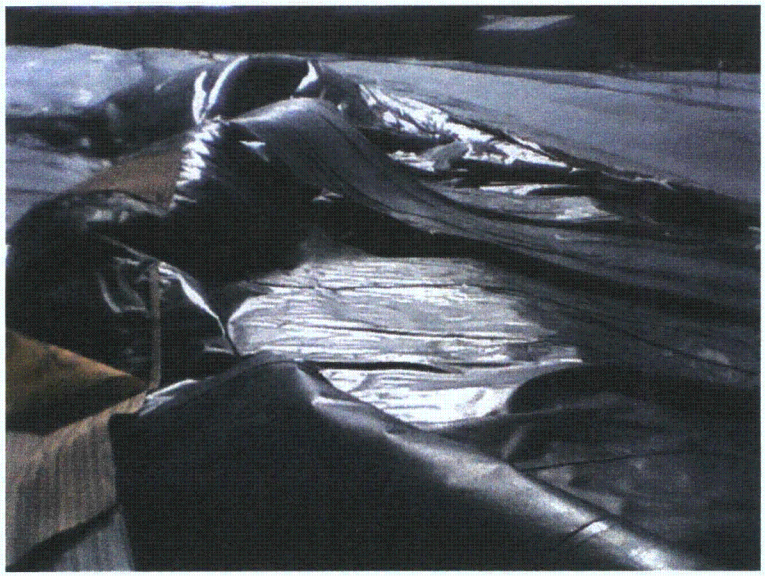
NYSERDA has also completed a review of its existing plans and procedures covering the general operations and maintenance of the geomembrane covers. This review identified what is covered in these plans and procedures to help NYSERDA develop a contingency program for the geomembrane covers. The review of existing plans and procedures, proposed content of the contingency plan, and a path for moving forward are found in Appendix F.

Appendix A

Photographs

Photograph 1: Conditions after Initial Securing of Damaged Section

Photograph 2: Conditions after Initial Securing of Damaged Section



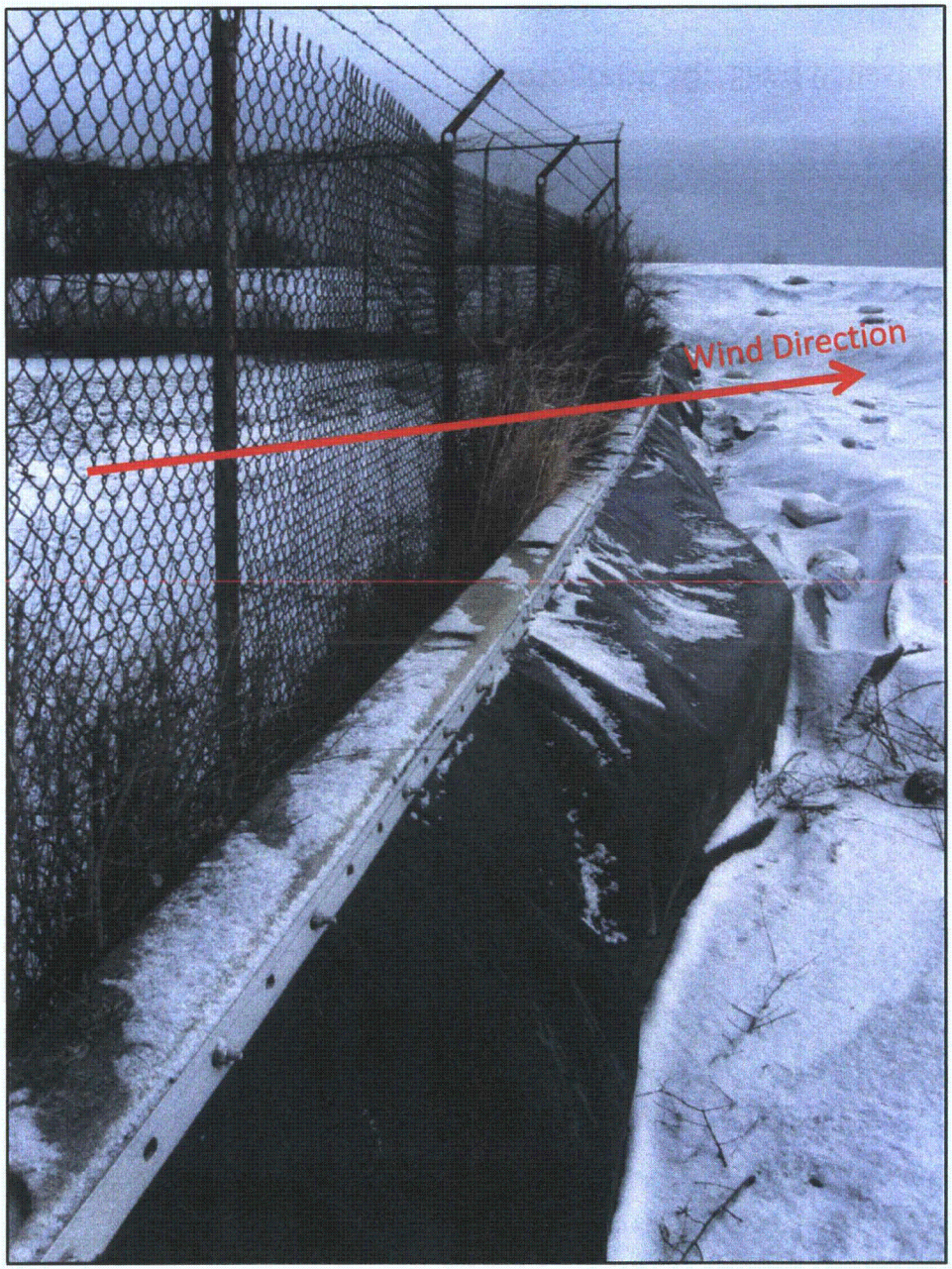
Photograph 3: Conditions after Initial Securing of Damaged Section

Photograph 4: Conditions after Initial Securing of Damaged Section

Photograph 5: Concrete Curing Blanket Covering Gap in XR-5 Geomembrane

Photograph 6: Temporary Repair of Damaged Geomembrane Cover

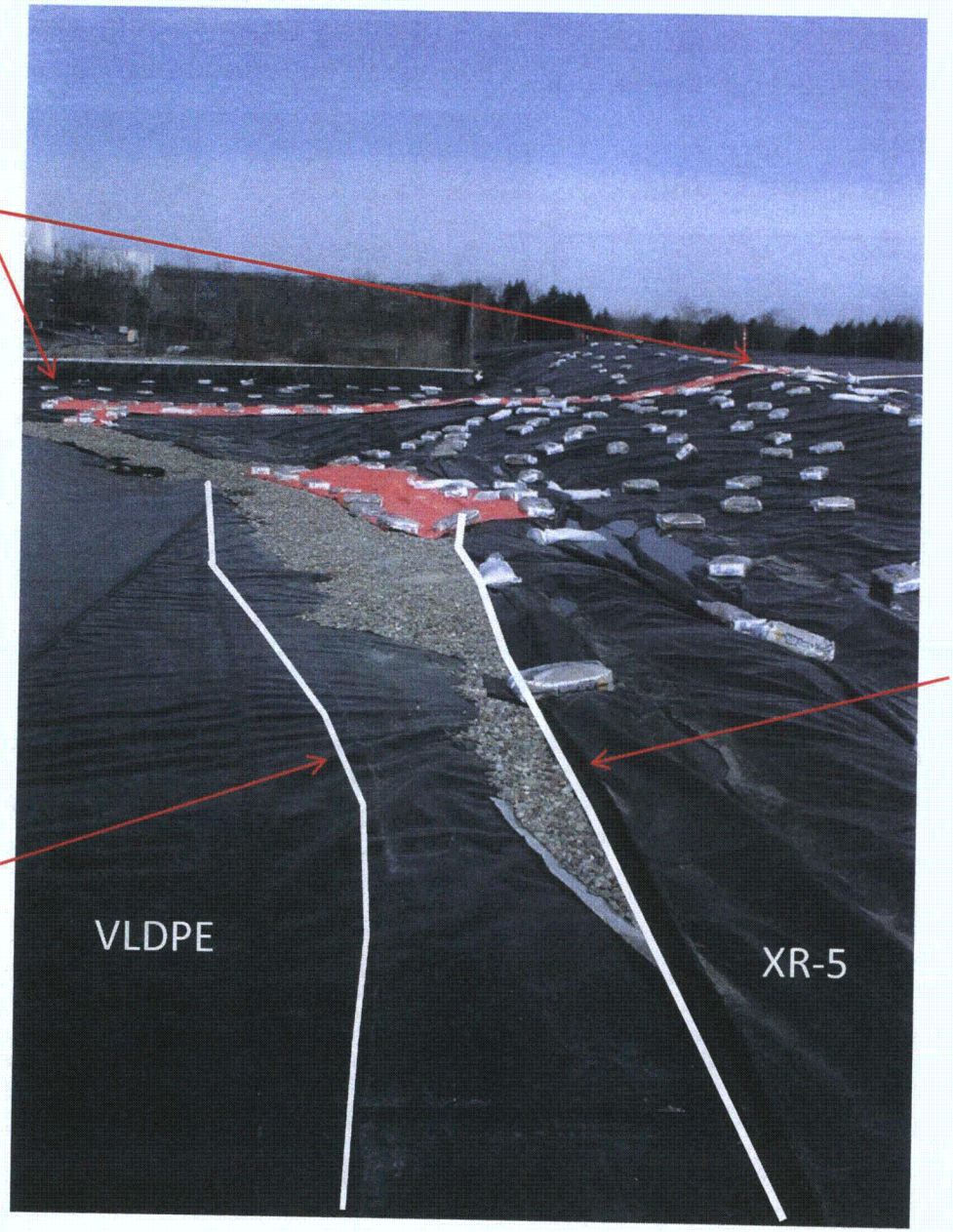
Photograph 7: Looking Southeast From NDA Geomembrane Cover – SDA Damage in Distance



Photograph 8: Jersey Barrier/Geomembrane Anchoring System Inside SDA Fence (one day after incident)

Photograph 9: Space beneath Jersey Barrier Windward Side

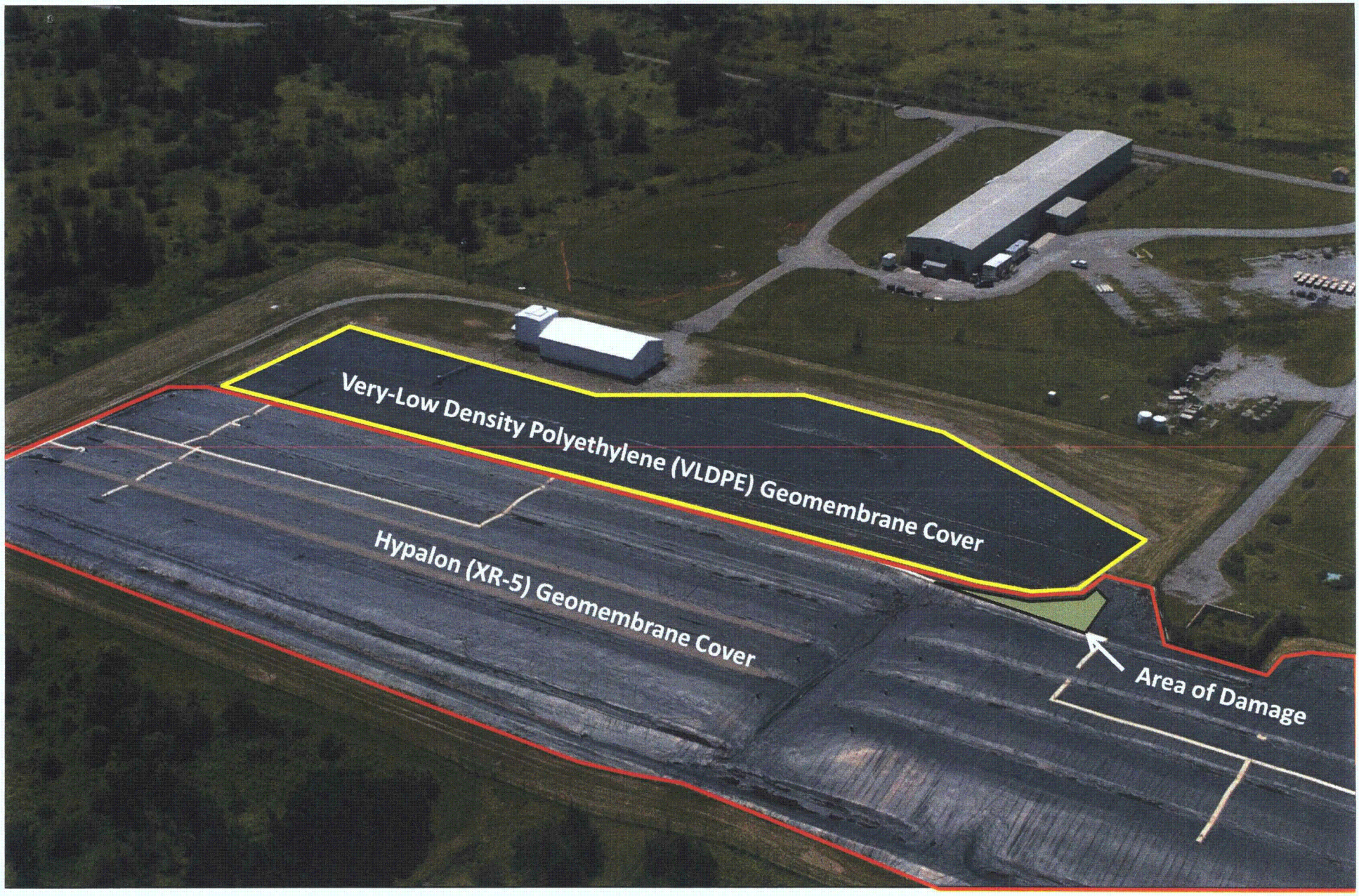
Extent of tear along welded seam of XR-5 geomembrane



Sand-ballasted edge of XR-5 geomembrane (after incident)

Original placement of sand ballasted edge of XR-5 geomembrane (before incident)

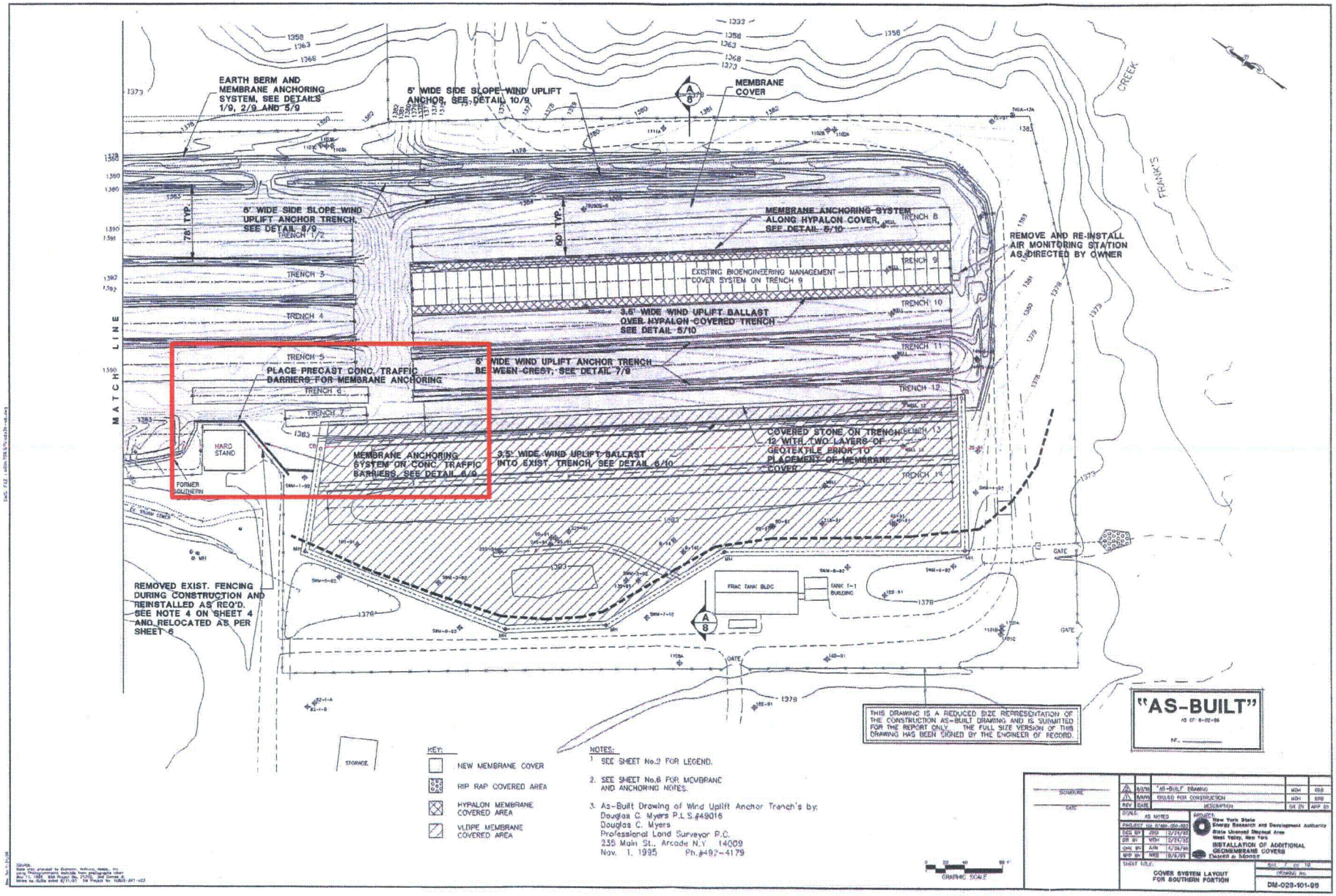
Photograph 10: Sand Ballast and Wind Anchor Trench



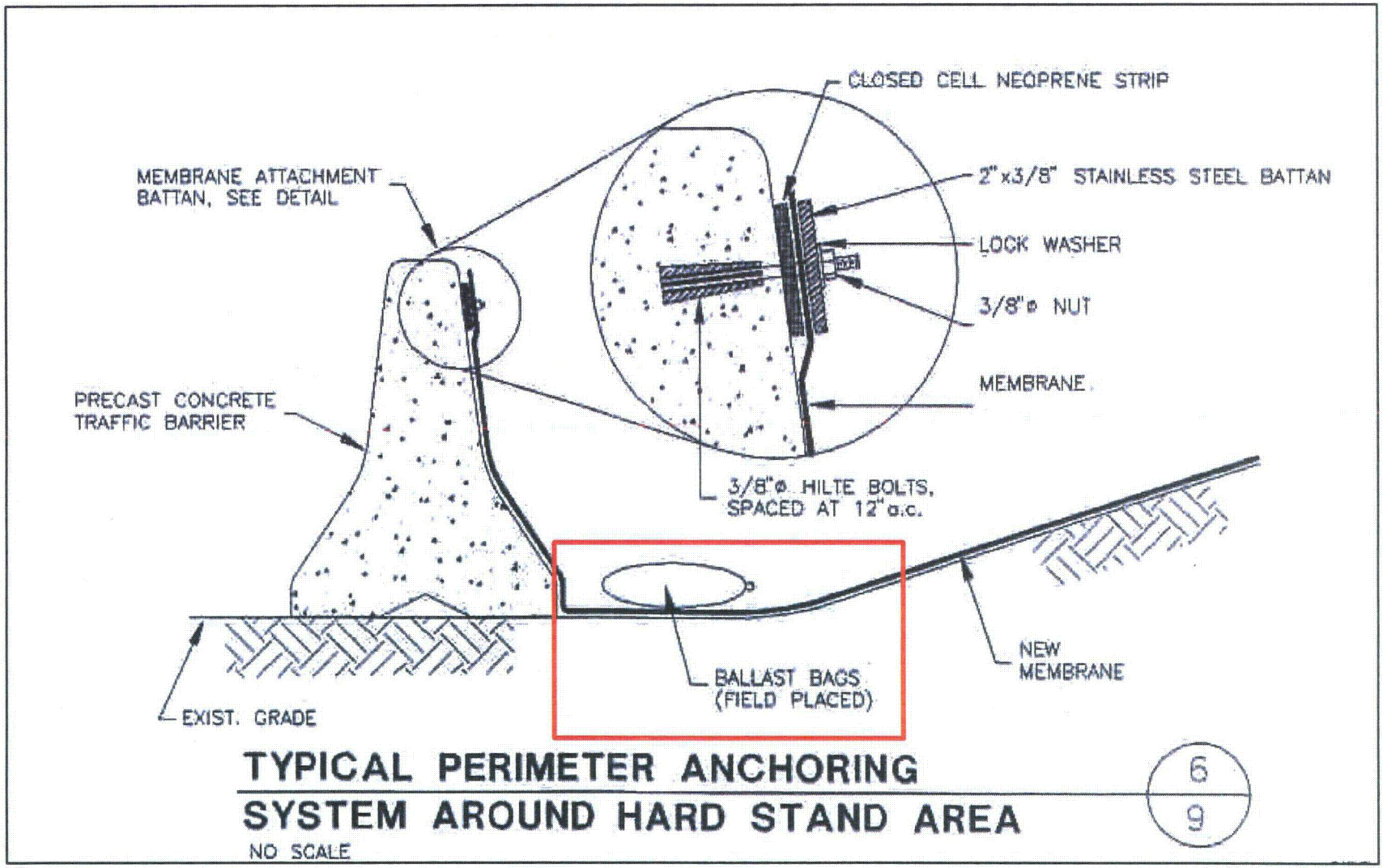
Photograph 11: Aerial Photograph of SDA with Geomembrane Damage Shown

Appendix B

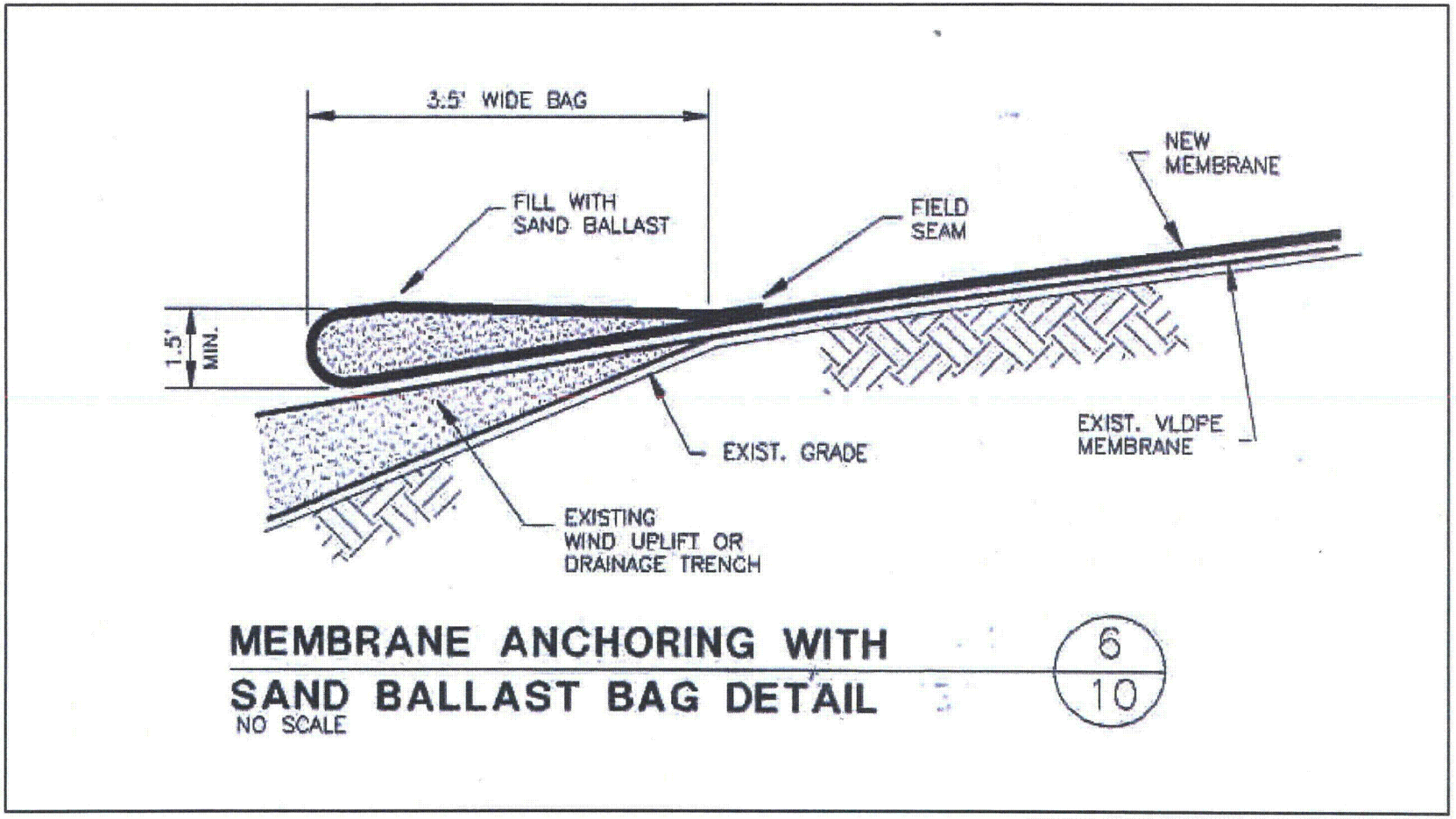
Engineering Drawings



Drawing 1: As-Built of Additional Infiltration Controls – SDA Southern Trenches



Drawing 2: Detail of Jersey Barrier Anchoring System Around Hardstand Area



Drawing 3: Detail of Wind Anchor Where VLDPE and XR-5 Covers Overlap (Between Trenches 12 and 13)

Appendix C

Engineering Change Notice 9

ENGINEERING CHANGE NOTICE

DAMES & MOORE

270 West Main Street
Springville, NY 14141
(716) 592-0026

Job No: 07465-050-023 ECN No: 009 Date: October 11, 1995

	Drawing Number	Rev	Date	Detail
Affected Drawings:	DM-023-102-95	1	8/9/95	6/9

	Section	Date	Section	Date
Affected Specifications:				

Description of changes (attach drawings and sketches as req'd.):

Replace Rip-Rap and folded back anchor around hard stand with reinforced concrete traffic barrier and sand filled ballast back per attached sheets. Eliminate asphalt paving.

Reason for change (attach additional sheets if required):

Faciliate construction.

Estimated cost of change: $_____ (Attach estimate details)

Change initiated by: A.J. Nello Signature Date 10/11/95

Change initiated by: R.R. Blickwedehl Engineer of Record Signature Date 10/11/95

DRAFTING ROOM ACTION:

Incorporate change: ___ Immediately ___ Next Drawing Revision ___ As Builts

Documents revised by: M.D. HANCHETT Signature Date 7/27/96

Revisions approved by: R.R. Blickwedehl Engineer of Record Signature Date 7/31/96

Attachments: (5) five

RRB:95:09:005.ecn ECN.FRM-Rev. 1.0-9/11/95

DAMES & MOORE

Sheet No. 1/5
Calc. No.
Rev. No.

Job No. 07465-050 Job INSTALLATION OF ADD'L GEO. COVERS. By AJN Date 10/11/95
Client NYSERDA Subject ALTERATION OF ANCHORS Chk'd. RH Date 10/11/95

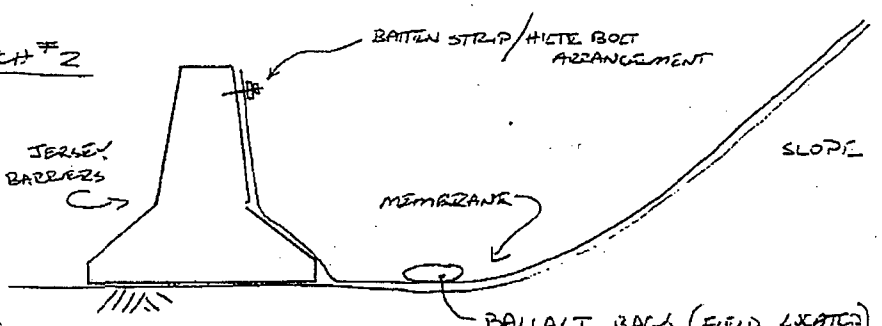
PROBLEM

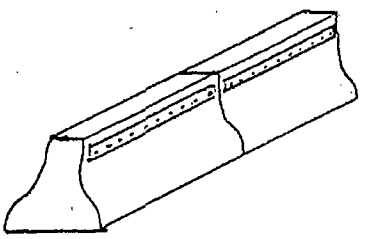
RUNOFF FROM THE GEOMEMBRANE NEEDS TO BE DIVERTED AWAY FROM THE HARDSTAND IN A SOUTHERLY DIRECTION. (SEE SKETCH #1-SH3). ADDITIONALLY THE ASPHALT (DETAIL 9/10) THAT WAS ORIGINALLY INTENDED TO BE PLACED ADJACENT TO THE HARDSTAND WILL NOT BE USED, AN ALTERNATE LINER DESIGN WILL BE NEEDED TO REMEDY THIS.

SOLUTION

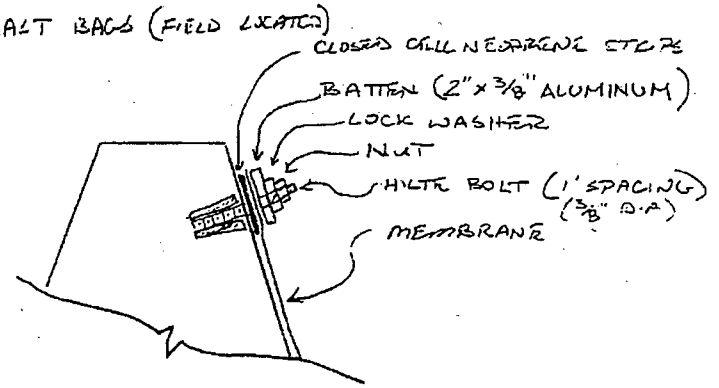
SKETCH #2 DETAILS A BATTEN STRIP/JERSEY BARRIER ANCHORING SYSTEM FOR THE GEOMEMBRANE AT THE HARDSTAND AREA. ADDITIONALLY [illegible] WILL BE USED TO CONTINUE THE ANCHOR SYSTEM BETWEEN THE BATTEN STRIP SYSTEM AND THE [illegible] 1/14 AREA.

SKETCH #2





BARRIER/BATTEN ARRANGEMENT



BATTEN DETAIL (SEE ATTACHMENT #3)

* ATTACHMENT #2

DAMES & MOORE

Sheet No. 2/5
Calc. No.
Rev. No.

Job No. 07465-050 Job INSTALLATION OF ADD'L GEO. LINERS By AJN Date 10/11/95
Client NYSERDA Subject ALTERATION OF ANCHORS Chk'd. RRB Date 10/11/

BALLAST BAGS WILL BE EQUIVALENT IN UNIT WEIGHT (PER FOOT WEIGHT) TO ORIGINAL SOIL BALLAST PER ORIGINAL DESIGN.... THUS:

$15' \times 9\,lb/ft^2$ (uplift) $= 135(1.25) = 168.8\,lb/ft.$ (SAY 170)

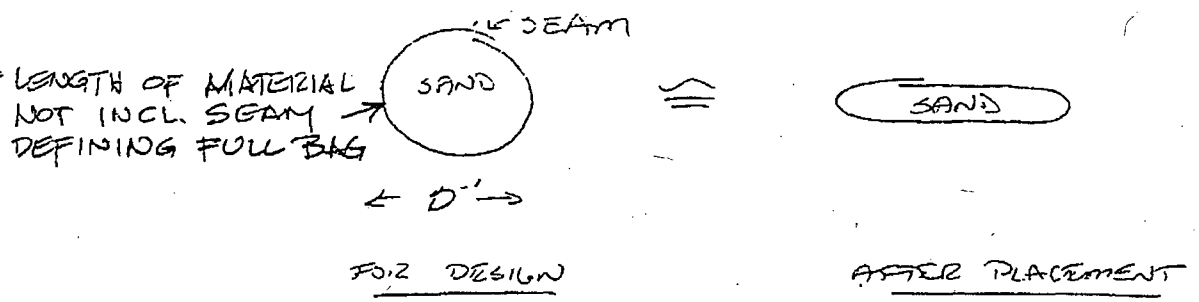
← APPROXIMATE LENGTH OF EXPOSED FABRIC.

THEREFORE;

A BALLAST BAG WITH FULL CIRCUMFERENCE L

$D = \sqrt{(168.8/120)\,4/\pi} = 1.34'$

$L = (\pi)(1.34) = 4.14$ SAY 4'-3"



ANCHORING DETAIL AT THE JERSEY BARRIER IS TO BE PER LINER MFR'S. RECOMMENDATIONS ON ATT3/SH.5.

AS AN ALTERNATIVE TO THE ABOVE, PLACING THE JERSEY BARRIER ON TOP OF THE MEMBRANE WOULD SERVE TWO PURPOSES, #1 BEING BALLAST IN PLACE OF THE SAND AND #2 BEING THE ANCHORING POINT FOR FABRIC END TERMINATION.

Appendix D

Work Plan for Repair of the Damaged Geomembrane Cover at the State-Licensed Disposal Area (SDA)

Work Plan for Repair of the Damaged Geomembrane Cover at the State-Licensed Disposal Area (SDA)

Under subcontract to Ecology and Environment, Inc. (E & E), NYSERDA's operation and maintenance contractor, American Environmental Group (AEG) will lead the work to repair the wind damage to a portion of the XR-5 Geomembrane cover at the SDA. AEG estimates that the wind damage repairs will take five, 10-hour days to complete. E&E's maintenance subcontractor, SLR, will provide labor support. The ambient air temperature must be above 50 degrees (F) for effective heat-sealing of the geomembrane. AEG is monitoring the 10-day forecast for the West Valley area to identify possible dates for performing the work.

GEOMEMBRANE REPAIR

The repair work will consist of the following steps:

1. **Mobilize the requisite field crew, equipment and materials needed for the work.**

2. **Cordon off the Very-Low Density Polyethylene (VLDPE) cover to restrict access** – The VLDPE cover is currently at the end of its useful life. In order to preserve its structural integrity, the entire area will be cordoned off with rope/temporary posts/signs until the cover can be replaced. This is intended to limit foot traffic on the VLDPE to only necessary activities for compliance with existing regulations and/or the safe management of the SDA. To the extent practicable, all repair activities will take place off of the VLDPE cover.

3. **Move the XR-5 ballast sack on Trench 12 back into its original position** (Photograph 10, Appendix A) - The sack will be opened and the ballast removed, and placed on tarps on the grass north of Trench 13 as a temporary stockpile location. The stone in the wind anchor trench between Trenches 12 and 13 will be removed, and placed on tarps on the grass north of Trench 13 as a temporary stockpile location. A hand shovel and wheelbarrow will be used to prevent damage to the underlying cover. Once the sack is empty and the stone removed, the existing XR-5 cover will be moved back to its proper position. The stone will be placed over the overlapping geomembrane covers in the wind anchor trench, and the sand ballast sack will be refilled and resealed.

4. **Add new ballast sack to extend XR-5 anchor system northward** – A new ballast sack will be installed to extend the heavy anchoring system farther to the north to meet the stone wind anchor at the ends of Trenches 12 and 13.

5. **Remove folds in the XR-5 damaged geomembrane cover** (Photograph 5, Appendix A) - The concrete curing blankets and the temporary sand ballast bags will be removed from the damaged area of the XR-5 geomembrane. The folds in the damaged area of the geomembrane will be pulled, smoothed out, and the cover returned to its original position, closing the gaps along the perimeter of the triangular-shaped area.

6. **Cover and seal the entire section of damaged XR-5 cover with new material** - Because the existing damaged material does not have sufficient overlap to reseal the tear to the undamaged section,

the triangular-shaped area will be repaired by installing a new piece of XR-5 over the existing geomembrane cover. The overlapping piece will be heat sealed continuously along the entire perimeter. All seams will be air lance tested by AEG and the test witnessed by E & E..

7. **Repair monument boots** - The damaged boots at the north and south monuments of Trench 7, and the south monument of Trench 6, will be repaired.

8. **Reseal ballast sack between Trenches 6 and 7** - The ruptured seam of the ballast sack between Trenches 6 and 7 will be heat sealed.

9. **Cover openings in the Jersey-barrier wall** (Photograph 9, Appendix A) – Air flow between and beneath the Jersey barriers contributed to the wind damage of the geomembrane cover. The openings along the entire length of the Jersey barriers to the south and east of the former Hardstand area will be sealed by attaching XR-5 geomembrane to the existing anchor straps on the inward side of the barriers, laying it over the top and down the outward side and anchoring it at ground surface with ballast. If deemed necessary at the time, anchor straps will be added to the outward side of the Jersey barriers to further anchor the new wind seals.

10. **Ballast will be placed along the base of the inward side of the Jersey barriers** – To correct the deficiency that NYSERDA believes allowed the wind uplift to occur, additional sand bag ballast will be positioned along the base of the Jersey barriers on the inward side as called for in the As-Built drawings (Drawing 2, Appendix B). These sand bags will be placed along the entire length of the Jersey barriers to the south and east of the former Hardstand area.

11. **Repair of minor damage** - Any other minor tears in the cover will be patched, and the walkway on the top of Trench 7 will be replaced.

12. **Demobilization** - The field crew will demobilize along with their equipment and excess materials.

ADDITIONAL MITIGATION EFFORTS CONSIDERED

NYSERDA, in consultation with E & E and AEG, believe that the recent change in the physical topography of the Nuclear Regulatory Commission-Licensed Disposal Area (NDA), reductions in ground surface frictional forces, and possible funneling effects may increase air flow and velocity during westerly and northwesterly winds. To attempt to reduce wind velocity, NYSERDA is considering installing an open mesh windscreen along the chain-link fence of the SDA near the former Hardstand area. The fabric would be attached to the existing fence to reduce wind velocities in this area.

Appendix E

Proposed Timeline and Approach for Replacement of the Very-Low Density Polyethylene (VLDPE) Geomembrane Cover at the State-Licensed Disposal Area (SDA)

Proposed Timeline and Approach for Replacement of the Very-Low Density Polyethylene (VLDPE) Geomembrane Cover at the State-Licensed Disposal Area (SDA)

NYSERDA will be initiating replacement of the Very-Low Density Polyethylene (VLDPE) geomembrane cover at the State-Licensed Disposal Area (SDA) in the near future as it is near the end of its service life. This decision is based upon recent laboratory test results of coupons taken from the VLDPE cover. According to the November 7, 2008 report prepared by Texas Research International Company (TRI), "there is strong evidence that this material is near the end of its useful lifetime." While there are very few visible cracks in the cover, TRI states that the "material is no longer protected from oxidation." Eventually cracks will develop from the outside, in. They also indicate that it "is not known how long it will take for this to occur."

As a preventative measure, the VLDPE cover will be cordoned off with rope/temporary posts/signs until the cover can be replaced. This is intended to limit foot traffic on the VLDPE to only necessary activities for compliance with existing regulations and/or the safe management of the SDA.

To accomplish the replacement of the VLDPE geomembrane cover, NYSERDA has prepared a general approach and timeline for completing the work:

May – June 2009:	Work with WVSMP operations and maintenance contractor, and its geomembrane subcontractor, to develop a rough cost estimate for the replacement of VLDPE.
July 2009:	Prepare WVSMP FY 2010-11 budget request that includes funding for the replacement of the VLDPE geomembrane cover.
August 2009:	Develop a detailed scope of work for replacing the VLDPE geomembrane cover. Provide scope of work to the WVSMP operations and maintenance contractor.
September – November 2009:	WVSMP contractor works with geomembrane subcontractor to develop detailed work plan, schedule and cost estimate for replacement work. Contractor submits work plan to NYSERDA.
November – December 2009	Health and Safety (H&S) and Radiation Protection (RP) reviews are conducted by WVSMP. NYSERDA finalizes contract for geomembrane replacement.
January – April 2010:	WVSMP contractor procures materials for replacement of the VLDPE geomembrane cover.
May - August 2010:	Geomembrane subcontractor installs new geomembrane cover at SDA.

Appendix F

Development of a Contingency Plan for the Geomembrane Covers at the State-Licensed Disposal Area (SDA)

Development of a Contingency Plan for the Geomembrane Covers at the State-Licensed Disposal Area (SDA)

INTRODUCTION

NYSERDA is in the process of developing a contingency plan to effectively respond to possible geomembrane cover events. In its March 24, 2009 letter to NYSERDA, the New York State Department of Environmental Conservation (NYSDEC) requested that a specific contingency program be developed for implementation in situations similar to the March 11, 2009 wind damage at the State-Licensed Disposal Area (SDA). The program will also include ongoing monitoring of the geomembrane cover.

NYSERDA's approach to this request has been to:

- Review existing written plans and procedures on the operations, monitoring and maintenance of the geomembrane covers that are currently in place
- Identify proposed content of the Geomembrane Cover Contingency Plan based upon what is already in place, and what needs to be added to NYSERDA's program
- Propose a path forward for NYSDEC's review

EXISTING PLANS AND PROCEDURES ON THE GEOMEMBRANE COVERS

In the March 24, 2009 letter to NYSERDA, NYSDEC stated that "the general Operations and Maintenance of the geomembrane has been the use of best management practices. Putting said practices in writing for SDA is appropriate." NYSERDA currently has several of these best management practices in existing plans and procedures. Listed below are five documents which are currently part of NYSERDA's existing plans and procedures. These documents describe the SDA geomembrane covers, the practices used by the WVSMP to monitor and maintain the integrity of the geomembrane covers, and the general emergency planning and response operations. NYSERDA's operations and maintenance contractor has two plans in place, also listed below) to support NYSERDA's geomembrane cover inspections, testing and repairs, as well as rapid response to off-normal events.

1. **OPS508, *SDA Infiltration Controls Description*** includes a physical description of the geomembrane covers, and a general description of the inspections performed to monitor the condition of geomembrane.

2. **OPS003, *Walkover Inspection of the SDA*** establishes the frequency and method for performing routine walkover inspections to assess the physical features, grounds and conditions of the SDA. This inspection includes observation of the geomembrane for potential failure of wind anchors or other damage to the geomembrane cover, including penetration boots, nonskid walkways and detention basins. The walkover inspection is performed at least five times per year with additional inspections performed during extended periods of abnormally high precipitation and/or following single, abnormally large precipitation events.

3. **OPS007, *Geomembrane Cover System Inspection*** outlines the steps for performing an annual inspection of the geomembrane. Performed annually by the maintenance support contractor, the inspection identifies cracks, tears, punctures or other potential loss of integrity of the geomembrane, boots around penetrations in the geomembrane, and all geomembrane seams and welds. The identified repairs are then performed on the geomembrane during the summer work season.

4. **OPS503, *Security Plan for the WVSMP*** includes routine vehicle patrols of the SDA by the West Valley Demonstration Project (WVDP) Security personnel. Although the security plan specifies that security personnel will check for site intruders as well as the integrity of the SDA security fence and entry gates, WVDP Security will report any observed off-normal conditions to the SDA Program Manager.

5. ***ER100, Emergency Response Plan for the WVSMP*** describes how NYSERDA, in cooperation with the WVDP (when needed) and our support contractors respond to declared emergencies and off-normal events. The Emergency Response Plan is supported by implementing procedures that describe responses to specific types of events.

Contractor Plans

1. ***OM-3, Geomembrane Cover System Maintenance and Testing Plan*** describes the process by which tears, cracks, punctures, or other failures of the geomembrane are addressed. This procedure also describes the process for collecting coupons of the geomembrane for testing, including the frequency at which tests are performed, and the analyses required for each type of geomembrane.

2. ***OM-6, Emergency Response Services Plan*** establishes the process for rapid mobilization of the maintenance support contractor when responding to off-normal events such as the wind damage event that occurred on March 11, 2009. The implementation of this plan on March 11 was effective in obtaining immediate assistance while minimizing the damage to the geomembrane.

CONTENT OF PROPOSED GEOMEMBRANE COVER CONTINGENCY PLAN

After evaluating the March 11, 2009 wind damage event at the SDA, as well as reviewing internal plans and procedures, NYSERDA proposes that this contingency plan cover the following areas:

- **SCOPE** -A physical description of what is covered (e.g., items, areas)
- **IDENTIFICATION OF THREATS** - An identification of expected events and description of possible threats to the geomembrane
- **DISCOVERY** -A means to identify the occurrence of off-normal events
- **NOTIFICATION** - A means to report off-normal events (regulatory notification requirements)
- **RESPONSE**
  - Arrangements for responding to off-normal events, including mobilization, lines of communication and structure of response teams
  - Specific first response actions to geomembrane damage
- **DOCUMENTATION** - A method for documenting response efforts

- **RECOVERY** - A method for establishing a recovery/repair plan

PROPOSED PATH FORWARD

In response to NYSDEC's request for a contingency program, NYSERDA proposes developing an overall written plan (Geomembrane Cover Contingency Plan) that includes the aforementioned proposed content. This plan would reference existing procedures, and any new procedures that are needed to support the plan.

NYSERDA is interested in NYSDEC's feedback on this approach prior to proceeding with development of the plan.