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June 17, 2009

Reference No. 056393

Mr. Michael Berkoff
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U.S. Environmental Protection Agency - Region V
Superfund Division, Remedial Response Section #2
77 West Jackson Boulevard (SR - 6J)
Chicago, Illinois 60604 - 3590

US EPA RECORDS CENTER REGION 5



Dear Mr. Berkoff:

Re: Pre-Final Design Report Addendum No. 1 - Version 2
12th Street Landfill Operable Unit No.4
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Allegan and Kalamazoo County

Attached please find three copies of the following deliverables for Pre-Final Design Addendum No. 1 - Version 2, as summarized in the Completion of Remedial Design memorandum that was provided to the United States Environmental Protection Agency (U.S. EPA) on April 23, 2009 by Conestoga-Rovers & Associates (CRA) on behalf of Weyerhaeuser Company (Weyerhaeuser) for the 12th Street Landfill, Operable Unit No.4, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Allegan and Kalamazoo County (Site):

- Version 2 of the revised text of Section 6 of the Pre-Final Design Report (with redline/track changes from January 2009 Pre-Final Design Report and CRA's version 1);
- Appendix A, Documentation of the Predeign Studies: Addition of landfill gas field testing data;
- Appendix B, Slope Stability Calculations: Replacement of slope stability calculations for January 2009 Pre-Final Design Report appendix;
- Appendix E, Specifications: Revised and new specifications sections to address design changes;
- Appendix G, Surface Water Management Calculations: Replacement of surface water management calculations for January 2009 Pre-Final Design Report Appendix; and
- Design drawings at an approximately 95 percent completion stage (i.e., Drawings C-01, through, C-12).





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& ASSOCIATES**

June 17, 2009

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Reference No. 56393

Should you have any questions or require any additional information, please do not hesitate to contact the undersigned.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Gregory A. Carli, P. E.

GC/gb/7

Encl.

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Version 2 – June 17, 2009

PRE-FINAL DESIGN REPORT - ADDENDUM NO. 1 REVISED SECTION 6.0

**12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN**

**Operable Unit No. 4 of the
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site**

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**MAY-JUNE 2009
REF. NO. 056393 (2)**

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6.0 DESIGN COMPONENTS

The design for the following components of the remedial action is described in this section:

- Site preparation;
- Excavation of paper residuals from outside the landfill footprint;
- Landfill grading, including modifying slopes to 3H:1V;
- Final landfill cover system;
- Surface water management;
- Landfill gas management;
- Access road;
- Institutional controls;
- Abandonment of existing groundwater monitoring wells; and
- Installation of groundwater monitoring wells.

6.1 SITE PREPARATION

Prior to excavating paper residuals outside the landfill footprint or the regrading of the landfill, the following activities will be performed:

- The condition of 12th Street will be reviewed and documented to ensure that the condition is maintained following completion of the construction activities.
- Silt fencing will be placed around the proposed excavation areas (~~Plan Sheet 2~~Drawing C-032) to prevent the potential migration of sediment beyond the limits of construction as a result of surface water runoff. The silt fencing will be installed in accordance with the specifications contained in Appendix E of the RMT Pre-Final Design Report.
- Brush and trees will be cleared and grubbed, as needed in the proposed excavation areas (~~Plan Sheet 2~~Drawing C-02), including enough space for equipment to access the areas and for the staging of materials and equipment. Cleared vegetation will be chipped and disposed within the limits of paper residuals or taken off site. Larger tree trunks and stumps will be stockpiled on-site and may be incorporated under the landfill cover or taken off-site. Root wads, to the extent possible, will be incorporated under the landfill cover.

- Existing groundwater monitoring wells, leachate head wells, landfill gas extraction wells, and staff gauges will be abandoned prior to performing grading and/or excavation activities as described in Section 8.1 of the RMT Pre-Final Design Report.
- A staging area for materials and office and equipment trailers will be established adjacent to 12th Street, outside the limits of paper residuals¹.
- A decontamination pad will be constructed at a location ~~within~~ directly adjacent to the proposed final limits of paper residuals adjacent to at the 12th Street Landfill¹.
- Temporary Access roads will be constructed as necessary to obtain access to the excavation and grading areas.
- Access agreements, redevelopment plans, and lines of communication will be established with the adjacent property owners.

6.2 EXCAVATION OF PAPER RESIDUALS OUTSIDE THE LANDFILL FOOTPRINT

The areal limits of visible paper residuals outside the footprint of the landfill on the MDNR property, the asphalt plant property, and in the wetlands were previously delineated based on information obtained by Geraghty and Miller and the U.S. EPA in 1994 and 2003, respectively (G&M, 1994b and U.S. EPA, 2004), and have been refined based on the findings of the predesign investigation performed by Weyerhaeuser in 2008. A copy of the report documenting the predesign studies (RMT, 2008e) is contained in Appendix A of the RMT Pre-Final Design Report. Based on the areal limits (~~Plan Sheets 1 and 2~~ Drawing C-02) and the thicknesses of visible paper residuals present in areas beyond the proposed final capped footprint of the landfill, an estimated total of 12,200 cubic yards (cy) of visible paper residuals needs to be excavated and relocated back into the landfill (200 cy from the MDNR property, 7,500 cy from the asphalt plant property, and 4,500 cy from the wetland).

The estimated volumes of off-site paper residuals to be relocated within the footprint of the landfill was revisited as part of the overall review of the pre-final design to verify the volume of material to be accommodated under the final cover system. The test pit and boring information was provided in Appendix A of the RMT Pre-Final Design Report, used to delineate both the horizontal and vertical extent of paper residuals.

¹ During the 2009 construction season these facilities may be staged within the boundary of the 12th Street Landfill near 12th Street.

A review of these logs showed paper residuals to be present beneath the asphalt plant property to a depth in excess of 10 feet (as indicated on the original RMT drawings), with these excessive depths being present in the current landfill embankment extending on to the asphalt plant property. However, paper residuals are not present to a depth of 10 feet over the entire delineated area on the asphalt plant property. In the northern and southern portions of this off-site area, the depth of paper residuals is approximately 2 feet and 4 feet, respectively, grading to over 10 feet in depth in the middle. An independent calculation of the excavation volume on the asphalt plant property, based on assigning areas to the various test pits and borings, resulted in an estimated excavation volume of approximately 7,300 cy, which is very close to the previous estimate of 7,500 cy.

The test pits conducted in the wetland area to the north and northwest of the landfill showed that the depth of paper residuals ranged from 8 inches to 3 feet (as indicated on the original RMT drawings), with the shallow depths being observed to the north and northeast and the depths of paper residuals increasing to the northwest as the toe of the landfill extends on to the asphalt plant property. It should also be noted that the depths of paper residuals decreased to zero (i.e., not present) as each test pit moved away from the toe of the landfill. The excavation volume was again independently checked by assigning areas to each of the test pits, which resulted in an estimated volume of approximately 2,300 cy, which is only half of the previous estimate of 4,500 cy. It would appear that the previous calculations must have assumed full depth of excavation from the landfill toe of slope to the defined limits of paper residuals, whereas the revised calculations recognized that the depths decreased to zero at the defined limits.

Finally, the test pits on MDNR property to the southeast of the landfill showed that the depth of paper residuals was approximately 8 inches along this entire property line. Similar to the wetland area to the north, the depths of paper residuals decreased to zero as each test pit moved away from the landfill toe of slope. The independently calculated excavation volume resulted in approximately 50 cy of paper residuals to be removed from the MDNR property and relocated to the 12th Street Landfill, which is considerably less than the previous estimate of 200 cy. However, similar to the wetland excavation volume calculation, this volume would double if the full depth of excavation was extended to the reported limit of paper residuals. In addition, some of the existing landfill slope extends on to the MDNR property, so the previous excavation volume of 200 cy likely included some of the required slope removal, as discussed below.

A recently completed topographic and property boundary survey of the 12th Street Landfill shows that the east/west running landfill property boundary with the adjacent MDNR property is actually up the landfill slope, resulting in more excavation than was

originally envisioned when the off-site removal volumes were calculated by RMT (see revised Drawing C-01). As such, it is roughly estimated that the volume requiring excavation from the MDNR property and relocation into the landfill is likely more than double (400 to 500 cy) the amount identified previously.

As a result of the independent review of the calculated excavation volumes, the total volume should be slightly less than previously indicated. There would appear to be approximately 2,000 to 2,200 cy less volume to be removed in the wetlands, but possibly an additional 200 cy to be removed from the MDNR property. Therefore, the revised total excavation volume will likely decrease from the previous estimate of 12,200 cy to between 10,000 and 10,500 cy, a decrease of approximately 15 percent. It should be remembered that the removal of paper residuals will need to be verified by sampling on the asphalt plant property and the wetlands, so the actual excavation volume could be larger than anticipated. Therefore, the revised design has continued to use the previous excavation volume estimate of 12,200 cy for placement under the final cover system, effectively allowing for approximately 15 percent additional excavation should it be needed.

In addition to the calculated volumes of paper residuals beyond the 12th Street Landfill property, there would be an associated excavation volume within the landfill slope areas when the property boundary encroaches into the landfill footprint. This is particularly evident for the landfill slope on the north edge of the MDNR property, as the recently completed property boundary survey shows the property line to be almost halfway up the landfill slope on the north side of the MDNR property. As such, in addition to the calculated volume of paper residuals beyond the landfill footprint, there would be a larger volume of material to be excavated from the slopes on the landfill to pull the toe of slope back onto the landfill property. This extent of the slope excavation and the associated volume will be discussed further in Section 6.3, Landfill Grading.

A similar situation occurs on the west side of the landfill, adjacent to the asphalt plant property. (It should be noted that the recently completed property survey did not show any major differences for the western property boundary adjacent to the asphalt plant property, as was observed for the property boundary for the MDNR property). In this situation, the west slope of the landfill veers slightly to the southwest and slowly crosses the property line such that by the southwest corner of the landfill the entire steep sloped area is no longer on the landfill property. It is not known how this steep sloped area looked prior to any landfill operations, but the discussion of historical operations in Section 2.2.2 of the RMT Pre-Final Design Report states that "prior to 1955, a portion of the property on which the 12th Street Landfill is located was a wetland". As such, it is expected that the sloped area to the southwest (note the driveway into the asphalt plant

property going diagonally down this slope) likely turned to the east and cut across the southern portion of the 12th Street Landfill connecting over to the northerly slope on the MDNR property on the other side of the landfill. Based on this information, it would not be expected that the sloped area near the southwest corner of the landfill would contain paper residuals, and as such would not need to be excavated.

6.2.1 EXCAVATION OF PAPER RESIDUALS ON THE MDNR PROPERTY

Paper residuals on the MDNR property will be excavated and relocated within the proposed limits shown on Plan Sheet 2 Drawing C-02, initially based on visual confirmation and finally by verification sampling as described in Section 6.2.3. The paper residuals will be placed within the landfill in lifts not exceeding 12 inches.

Based on the previous investigations and the more recent topographic and property survey information, approximately ~~200~~400 to 500 cy of visible paper residuals are estimated to be excavated and relocated back into the landfill from the MDNR property (Plan Sheet 2 Drawing C-02). As documented in the predesign studies (RMT, 2008e) (copied in Appendix A of their RMT Pre-Final Design Report), where present, paper residuals on the MDNR property are visible on the ground surface, or covered with a thin (less than approximately 1 inch thick) layer of forest litter (e.g., decaying leaves and branches mixed with occasional topsoil). The paper residuals are light gray, and overlie a poorly graded yellowish-brown sand, and are less than 6 to 8 inches thick. Paper residuals are easily distinguishable from the native soil (grayish-brown topsoil and yellowish-brown sand) based on color and consistency. The water table on the MDNR property is more than 6 feet below ground surface (bgs), and will not be encountered during the excavation activities.

The required excavation and removal of paper residuals from the MDNR property will also require encroachment into the landfill slope to the north (but should not require any significant removal of the landfill slope to the west, as the recent property survey shows that the property line is approximately along the toe of the landfill on this side of the MDNR property). Referring to Drawing C-02, it can be seen that the property line extends as far into the landfill slope to the 718 elevation contour at the northwest corner of the MDNR property, which is more than 10 feet in elevation above the toe of slope elevation. Therefore, it is expected that this material may need to be relocated back on to the landfill, which would result in a 10-foot vertical cut at the property boundary. The entire slope may be cut back further into the landfill if paper residuals are found at depth.

6.2.2 EXCAVATION OF PAPER RESIDUALS ON THE ASPHALT PLANT PROPERTY

Paper residuals on the asphalt plant property will be excavated and relocated within the proposed limits shown on ~~Plan Sheet 2~~Drawing C-02, initially based on visual confirmation and finally by verification sampling as described in Section 6.2.3. The paper residuals will be placed within the landfill in lifts not exceeding 12 inches.

Based on the previous investigations, approximately 7,500 cy of visible paper residuals are estimated to be excavated and relocated back into the landfill from the asphalt plant property (~~Plan Sheet 2~~Drawing C-02). The area on the asphalt plant property requiring excavation (~~Plan Sheet 1~~Drawing C-01) is divided into two areas based on site features. The northern portion of the excavation area is in the wetland that extends north of both the asphalt property and the landfill. The southern excavation area includes a portion of the western landfill sideslope (as discussed previously), the flatter area directly west of the landfill sideslope, a paved area, and the asphalt berm area.

Northern Excavation Area on Asphalt Plant Property

In the wetland, and as documented in the predesign studies (RMT, 2008e) (copied in Appendix A of the RMT Pre-Final Design Report), where present, paper residuals are covered by approximately 6 inches of organic topsoil or a black silty sand. Paper residuals in the northern portion of the excavation area are gray, overlie peat, and are approximately 3.5 feet thick. Paper residuals are easily distinguishable from the native soil based on color and consistency. It is expected that the paper residuals, combined with the overlying topsoil or black silty sand, will be removed and placed on the landfill.

As needed, the sidewalls of the excavation will be sloped to maintain overall stability of the excavation. The sidewalls of the excavation along the landfill will be graded to a slope of 4 horizontal to 1 vertical (4H:1V) to maintain the stability of the excavation and the landfill. Standing water or groundwater may be encountered during excavation activities. Under these conditions, the paper residuals will be temporarily stockpiled immediately adjacent to the excavation area (and within the silt fencing), where excess water can gravity-drain back into the excavation prior to transportation to the landfill. This dewatering procedure is generally consistent with the U.S. EPA-authorized TCRA river sediment excavation activities. After transportation to the landfill, if the paper residuals are still too wet, they may-will be spread in thin lifts and allowed to air-dry,

mixed with mulch or dryer fill materials, generated from the landfill grading activities, or mixed with solidification agents (e.g., Portland cement).

Southern Excavation Area on Asphalt Plant Property

In the southern excavation area on the asphalt plant property, and as documented in the predesign studies (RMT, 2008e) (copied in Appendix A of the ~~is~~ RMT Pre-Final Design Report), where present, paper residuals are covered by varying amounts of granular fill and asphalt and these residuals are up to approximately 10 feet thick. At the extreme southern end of the off-site excavation area on the asphalt plant property, the depth of observed paper residuals reduced to only 2 feet bgs. Paper residuals are easily distinguishable from the fill material and asphalt based on color and consistency. However, it is likely that the paper residuals, combined with the overlying granular fill and asphalt layers, will be removed together and placed on the landfill.

A tarry material (likely asphalt) was found to be commingled with paper residuals at 4.5 feet bgs at Geoprobe® boring RDB-12, installed during the predesign studies investigation. At various depths, petroleum odors are also noted. The source of the petroleum odors ~~could~~ were not be identified by RMT.

As needed, the sidewalls of the excavation will be sloped to maintain overall stability of the excavation. The sidewalls of the excavation along the landfill will be graded to a slope of 4 horizontalH to 1 verticalV to maintain the stability of the excavation and the landfill. To the extent practical, and based on visual observation, granular fill/soil and asphalt overlying the paper residuals will be segregated from the paper residuals and stockpiled on the asphalt plant property in a nearby area to be designated by Wyoming Asphalt (the asphalt plant property owner). Excavated paper residuals containing petroleum-based odors will be placed in the landfill (and incorporated with the paper residuals placed under the final cover).

During the predesign studies field investigation in June 2008, groundwater was encountered at a minimum of 3 feet bgs in this area. At this point in the design, whether groundwater will enter into the excavation and need to be removed from the excavation is unknown, but quite likely. Prior to the start of construction, the contractor performing the Remedial Action (RA) construction activities may elect to perform some field testing to confirm whether groundwater will be encountered and check the quality of such encountered groundwater. The RA contractor will be responsible for identifying and providing the names of a licensed transporter and disposal facility for off-site disposal in the event that water is encountered during excavation activities, and off-site disposal is needed. As applicable, the RA contractor will also be required to provide the sampling

procedures that support acceptance at the disposal facility. All transportation and disposal sub-contractors will be required to meet applicable provisions of federal, state, and local regulations and codes. Once an acceptable transporter and disposal site are provided to Weyerhaeuser and within a minimum of 2 weeks prior to implementation, the proposed transporter, disposal facility, and associated sampling requirements will be provided to the U.S. EPA.

~~If on-site discharge of groundwater is appropriate, prior to the start of construction, the contractor performing the Remedial Action construction activities will be responsible for identifying and providing to Weyerhaeuser for approval, details regarding the conveyance systems to facilitate on-site discharge of groundwater. These systems will meet the requirements of federal, state, and local requirements. Once these proposed management methods are reviewed and determined to be acceptable to Weyerhaeuser, and within a minimum of 2 weeks prior to implementation of the work activities, the proposed details regarding any on-site discharge of groundwater will be provided to the U.S. EPA.~~

As an alternate to off-site disposal of water encountered during excavation activities, the RA contractor may elect to manage the water on-site. On-site water management will consist of a system, which will store, treat, and discharge to the sanitary sewer system or to the wetlands under the substantive requirements of a National Pollutant Discharge Elimination System (NPDES) permit. The water handling and on-site storage system will address the following:

- i) potentially contaminated surface water;
- ii) water collected from construction excavations;
- iii) groundwater and surface water entering excavation areas;
- iv) surface water collected from temporary soil stockpiles; and
- v) wastewater from the personnel (not including sanitary wastewater) and equipment decontamination facilities.

Water that is collected from the above-mentioned sources will be collected and pumped to a 20,000-gallon frac tank for temporary storage. The influent frac tank will settle sediment from the water, therefore the RA contractor shall take care when pumping water from the influent frac tank into the treatment system. Once a sufficient volume of water has been collected, the water will be treated using an on-site water treatment system. The on-site wastewater treatment system will consist of bag filter or sand filtration followed by treatment through primary and secondary activated carbon

adsorption units. The treated water will be pumped to a 20,000-gallon effluent storage frac tank. The treated effluent will be sampled by the RA contractor in the effluent storage frac tank prior to discharge. The RA contractor will provide a minimum of two 20,000-gallon effluent frac tanks so that sufficient storage capacity is available to prevent delay of the excavation activities. The design flow rate of the system will be approximately 50 gpm. The system will be provided with appropriate secondary containment.

Treated effluent will be discharged to the local sanitary sewer system or the wetland area north of the 12th-th Street Landfill once the treated water has been confirmed to meet the discharge requirements. The parameters for analyzing the effluent prior to discharge will be determined to ensure that the water meets the local municipality's Publicly Owned Treatment Works (POTW) pretreatment requirements or the requirements of an NPDES permit. The proposed discharge rate for the treated water will be determined based on the on-site water management option selected by the RA contractor. The rate and volume of discharges will be recorded by the RA contractor.

In the event that the surface water and groundwater cannot be treated on-site to meet POTW or NPDES discharge requirements, the water will be sent off-site to a commercial treatment facility. Water which requires off-site disposal, will be managed in accordance with applicable regulations as discussed above.

Paper residuals excavated from below the water table ~~may~~will be temporarily stockpiled immediately adjacent to the excavation area (within the silt fencing), where the material will be allowed to dewater; (excess water can gravity-drain back into the excavation) prior to being transported to the landfill. After being transported to the landfill, if the paper residuals are still too wet to support additional fill, they may be spread in thin lifts (not exceeding 12 inches) and allowed to air-dry, mixed with mulched materials or dryer fill materials generated from the landfill grading activities, or mixed with solidification agents (e.g., Portland cement).

Oil/Natural Gas Pipeline on Asphalt Plant Property

An underground oil/natural gas pipeline that is owned by Major Pipeline, L.L.C. (Major Pipeline), ~~that~~ but is not currently ~~not~~ in service, is present in the area where paper residuals need to be excavated (~~Plan Sheets 1 and 2~~Drawings C-01 and C-02). The Right-of-Way Agreement for this pipeline indicates ~~d~~ that it was installed in approximately 1957. Based on discussions with a representative of Major Pipeline, the pipeline was installed in a trench approximately 3 to 5 feet below the then-current ground surface (which was likely in the wetland area) and backfilled with native soil.

Historical aerial photographs suggest that paper residuals were placed over the backfilled pipeline. Major Pipeline will be contacted to mark the location of the pipeline in the field prior to any excavation work near the pipeline, and will be present on-site during the start of excavation activities, at a minimum. Although the pipeline is believed to be buried a minimum of 3 feet below (not within) the paper residuals, work in the vicinity of the pipeline will proceed cautiously using hand shoveling to locate the pipe, as needed.

6.2.3 VERIFICATION SOIL SAMPLING ON THE MDNR AND THE ASPHALT PLANT PROPERTIES

Upon completion of the excavation activities on the MDNR property and the asphalt plant property, to the visual extent of the distinguishable paper residuals, samples of the native soil underlying the excavated paper residuals at the base of the excavation will be collected and analyzed to confirm the adequacy of the excavation activities. This verification sampling will be used to demonstrate completion with the Michigan Part 201 Generic Residential Cleanup Criteria (GRCC) pursuant to the MDEQ's Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria (STM; MDEQ, 2002).

Soil samples will be collected using a systematic random sampling strategy. Based on the information obtained from the test pits that were excavated on the MDNR property and asphalt plant property as part of the predesign studies conducted in 2008 (Appendix A), the estimated areal extent of paper residuals on the MDNR property is 3,350-700 ft² (0.085 acre), and the estimated areal extent of paper residuals on the asphalt plant property is approximately 31,900-32,000 ft² (0.7 acre). Using these estimates, and following the MDEQ's STM guidance, it is anticipated that nine soil samples will be collected in the excavation on the MDNR property and that 13 samples will be collected in the excavation on the asphalt plant property. These estimates may be low because they do not attempt to account for the surface area of the sidewalls of the excavations. The actual number of samples to be collected on each property will be reviewed following the completion of the excavations and will be adjusted (up or down) as needed to meet the STM guidance (refer to Note 3 in Table 6-1).

Soil samples will not be collected from a local background area, as is sometimes necessary, because the constituents of potential concern, PCBs and, for the asphalt plant property, petroleum-related VOCs, would not be expected to be present at background locations.

The following text describes how the sample locations will be determined, how the samples will be collected and analyzed, and the criteria to determine if sufficient material has been excavated.

Overview of Sampling Activities - The soil samples will be collected from the top 6 inches of the native soil below the surfaces of the excavation base and sidewalls, and analyzed for PCBs. On the asphalt plant property, samples will also be tested for VOCs. At least one sample will be collected from each sidewall of an excavation. Samples will be collected following the procedures described in Section 2.5 of the Multi-Area Field Sampling Plan (Appendix N). Samples for analysis of VOCs will be collected using the field methanol preservation method.

Upon completion of ~~the excavation~~ to the visual extent of the distinguishable ~~of paper~~ residuals on the MDNR property and on the asphalt plant property, the following activities will be performed:

- Estimate the total area for which verification of soil remediation is to be performed, including the base of the excavation and the sidewalls;
- Verify that the area is similar to that estimated based on the test pit investigations performed in 2008. If the total area is more (or less) than 10 percent of the preliminary estimates shown in Table 6-1, then recalculate the grid interval and the number of samples to be collected;
- Establish a sampling grid for the total area (modifying, by hand, a sampling plan figure as necessary to represent sidewalls), using the grid intervals provided in Table 6-1. In setting up the sampling grid, identify the most southwestern ~~most~~ corner as the (0, 0) coordinates. Use the pre-selected coordinates of 5 feet east, 10 feet north, (5, 10) to locate the first sampling location. Collect all remaining samples from locations that are east and north from this first location by the grid interval distance. Adjust the grid as necessary to collect at least one sample from each sidewall;
- Describe the soil samples in the field using the Unified Soil Classification System;
- Collect the samples from the top 6 inches of native soil below the surface of the excavation base and the sidewalls using a stainless-steel trowel and standard soil sampling and decontamination procedures. In addition to collecting samples for PCB analysis, collect samples on the asphalt plant property for VOC analysis using the methanol preservation method (on the asphalt plant property, collect the samples for PCB and VOC analyses at the same grid point);

Label the samples from the MDNR property "VSRDNR-1," to denote Verification of Soil Remediation, Sample 1, through "VSRDNR-9"(estimated). Label the samples

from the asphalt plant property "VSRAP-1", through "VSRAP-13" (estimated), to denote Verification of Soil Remediation (see Table 6-1);

- Place the samples in coolers containing ice, and ship the samples via overnight delivery to the laboratory following chain-of-custody procedures; and
- Analyze all samples for PCBs and, for the samples collected on the asphalt plant property (the "VSRAP" samples), analyze the samples for VOCs as well. The analytical methods and target detection limits are provided in the Multi-Area QAPP (RMT, 2008c; copied in Volume 2 of this report).

The samples will be submitted to the laboratory for quick-turn analysis (i.e., 24-hour) so that the results can be reviewed and the adequacy of the excavation verified before restoring the excavated areas. As necessary, additional excavation, followed by sample collection and analyses, may be performed.

Quality Control Samples - Collect one equipment rinsate blank and one field duplicate soil sample from each excavation (i.e., one on the MDNR property and one on the asphalt plant property). Identify the QC samples on the chain-of-custody records as QC1, QC2, etc. Record the true identify of the QC samples in the field log book. Submit the QC samples for analysis of the same parameters as the field samples.

Data Evaluation - The laboratory results will be validated to determine their acceptability in meeting the data quality objectives of the soil verification sampling program. If targeted constituents of potential concern are detected in any of the samples, use appropriate statistical methods, consistent with the MDEQ's STM guidance, to evaluate the environmental significance of any detections and the potential need to conduct additional excavation activities.

The applicable criteria are the lowest of the Part 201 GRCC in *Table 2. Soil: Residential and Commercial 1*, of the MDEQ's Remediation and Redevelopment Division's Operational Memorandum No. 1 (January 23, 2006), which are the criteria used for defining a facility under Section 324.20101(1)(o) of Part 201. For PCBs, the applicable criterion is 4 mg/kg, which is the criterion for direct contact.

Review the results of the sample analyses, and if appropriate, any statistical evaluations, with the U.S. EPA to confirm that the data quality objectives of the soil verification sampling have been met and that it is acceptable to restore the areas disturbed by the excavations.

6.2.4 RESTORATION OF DISTURBED AREAS

Once it is determined that the data quality objectives have been met on the MDNR and the asphalt plant properties, the disturbed areas will be restored to a condition agreed upon between Weyerhaeuser and the MDNR and Wyoming Asphalt, respectively. At a minimum, this will include placing fill, as needed, to promote positive drainage from the disturbed areas and the establishment of vegetation. Additional restoration activities may include the planting of trees on the MDNR property to replace trees that need to be removed as part of the excavation activities and/or restoring the paved area on the Wyoming Asphalt property that ~~may~~ may be disturbed.

6.2.5 EXCAVATION OF PAPER RESIDUALS IN WETLAND NORTH OF THE LANDFILL

Paper residuals on the 12th Street Landfill property that are located in the wetland north of the landfill will be excavated and relocated within the proposed limits shown on ~~Plan Sheet 2-Drawing C-02~~ based on visual confirmation, in accordance with the ROD. The paper residuals will be placed within the limits of paper residuals in lifts not exceeding 12 inches. No soil verification sampling will be performed on the 12th Street Landfill property.

The following text describes the paper residuals located north of the landfill and how the area will be restored.

Extent of Planned Excavations

Approximately ~~4,500~~ 2,000 to 2,500 cy of visible paper residuals are estimated to be excavated and relocated back into the landfill from the wetland north of the landfill in the approximate area shown on ~~Plan Sheet 2-Drawing C-02~~. As documented in the predesign studies report (RMT, 2008e) (copied in Appendix A of the RMT Pre-Final Design Report), on the eastern half of the excavation areas, where present, paper residuals are visible on the ground surface, or covered by a thin (less than approximately 1 inch thick) layer of forest litter (i.e., decaying leaves and branches mixed with occasional topsoil). Paper residuals are light gray, they overlie topsoil or a poorly graded yellowish-brown sand, and they are a maximum of approximately 8 inches thick. Paper residuals are easily distinguishable from the native soil (dark-gray topsoil and yellowish-brown sand) based on color and consistency. During the predesign studies field investigation in June 2008, the groundwater was ~~approximately 1.0 to 1.5 feet below~~ found to be at or slightly below the ground surface in this area.

The underground oil/natural gas pipeline described in Section 6.2.2 is present in the wetland where paper residuals need to be excavated (~~Plan Sheets 1 and 2~~Drawing C-01 and C-02). Historical aerial photographs suggest that paper residuals were placed over the pipeline. Major Pipeline will be contacted to mark the location of the pipeline in the field prior to work near the pipeline. Although the pipeline is believed to be buried a minimum of 3 feet below (not within) the paper residuals, work in the vicinity of the pipeline will proceed cautiously using hand-shoveling to locate the pipe, as needed.

Paper residuals in the western half of the excavation area are either at the ground surface or are covered with approximately 0.5 to 1.0 ~~foot~~feet of organic topsoil. The paper residuals are gray, they overlie a yellowish-brown clayey organic soil or peat, and they are approximately 3 feet thick adjacent to the landfill and become thinner (less than 1/2-inch) near the limits of identified ~~limits~~extent of visible paper residuals. Paper residuals are easily distinguishable from the native soil based on color and consistency.

The sidewalls of the excavation along the landfill will be shallow (less than 4 feet) and will be graded to a slope of 4 ~~horizontal~~H to 1 ~~vertical~~V to maintain the stability of the excavation and the landfill. Standing water and/or groundwater may be encountered during the excavation activities.

At this point in the design, whether groundwater will enter into the excavation and need to be removed from the excavation is unknown. Prior to the start of construction, the contractor performing the Remedial Action (RA) construction activities may elect to perform some field testing to confirm whether groundwater will be encountered and check the quality of such encountered groundwater. The RA contractor will be responsible for identifying and providing the names of a licensed transporter and disposal facility for off-site disposal in the event that water is encountered during excavation activities, and off-site disposal is needed. As applicable, the RA contractor will also be required to provide the sampling procedures that support acceptance at the disposal facility. All transportation and disposal sub-contractors will be required to meet applicable provisions of federal, state, and local regulations and codes. Once an acceptable transporter and disposal site are provided to Weyerhaeuser and within a minimum of 2 weeks prior to implementation, the proposed transporter, disposal facility, and associated sampling requirements will be provided to the U.S. EPA.

~~If on-site discharge of groundwater is appropriate, prior to the start of construction, the contractor performing the Remedial Action construction activities will be responsible for identifying and providing to Weyerhaeuser for approval, details regarding the conveyance systems to facilitate on-site discharge of groundwater. These systems will~~

~~meet the requirements of federal, state, and local requirements. Once these proposed management methods are reviewed and determined to be acceptable to Weyerhaeuser, and within a minimum of 2 weeks prior to implementation of the work activities, the proposed details regarding any on-site discharge of groundwater will be provided to the U.S. EPA.~~

Alternatively, if on-site water management is determined to be the most viable option for water management, the water will be stored, treated, and discharged in accordance with the details provided in Section 6.2.2.

Paper residuals excavated from below the water table ~~may~~ will be temporarily stockpiled immediately adjacent to the excavation area (within the silt fencing), where the material will be allowed to dewater, (excess water can gravity-drain back into the excavation) prior to being transported to the landfill. After being transported to the landfill, if the paper residuals are still too wet to support additional fill, they may be spread in thin lifts (not exceeding 12 inches) and allowed to air-dry, mixed with mulched materials or dryer fill materials generated from the landfill grading activities, or mixed with solidification agents (e.g., Portland cement).

Restoration of Disturbed Areas

Once the visible paper residuals are removed from the wetland north of the landfill, the area will be covered by the final cover and access road/ditch as shown on Detail 1 on ~~Plan Sheet 5-Drawing C-0510~~ or restored by backfilling the excavation. The backfill material will be capable of sustaining vegetation similar to what exists adjacent to the excavation. Restored areas that are outside the proposed limits of the landfill final cover and the site access road/ditch will be revegetated in accordance with the Construction Quality Assurance (CQA) Project Plan (Appendix C) and the Specifications (Appendix E).

6.3 LANDFILL GRADING

6.3.1 GRADING PLAN

As described in Section 4.3 of the RMT Pre-Final Design ~~Report~~, during the Emergency Action in 2007, the entire eastern slope of the landfill along the Kalamazoo River was cut back to an approximately 5H:1V slope. A buffer zone was created along the former powerhouse channel by cutting back approximately 35 feet of the eastern slope of the landfill adjacent to the river ~~(Figure 4-3)~~. A clay barrier layer was also

constructed along the base of the regraded eastern slope. Additional details regarding the landfill final cover are discussed in Section 6.4 of this report.

Following the removal of the visible paper residuals/sediment in the channel, the riverbank from approximately elevation 698.0 to 702.5 feet M.S.L. was regraded to a 3H:1V slope and covered by riprap (D₅₀ of 9 inches), installed over a geotextile fabric. Upslope of the riprap (approximately elevation 703.0 feet M.S.L.), 6 inches of topsoil were placed across the bench (approximately 703.0 feet M.S.L.). From elevation 702.5 to 707.0 feet M.S.L. on the regraded 5H:1V sideslope, 6 inches of general fill material were placed on the eastern sideslope, overlain by 6 inches of topsoil. The topsoil was then covered by erosion control matting (Enkamat®, which is a three-dimensional nylon turf reinforcement mat made of nylon filaments joined at the intersections).

The topsoil and erosion control matting above elevation 702.5 feet M.S.L. will be removed and restored (i.e., reused) as part of the final cover placement.

The remaining sideslopes on the northern, eastern, and western sides of the landfill will be graded to a maximum of 43H:1V. The paper residuals along the MDNR property and the asphalt plant property boundaries will be pulled back a minimum of ~~221~~214 feet from the property line to provide the space required to build an access road/ditch ~~and surface water controls~~ around the base of the landfill (Detail 1-4 on Plan Sheet 5 Drawing C-0511).

~~An approximately 8 foot wide bench (Detail 2 on Plan Sheet 5) will be created approximately halfway up the landfill sideslope on the northern, western, eastern, and southeastern sideslopes. This bench could be used as a walking path as part of a potential future "eco-park" design, and will also minimize soil erosion caused by surface water runoff. Based on the proposed grading plan (Drawing C-0305), and the results from the soil borings advanced into the landfill during the recently completed predesign studies investigation (copied in Appendix A of this report), approximately 26,600 cy (volume to be confirmed in final design) of material will be cut from the existing landfill sideslopes and relocated further into the landfill.~~

The relocated paper residuals will be placed on top of the existing landfill, ~~as such that the northern, western, and southeastern landfill sideslopes will be graded~~ are cut back to a 43H:1V slopes. The eastern landfill sideslope along the Kalamazoo River will ~~be graded to remain at 5H:1V, while the southern sideslope along 12th Street will be graded to an 8H:1V slope, and~~ The top of the landfill will be graded to a minimum 5 percent slope, as shown on Drawing C-0305 (Plan Sheet 3). The approximate fill height

after regrading will be approximately 741.735 feet M.S.L., which is only 2 feet higher than the current landfill and approximately 35 feet above the wetlands.

6.3.2 GLOBAL SLOPE STABILITY EVALUATION

As part of the design review and subsequent re-design of the 12th Street Landfill cover system, a geotechnical investigation was carried out between May 6 and May 12, 2009. The purpose of the geotechnical investigation was to determine the composition and shear strength of the landfill materials and the shear strength of the off-site paper sludge materials. These geotechnical parameters are required for evaluating the stability of the completed landfill slopes and the sliding stability of the proposed landfill cover. A separate memorandum presenting the details of the recently completed geotechnical investigation is included in Appendix AB - Slope Stability Calculations. Documentation of Pre-design Studies. The location of the boreholes installed during the geotechnical investigation are shown on Figure 1 of Appendix B.

A review of the landfill borehole logs (included with the geotechnical memorandum in Appendix AB) shows that the depth of the landfill deposits (paper residuals) is was 22 to 29.5-25.5 feet bgs in boreholes SB-1 to SB/GW-6, with the exception of SB/GW-2 and SB-5 which was-were terminated in the landfill deposits at a depths of 36 feet and 31.5 feet bgs, respectively. At boreholes SB-1, SB/GW-2, SB-3, SB-4 and SB-5, which are generally located along the top edge of the landfill slopes, sand (SB-1 to SB-4) and/or fly ash (SB-5) materials were encountered at the ground surface or below the topsoil layer. The sand and/or fly ash materials extend to depths of 9 to 24-20 feet bgs and are underlain by the paper sludge or paper sludge/sand mix materials which extend to the native deposits beneath the landfill. In borehole SB/GW-6, advanced close to the center of the landfill, there was a surficial sand layer of only 2 inches thick before paper sludge materials were encountered, which continued to a depth of 25.5 feet bgs before encountering native sand deposits.

The standard penetration test (SPT) "N" values of the paper sludge materials ranged from 1 to 11 blows per foot, indicating a state of consistency ranging from very soft to stiff. The moisture content in the paper sludge and paper sludge/sand mixtures ranged from 19 to 126 percent, indicating generally saturated conditions. The undrained shear strength of the paper sludge materials was tested through field shear vane tests (FVT), which showed that the peak undrained shear strength of the paper sludge and paper sludge/sand mixtures in the landfill ranged from 516 to 3095 pounds per square foot (psf), while residual shear strengths with more than half of the values ranging from 258

to 1290 to 1548 psf. This resulted in a sensitivity of 1.2 to 3.71 to 5, indicating that the landfill paper sludge has low to medium sensitivity.

Based on these results presented in the attached technical memorandum, global slope stability modeling was will be was performed, as presented in the second technical memorandum by Inspec-Sol (Appendix B), (Appendix B) to assess the potential effect of the moisture content and shear strength of the paper residuals on the stability of the landfill sideslopes following the excavation and relocation of paper residuals within the landfill and to meet the requirements of the State of Michigan solid waste management regulations (Part 115). The slope stability modeling was will be was performed for the most critical slope configuration (43H:1V), conservatively conservatively assuming saturated fill conditions at a reasonable depth below near the landfill surface (using the results of the recent geotechnical investigation). The slope height and geometry that were modeled were based on the landfill grading plan (without the 8 foot wide bench that will be created halfway up the landfill slope to conservatively simplify the model). The results of the global slope stability modeling indicate that a factor of safety of 1.34 will be obtained for the modeled "worst case" conditions. This factor of safety is conservative because it does not take into account the 8 foot wide mid-slope bench, which will increase the factor of safety.

Cross-sections of the landfill depicting the existing and final closure conditions, were selected for static slope stability analyses. The cross-sections were selected based on a combination of subsurface conditions and the above grade landfill slope geometry that would result in representative conditions. The cross-sections were analyzed for the existing and proposed (closure) conditions to determine the relative effect of the proposed expansion on the landfill slopes. It has been assumed for the purpose of the analyses that the slopes (following construction operations) will not be steeper than the proposed slope of 3H:1V.

Graphs of the slope stability analyses are provided on Figures A1 to A16, and are summarized in Table 6 in Appendix B. A review of the results shows that the targeted minimum factors of safety are achieved for the proposed conditions at the cross-sections analyzed using the estimated soil shear strength properties, except cross-section C-C where a factor of safety of 1.45 was achieved. In view of the conservative soil parameters assumed for the analysis and an overall improvement over the existing condition (factor of safety of 1.04), the marginally low factor of safety of 1.45 can be considered acceptable. As such no significant slope stability issues are anticipated for the side slopes constructed at 3H:1V, provided construction recommendations provided in the technical memorandum are followed.

Michigan solid waste regulations stipulate analysis of slope stability, but do not define a required factor of safety. Generally accepted geotechnical practice applies a factor of safety of 1.5 for "normal conditions" and 1.3 for "worst-case conditions". The worst-case conditions of complete saturation are not likely to occur because of the extent and thickness of the hydraulically conductive sand fill that comprises the landfill's existing cover and its proposed final cover. The sand will act as a preferential pathway to dewater and stabilize the residuals within the landfill such that they are not likely to remain saturated. ~~The calculated factor of safety is consistent with current practice for the modeled worst case conditions. The result also confirms that leachate does not need to be removed from the 12th Street Landfill to achieve stable sideslopes, as presented in the Documentation of the Predesign Studies report (copied in Appendix A of this report).~~

Pending the results of the ongoing direct shear box testing, cover system sliding stability analyses were performed using the infinite slope methodology for the critical interfaces between the geosynthetic layers and between geosynthetic layers and landfill soils or cover system soils. The interface shear strength parameters have been assumed based on the literature review and experience with similar components. The interface shear strength parameters used and the results of the analyses are presented in Appendix B. The analyses assumes no up lift pressures on the cover system. A review of results presented in Table 6 in Appendix B shows that for the assumed interface-shear strength parameters and conditions, the calculated factors of safety exceeds 1.5.

~~As described in the Documentation of the Predesign Studies report,~~ Although Weyerhaeuser does not plan to install a leachate collection system at the 12th Street Landfill, perched liquid may be present within the landfill, as described in the RMT report entitled "Documentation of the Predesign Studies". Based on conclusions from previous subsurface investigations at the landfill (i.e., the Test Pit Investigation Technical Memorandum, Geraghty & Miller, 1994a), perched liquid was found in areas where high-permeable material (construction debris) overlies low-permeable material (paper residuals). ~~These areas are identified on Plan Sheet 2.~~ Test pits will be excavated in these areas, and if present, perched leachate will be removed. Leachate seeps may also form, during the regrading of the landfill, in areas where perched leachate comes closer to the landfill surface. Leachate, if present, will be collected and containerized in five frac tanks and disposed at a licensed publicly-owned treatment works (POTW) or managed on-site as discussed in Section 6.2.2.

6.4 FINAL LANDFILL COVER SYSTEM

To meet the requirements of the ROD (described in Section 4.2 of their original RMT report), a final cover system will be placed over the regraded landfill sideslopes and top portion of the landfill.~~will be covered by a sidewall containment system (SWCS) (also known as a final cover system).~~ The final cover that has been designed to meet the following objectives:

- to prevent the release of PCBs to the environment;
- to provide sideslope stability, flood protection, and erosion control;
- to minimize infiltration of precipitation through the landfill;
- to prevent migration of residuals or leachate from the landfill into the adjacent areas; and
- to eliminate direct contact hazards.

The final cover ~~has also been~~ will be designed to meet the relevant portions of the Michigan Solid Waste Landfill closure regulations pursuant to Part 115, Solid Waste Management, of the NREPA. The erosion protection provided will be sufficient to protect the containment system from a 500-year flood event.

Prior to constructing the final cover over the 5H:1V eastern sideslope, the existing 6-inch thick layer of topsoil along with the turf reinforcement mat (Enkamat®) that was installed during the Emergency Action in 2007, will be removed. The topsoil and Enkamat® were installed as an interim measure until the final cover was constructed.

The riprap and the clay barrier layer (Figure 4-3) installed during the Emergency Action in 2007 will remain in place. As described in the Emergency Response Plan Design report (RMT, 2007a), the riprap and the clay barrier layer are permanent measures that will not be removed during the Remedial Action. Installation of these measures as part of the Emergency Action will allow for the rest of the final cover system to be installed above the elevation of the 2-year flood event (approximately 702.5 feet M.S.L.).

~~The clay barrier layer is part of the final cover system that will provide sidewall containment and hydraulic separation.~~

The final cover will be installed over approximately 6.8 acres of the 12th Street Landfill (Plan Sheet 4 Drawing C-043) and will consist of the following components from bottom to top (Detail 6-5 on Plan Sheet 6 Drawing C-0511):

- A 6-inch select granular fill layer placed on top of the landfill as a suitable subgrade material for the final cover and a gas venting layer for the passive gas venting system consisting of strips of geosynthetic material will be placed at 200-foot intervals up the slopes geocomposite drainage material (geonet) installed either as a continuous layer over the entire landfill or in strategic locations (i.e., strips of geonet) designed to convey landfill gas to passive gas vents strategically located near the top of the landfill surface. This layer will be capable of collecting landfill gas and conveying it to the passive venting system. Granular fill from an off-site source that has ~~The geoventnet strips consists of a polystyrene plastic grid-core wrapped in non-woven geotextile, with capacity for a minimum hydraulic conductivity of 1×10^{-2} to 0.3 centimeters per second (cm/s), and that does not contain gravel, retained on the Number 4 sieve (for protection of the 40-mil linear low density polyethylene [LLDPE] geomembrane above) will be used to construct the fill layer.~~ The perforated gas pipes within this fill layer will be bedded in select aggregate fill (gravel). A 12-ounce ~~surrounded by two layers of nonwoven geotextile to prevent soil intrusion and will be placed over the select aggregate fill bedding to protect the overlying geomembrane.~~
- A 40-mil thick textured LLDPE geomembrane liner (barrier layer) will be placed over the select granular fill ~~geonet or the nonwoven geotextile fabric~~ above the select aggregate fill gas pipe bedding material. The geomembrane liner will act as a barrier to minimize infiltration of precipitation into the residuals.

In lieu of the PVC liner specified in the ROD, use of the 40-mil thick textured LLDPE geomembrane was previously proposed, and preliminarily accepted by the U.S. EPA (U.S. EPA 2008b). LLDPE meets the relevant portions of the Michigan solid waste management closure regulations pursuant to Part 115 and has a hydraulic conductivity on the order of 4.0×10^{-13} cm/s (Giroud and Bonaparte, 1989; as presented in U.S. EPA, 1994). In comparison, the hydraulic conductivity of PVC is on the order of 2.0×10^{-11} cm/s. ~~Moreover, LLDPE was approved for the King Highway Landfill (OU-3).~~

Because PVC geomembrane is only manufactured as a "smooth" material, it does not develop a high interface friction range or adhesion with soil or other synthetic materials (e.g., nonwoven geotextile). This makes it difficult to create stable final slopes at the proposed 43H:1V and ~~to~~ 5H:1V grades. Because an LLDPE geomembrane can be manufactured as a "textured" material, it is a more appropriate alternative for the steep sideslopes of the 12th Street Landfill. Using a textured LLDPE geomembrane will improve the interface friction angle and the adhesion between the geomembrane and the soil or synthetic material, while still providing an effective barrier to infiltration. This will increase the factor of safety against slippage along the liner/soil interfaces and ultimately provide more stable final cover slopes.

As part of the pre-design geotechnical investigation, direct shear box testing will be performed to ~~Calculations were performed (Appendix B) to determine the factor of safety against slippage along the critical geosynthetic (geomembrane/soil, geomembrane/geotextile, and geotextile/soil) and soil interfaces. Typical engineering values and direct shear test results from previous final cover construction projects at other landfills were used in the calculations. Although the~~ The shear box testing will utilize site-specific soil and geosynthetic materials that would be used for the 12th Street Landfill remedial action have not yet been identified, and thus tested, available test results from previous final cover construction projects and typical engineering values generally to represent the critical interfaces within the 12th Street Landfill final cover system. The resultant calculations indicate that minimum factors of safety of 2.03 and 1.31 will be obtained for the geosynthetic and soil interfaces, respectively, identified would determine the factors of safety above on the 43H:1V landfill sideslopes for the modeled "worst-case" conditions. These factors of safety are above the for generally accepted geotechnical practice of applying a factor of safety of are 1.5 for "normal conditions" and 1.3 for "worst-case conditions".

Direct shear testing will be performed prior to construction to determine site-specific values for the ~~sand/sand, sand/paper sludge/geomembrane, paper sludge/40-mil LLDPE textured geomembrane, geomembrane drainage net/40-mil LLDPE textured geomembrane, 40-mil LLDPE textured geomembrane/12-ounce nonwoven geotextile, and the 12-ounce non-woven geotextile/select aggregate fill interfaces. Updated:~~ The resultant interface slope stability calculations incorporating these direct shear box testing results will be submitted to the U.S. EPA prior to construction.

- A 12-inch thick select granular fill layer (part of the required 24-inch thick protective layer) will be placed above the 40-mil thick textured LLDPE geomembrane liner. (The liner will be overlain by 128-ounce non-woven geotextile to protect the liner against punctures). Granular fill will be obtained from an off-site source that has a minimum hydraulic conductivity of 1×10^{-2} cm/s, and that does not contain gravel retained on the Number 4 sieve (for protection of the 40 mil LLDPE geomembrane below). This layer will act as a subsurface drainage layer to convey infiltrating surface water off of the final cover.

Alternatively, a geocomposite drainage material (geonet) may be used in lieu of the 12-inch thick select granular fill layer. A geonet can typically convey infiltrating surface water off of the final cover system more effectively than aggregate material. Also, a geonet comes with geotextile fabric surrounding the plastic grid core, so a separate geotextile fabric would not be required. The contractor will be allowed to install either the 12-inch thick select granular fill layer (with separate geotextile) or

the alternative geonet. (Note that the use of geonet must also include an additional 12 inches of general fill to achieve the required 24-inch thick protective layer if a geonet is used for the drainage layer).

- A 12-inch (or 24-inch) thick general fill layer (part of the required 24-inch thick protective layer) will be placed above the 12-inch thick select granular fill layer (or geonet). This protective layer will be capable of sustaining the growth of nonwoody plants and will have adequate water-holding capacity.
- A 6-inch thick vegetative layer will be placed over the protective layer. This layer will be designed to promote vegetative growth, promote surface water runoff, and minimize erosion. Consistent with the future use of the land being an eco-park, the vegetative growth will consist of a mix of grasses and forbes (flowering plants) native to the area.

The final cover components describe above will be placed in accordance with the requirements of the Construction Quality Assurance (CQA) Project Plan (Appendix C) and the Specifications (Appendix E).

The final cover along the Kalamazoo River will tie into the clay barrier layer, as shown on Detail 2 on ~~Plan Sheet 6~~ Drawing C-0612. ~~The existing clay barrier will be extended approximately 30 feet to the north during the Remedial Action (Plan Sheet 4) to provide hydraulic separation between the proposed limits of paper residuals and the Kalamazoo River.~~ The portion of the clay barrier layer that is disturbed as a result of tying the geomembrane barrier layer into the clay barrier layer, will be reconstructed and tested in accordance with the CQA Project Plan (Appendix C) and the Specifications (Appendix E). Prior to the connection of the final cover to the clay barrier layer along the Kalamazoo River, the portion of the north slope extending beyond the north limit of the previously constructed 5H:1V eastern sideslope (part of Emergency Action in 2007) will be relocated back on to the 12th Street Landfill during the other off-site material (paper residuals) relocation activities.

As shown in Appendix F, the riprap was designed to provide protection from the flow velocity (5.7 feet per second) of the 500-year flood event. Previously, approximately 260 linear feet of riprap were installed along the Kalamazoo River as part of the Emergency Response Action performed in 2007. The riprap was installed over a geotextile fabric from the base of the river up to elevation 703.5 feet M.S.L. (the elevation of the access road along the riverfront is 703 feet M.S.L.). ~~An additional 50 feet of riprap will be installed (20 feet beyond the clay) to provide the necessary protection of the proposed landfill footprint. The riprap will be placed in accordance with the~~

~~requirements of the CQA Project Plan (Appendix C) and the Specifications (Appendix E).~~

Upslope of the riprap, for the entire length of the proposed eastern landfill sideslope ~~(and extended 20 feet beyond the northern edges of the slope)~~, erosion control matting (Enkamat®, which is a three-dimensional nylon turf reinforcement mat made of nylon filaments joined at the intersections) will be installed from approximate elevation 703 feet M.S.L. to approximately 707 feet M.S.L. ~~(Plan Sheet 4 Drawing C-04 and Detail 2 on Drawing C-0612 Plan Sheet 6).~~ Calculations contained in Appendix F show that the Enkamat® installed to an elevation of approximately 707 feet M.S.L. will meet the requirements of the ROD, which requires an erosion protection system to provide protection from a 500-year flood event and extend to a minimum elevation of 707.0 feet M.S.L. In addition, the transition area between the 12th Street Landfill property and the MDNR property (on the southern end of the eastern side of the 12th Street Landfill along the Kalamazoo River will be protected by erosion control matting.

6.5 SURFACE WATER MANAGEMENT

Temporary erosion and sedimentation controls will be installed prior to excavation and landfill grading activities and will be maintained until permanent erosion controls are in place. Temporary erosion and sedimentation controls will consist of silt fencing. Silt fences will be installed around the proposed excavation areas ~~(Plan Sheet 2 Drawing C-023)~~ to prevent the potential migration of sediment from the limits of construction as a result of surface water runoff. Silt fences will be visually inspected in accordance with Section 7.2. Trapped sediment will be excavated and placed into the landfill underneath the final cover. Sediment controls will be installed in accordance with the Specifications (Appendix E) and with the Guidebook of Best Management Practices for Michigan Watersheds (MDEQ, 1998).

In addition to the ~~permanent~~ erosion protection along the eastern landfill sideslope (riprap and Enkamat®) described previously in Section 6.3, erosion caused by surface water runoff from the rest of the landfill final cover will be minimized by vegetating the final grades ~~and installing a bench approximately halfway up the slope along the western, northern, and southeastern landfill sideslopes.~~ Estimates of erosion from the landfill, using the Revised Universal Soil Loss Equation, are presented in Appendix G.

~~Surface water runoff from above the mid-slope bench will be collected in a series of perforated collection pipes located within the final cover (Detail 2 on Plan Sheet 5) and directed to downslope flumes (Details 3 and 4 on Plan Sheet 5) that discharge into the~~

on-site wetland or to an outlet adjacent to the Kalamazoo River (Plan Sheet 4). Surface water runoff on the west side of the landfill from below the bench will be collected by directed alongside the by a combined access road (the access road is designed such that it can collect and convey surface water runoff) through a shallow /ditch that and discharges into the on-site wetland to the north or into the Kalamazoo River. On the southern landfill slope, surface water will be diverted to the east access roads using diversion berms through a shallow ditch that discharges directs surface water around to the MDNR property, discharging to the Kalamazoo River (Plan Sheet 4 Drawing C-047 and Detail 4 on Plan Sheet 8 Drawing C-0812) and culverts underneath the mid-slope bench (Plan Sheet 4 and Detail 3 on Plan Sheet 8). For the northern portion remainder of the 12th Street Landfill, surface water will be allowed to sheet flow off the cover system into a combined shallow ditch/access road, with several V-notches in the outside of the ditch to allow discharge of the collected surface water and into the wetlands to the north or the adjacent properties. Perforated toe drain pipes will be installed at the base of the final cover (and within the 12-inch thick granular fill layer or connected to the geonet The geocomposite drainage net that is part of the final cover) will facilitate drainage of any infiltrating precipitation to drain any surface water that may infiltrate into through the upper layers of the final cover soil to the perimeter ditches. The perforated toe drain pipe will have discharge points approximately every 200 feet (Detail 1-5 on Plan Sheet 5 Drawing C-0511). As a result of the subsurface water controls and some diversion of most of the surface water via shallow ditches around the perimeter of the landfill, the flow rate of surface water that may discharge onto the adjacent MDNR property or asphalt plant property from the remaining side slopes (after beyond the limits of the final cover is installed) will be significantly less than under current conditions.

The PCSWMM.net model (SWMM v.5.0.013) was used to calculate storm water flows at ditch inlet locations for both the 25-year and 100-year storm events. The model is a widely accepted hydrologic and hydraulic computer-modeling program based on the United States Environmental Protection Agency's Stormwater Management Model (SWMM).

The storm water ditches were designed to convey the 24-hour/25-year storm event, with additional modeling completed for the 24-hour/100-year storm events. For efficiency, the access road and perimeter ditches have been integrated, which resulted in the dimensions of the road/ditch with a five-foot bottom width and 3H:1V side slopes. The bottom of the ditches were modeled to include a stone bottom to protect from damage associated with vehicular traffic (ATV's for sampling, etc). To ensure that the stone material remains in place and does not erode under high flow conditions, a perforated

geoweb material will be incorporated into the granular surface, holding the stone within its "honeycomb" structure.

The ditch outlets consist of depressions approximately every 200 feet along the outside edge of the ditch(es) with the complete outside perimeter along the northern section of the landfill armoured with a turf reinforcement mat to protect against erosion. The ditch outlets will discharge to the wetland, with the extreme east end of the perimeter ditches discharging to the Kalamazoo River.

All modeling parameters and outputs are located in Appendix G.

~~Analysis of the surface water management system (Appendix G) was completed using a 25-year, 24-hour storm event, and the U.S. Department of Agriculture Soil Conservation Service's (now known as the Natural Resource Conservation Service's) Technical Release-55 (TR-55) method. The TR-55 method is a process that involves determining the drainage area, vegetative cover type, soil type, drainage path, time of concentration, travel time, rainfall amounts, storm distributions and storm durations to compute runoff quantities for each watershed.~~

~~Pipe strength analyses were performed to demonstrate that the proposed surface water collection pipes (toe drain system) for the 12th Street Landfill will withstand the potential worst case loading conditions from soil overburden and equipment traffic (Appendix H). Piping and permeability calculations were also performed (Appendix I) to demonstrate that the storm water toe drain collection pipes will be designed to limit pipe bedding material from entering the pipe.~~

6.6 LANDFILL GAS MANAGEMENT

6.6.1 GAS SYSTEM

~~As described in the RD Workplan (RMT, 2008a) and the Documentation of the Predesign Studies report (RMT, 2008e) (Appendix A of this report), based on experience at other landfills containing paper residuals, Weyerhaeuser has decided to install the components of a system to, if necessary, prevent off-site gas migration from the landfill and to protect the integrity of the final cover. The components of the system will be installed according to the CQA Project Plan (Appendix C) and the Specifications (Appendix E) and will consist of the following:~~

- ~~Approximately 3,000 linear feet of 4-inch diameter horizontal perforated high-density polyethylene (HDPE) (SDR 17) pipe (Plan Sheet 3 and Detail 4 on Plan Sheet 5) embedded in the 6-inch thick granular fill layer in the final cover system. As described in Section 6.3, the granular fill layer will have a minimum hydraulic conductivity of 1×10^{-2} centimeters per second (cm/s). The perforated pipe will be interconnected and will convey the landfill gas to the gas vent pipe locations.~~
- ~~Twenty 4-inch diameter HDPE (SDR 17) vertical pipes (Detail 5 on Plan Sheet 6) that extend from the horizontal perforated lateral pipes to approximately 6 inches above the surface of the final cover, at which point a blind flange will be installed in the vent a passive gas vent is necessary.~~

~~The locations of the 4-inch diameter horizontal perforated lateral pipes and the vertical gas vent locations are shown on Plan Sheet 3. Initially, the vent locations will be blinded off and monitored. The gas probes will also be monitored. If no off site gas migration is detected, the vent locations will remain closed. If gas migration occurs, some or all of the vents will be installed.~~

~~The gas vent locations will be a minimum of approximately 24 feet from the mid-slope bench that may be used as a walking path in a future eco-park. (Potential risks to human health and safety associated with a future eco-park on the landfill, including potential inhalation of landfill gas by persons using the mid-slope walking path, will be evaluated as part of a potential future use risk assessment that would be developed and submitted to the U.S. EPA after approximately 1 year of post-construction environment monitoring). LLDPE pipe boots will be installed around the vertical gas vent pipes to minimize gas from migrating around the pipes, and to reduce the potential for surface water infiltrating the final cover (Detail 3 on Plan Sheet 6).~~

As part of the pre-design activities, a field program will be was implemented to obtain direct information regarding the ability of the 12th Street Landfill to produce landfill gas (LFG) in its current condition. The results of this field testing program will beare the primary factor in the design of the gas collection system for the 12th Street Landfill. A modified Tier 3 testing program (based on U.S. EPA's Method 2E) will be was implemented to obtain site-specific information regarding potential LFG generation as well as gas quality (i.e., percent methane, carbon dioxide, and oxygen). This information will assisted in the confirmation of the anticipated passive LFG collection system design, as outlined below.

Appendix A presents a detailed technical memorandum that discusses the field program, results, and calculations that were used in the development of the passive venting system. The following paragraphs present a brief summary of the LFG design.

A-The passive LFG collection system will be designed for the 12th Street Landfill to will mitigate the potential buildup of gas under the final cover system. The system will be design ed to includes the placement of passive vent strips comprised of gas collection media geosynthetic material placed over the existing paper sludge residuals surface, installed perpendicular to the slopes at approximately 200-foot intervals, in that manner connecting nay-any collected gas at the toe of slopes to the passive gas vents installed in the top area of the sitelandfill. The se-vent strips will be comprised of a geosynthetic core of polystyrene wrapped in a non-woven geotextile. These materials are commonly used to mitigate soil gases under building foundations and have been implemented in solid waste applications for liner and cover systems. may consist of geocomposite drainage material lain over the existing paper sludge residuals or the excavation of shallow gravel trenches within the surface of the waste. The offset distance or placement of the strips/trenches will be supported by information obtained from the field testing program to estimate the LFG generation rate for this particular Site. It is currently anticipated that the strips/trenches may be installed at approximately 200-foot centers, perpendicular to the slopes. (If trenches are utilized in lieu of geonet strips, the trenches will be installed approximately 2 feet into the waste, with a 4 inch polyvinyl chloride (PVC) schedule 40 pipe in each trench that is connected to a vent near the top of the landfill that penetrates through the final cover liner system). The final horizontal spacing design for the strips/trenches will increase or decrease pending the results of the planned field investigation activities. The anticipated vent spacing for this Site is approximately one per acre.

The predesign field activities confirmed the anticipated low LFG generation rate from the 12th Street Landfill. This is due to several factors including the type and age of the waste, the shallow depth of burial of the waste, as well as an elevated leachate mound within the waste.

The modified Tier 3 testing results are presented in Appendix A. The results indicated that the application of a low flow and vacuum condition (i.e., 30 cubic feet per minute [cfm] and 10 inches of water column [in. WCI]) influenced the landfill site within a 3-hour testing period. The LFG quality decreased from the beginning of the test and continued in a downward trend for both methane and carbon dioxide concentrations. Conversely, the oxygen and balance gas concentrations increased during the same time period. This is indicative of a waste that is in the declining stages of methane production, and as a result the waste cannot generate enough LFG to maintain a steady-

state condition. Subsequently, the field testing was conducted at a lower flow and vacuum rate to confirm this condition. A higher flow rate and vacuum was also applied to the extraction well. These additional tests resulted in a similar downward trend for methane and carbon dioxide and a greater upward trend for oxygen and balance gases. The methane generation potential, k, from the landfill was calculated to be 0.00002/year by using this information along with the calculation procedures outlined in the Tier 3 method. This is a significantly lower value than typically used in LFG modeling, which validates the lower than anticipated LFG production.

A flow rate of 30 cfm was used in the design calculations for the passive vent system since this represents the upper limit of flow from the 12th Street Landfill. The gas vent strips will be spaced at 200 feet, perpendicular to the slopes. The vent strips will be connected to a gravel pad at the crown of the landfill or intermittently along the slopes. From the gravel pad(s), 4-inch polyvinyl chloride (PVC) schedule 40 riser pipes will be installed that will penetrate through the final cover liner system and vent any collected gas directly to the atmosphere. There are seven proposed gas vents for the 12th Street Landfill, or approximately one vent per acre.

Lastly, ~~the~~ potential pressures developed from the production of LFG (based on the testing results) ~~will be~~ have been incorporated into the ~~planned~~ passive gas venting system as well as the stability determination of the final cover system. The final design ~~will~~ has incorporated a potential LFG pressure of approximately 10 to 20-15 inches of water column (in. WC) for 3H:1V slopes, which is consistent with values found in literature (RG&A, 2008). ~~(should 4H:1V slopes be required, the potential LFG pressures would be between 17 and 28 in. WC).~~ The range of values presented is dependent on the adhesion of the materials being used in the cover design.

Pipe strength calculations were ~~will be~~ performed to demonstrate that the horizontal HDPE (SDR 17) gas collection pipes (if gravel trenches are utilized) pipes will withstand the potential worst case loading conditions from soil overburden and equipment traffic (Appendix H). Piping and permeability calculations were ~~will also be~~ performed (Appendix I) to determine the appropriate size perforations to limit pipe bedding material from entering the pipe.

The passive gas vent locations will be monitored in accordance with the PSVP (Appendix D). Depending on the results from the landfill gas monitoring activities (see Appendix D), some or all of the gas vents may be installed as described above. If the results from the landfill gas monitoring program indicate the need to actively collect landfill gas in some or all areas of the landfill (if for example, methane is detected at elevated concentrations in perimeter monitoring probes), an active landfill gas system

~~will be designed and installed.~~ Any modifications to the gas management system will be presented to the U.S. EPA for review and approval prior to implementation.

6.6.2 PERIMETER LANDFILL GAS MONITORING NETWORK

Natural features, including the wetlands and the Kalamazoo River, limit potential landfill gas migration pathways to the north and east of the landfill, respectively. Following the construction of the final cover, gas monitoring probes will be installed along the southern side of the landfill property, along the boundaries with the MDNR property and 12th Street, and along the boundaries with the asphalt plant property to the west. The probes will be spaced approximately every ~~250-500~~ feet at the locations shown on ~~Plan Sheet 4~~ Drawing C-046. A typical gas probe construction detail is shown in Detail ~~5-7~~ on ~~Plan Sheet 7~~ Drawing C-0711. The landfill gas monitoring probes will be monitored in accordance with the O&M Plan (Appendix J) and the PSVP (Appendix D), both contained in the RMT Pre-Final Design Report.

6.7 ACCESS/DITCH ROAD

An approximate ~~140~~-foot wide access road will be constructed around the much of the perimeter of the landfill and will be accessible from 12th Street (Plan Sheet 4 Drawing C-064). The access road is combined with the perimeter drainage ditches, with the bottom width being 5 feet to facilitate ATV vehicles for routine monitoring activities. In the event that larger vehicles require access around the perimeter of the 12th Street Landfill, the ditches have been designed to be shallow (1.5 feet in depth) and wide (14 feet in overall width), such that larger vehicles could utilize these ditches as access roads. The only location around the perimeter of the landfill that may not have an access road is along the north side of the MDNR property, due to the encroachment of the existing slope on MDNR property. Construction of an access road along this portion of the landfill boundary would require even further cuts into the existing slope than are already required to pull all waste paper residuals back on site.

The access road will effectively be an extension of the cover system, except that the upper topsoil layer would be replaced with a granular stone layer and general fill, and will be constructed in accordance with the CQA Project Plan (Appendix C) and the Specifications (Appendix E), both contained in the RMT Pre-Final Design Report, and The access road/ditch will be installed at a minimum elevation of 703 feet M.S.L. to allow for access during a 2-year flood event (702.5 feet M.S.L.). ~~Along the western, northern, and southeastern sides of the landfill, the access road will be constructed of~~

~~general fill (base) and select aggregate fill topsoil (Detail 1 on Plan Sheet 5 Drawing C-05).~~ The access road will typically only be used for monitoring activities, so access will be essentially limited to all-terrain vehicles only. Along the Kalamazoo River on the eastern side of the landfill, there will be no ditch and the access road will ~~consist~~ continue as of topsoil, ~~plus and~~ Enkamat® (Detail 2 on Plan Sheet 6 Drawing C-0612), in order to provide a more aesthetic view from the river and from the walking paths in the potential future eco-park. All surface water discharging from the east side of the landfill will sheet flow across the access road and discharge into the previously constructed rip rap embankment.

~~The access road/ditch~~ will be widened approximately 3 feet at certain locations (Detail 2 ~~on Plan Sheet 8 Drawing C-0811~~) to allow for the installation of, and access to, gas probes and groundwater monitoring wells. Gates (Details 3-8 and 4-9 on Plan Sheet 7 Drawing C-0712), designed to prevent vehicle access, will be installed at the access road entrances along 12th Street. Additional information regarding the gates is discussed in Section 6.8.2.

6.8 INSTITUTIONAL CONTROLS

6.8.1 DEED RESTRICTIONS

The ROD requires that deed restrictions be imposed on the 12th Street Landfill property as necessary to appropriately restrict future land use pursuant to Section 20120a (1)(i) of the NREPA (i.e., for "limited industrial" land use). The SOW states that Weyerhaeuser is to rely upon the Restrictive Covenant for the 12th Street Landfill property that was filed on April 23, 2004, and that, if any deed restrictions are needed on adjacent properties, Weyerhaeuser shall attempt to obtain such deed restrictions in accordance with Section IX of the Consent Decree. Although the SOW states that the Restrictive Covenant for the 12th Street Landfill was filed on April 23, 2004, the *Declaration of Restrictive Covenants and Environmental Protection Easement* was found to have been recorded by the Allegan County Registrar of Deeds on March 25, 2005. This document is included in Appendix K.

The March 25, 2005, *Declaration of Restrictive Covenants and Environmental Protection Easement* (Deed Restrictions) granted certain land use or resource use restrictions for the 12th Street Landfill property. These Deed Restrictions were granted by and between Plainwell, Inc., the MDEQ; and the U.S. EPA as a third-party beneficiary. Weyerhaeuser Company, as a subsequent title holder of the property, is subject to the requirements of the Owner in the Deed Restrictions.

In general, the Deed Restrictions prohibit uses of the property that are not compatible with the property's zoned industrial land use designation, the limited industrial land use category under Section 20120a(1)(i) of the NREPA, or other use that is consistent with the assumptions and basis for the cleanup criteria developed pursuant to Section 20120a(1)(i) of the NREPA. Specifically, the Deed Restrictions prohibit the following uses of the landfill property:

- a) A residence, including any mobile home or factory-built housing, constructed or installed for use as residential human habitation;
- b) A hospital for humans;
- c) A public or private school for persons under 21 years of age;
- d) A daycare center for children;
- e) Any purpose involving residential occupancy on a 24-hour basis; and
- f) Any other use that would disturb or penetrate the landfill cover or erosion control system as set forth in the ROD.

The Deed Restrictions also prohibit the following activities on the landfill property:

- Any excavation, drilling, penetration, or other disturbance of the surface or subsurface soil on the property, except as necessary for compliance with the O&M Plan, or conducted in accordance with any work plan approved or modified by the U.S. EPA, with MDEQ concurrence;
- Any construction of building on the property unless plans are submitted to, and approved by, the MDEQ and the U.S. EPA; and
- Any activity that may interfere with any element of the ROD, including the performance of the operation and maintenance activities, monitoring or other measures necessary to ensure the effectiveness and integrity of the remedy.

The Deed Restrictions also require that vegetation and other materials be kept clear of the permanent markers, and that all soil, media, and debris on the property be managed in accordance with the applicable requirements of Section 20120c of the NREPA; Part 111, *Hazardous Waste Management*, of the NREPA; Subtitle C of the RCRA; and other relevant state and federal laws.

As discussed in Section 2.3 of the RMT Pre-Final Design Report, following implementation of the remedial action, Weyerhaeuser is considering the development of

an education-based natural park area on the 12th Street Landfill property. This educational "eco-park" would showcase the history of the Kalamazoo River in that area and highlight the adjacent wetland habitat. In concept, the eco-park may include walking paths on the landfill cover with signs at designated viewing areas that would describe the history and ecology of the area. Another potential future land use option being considered is to provide access to the township to extend a river walk along the eastern boundary of the landfill heading north through the 17 acres of wetland buffer that would connect the existing river walks in the cities of Plainwell and Otsego.

While no decisions have been made regarding the future use of the landfill, components of the remedy have been designed with the flexibility to accommodate possible future use of the property as an eco-park and/or to connect the existing Plainwell and Otsego River walks in front of the landfill. ~~As described in Section 6.2 of this Design report, the grading plan for the landfill has been designed with an 8 foot wide bench that could be used as a walking path in the future (Detail 2 on Plan Sheet 5). This walking path would be located approximately halfway up the landfill sideslopes and would provide overlooks of the river and wetlands, possibly with educational signage at select locations. In addition, the locations of the passive gas vents were selected, in part, to provide separation from the mid-slope bench so that potential odors emanating from the vents would not be a nuisance to recreational users.~~

Any future recreational use of the 12th Street Landfill property would be implemented only upon the U.S. EPA's approval, including appropriate modifications to the existing Deed Restrictions and possibly the ROD. Within the RD/RA process, the approximately 1 year into the O&M period, Weyerhaeuser may prepare a more detailed future land use concept and relevant human health risk assessment for presentation to the U.S. EPA; the MDEQ; and potential project stakeholders such as the MDNR, the cities of Plainwell and Otsego, and the U.S. Fish and Wildlife Service. The input of the stakeholder group would be incorporated into a final land use plan for review and approval by the U.S. EPA.

6.8.2 FENCING AND GATES

Fencing and gates (Details ~~38, 4, and 6-9~~ on ~~Plan Sheet 7~~ Drawing C-0712) will be installed along 12th Street (~~Plan Sheet 4~~ Drawing C-04) and along ~~certain a short~~ portions of the asphalt property and MDNR property boundaries to deter pedestrians and vehicular traffic from entering the landfill by simply going around the ends of the fence. The fencing and gates are consistent with existing access restrictions and likely restrictions that would be needed for a potential eco-park. If the U.S. EPA and/or

Weyerhaeuser determines that an eco-park is not an appropriate land use for the landfill property, Weyerhaeuser will submit a plan to the U.S. EPA to install additional fencing consistent with the ROD.

In accordance with the ROD, permanent markers will be placed along the property boundaries describing the area of the OU-4 and the nature of any restrictions. Warning signs will also be posted on the fence every 200 feet and on all entry gates. The number, content, and location of the permanent markers and warning signs will be presented to the U.S. EPA for approval prior to their installation.

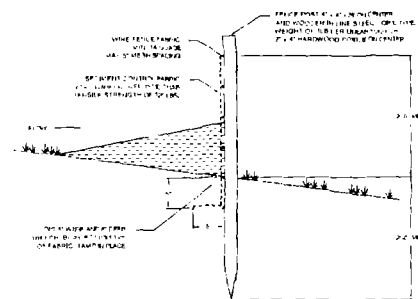
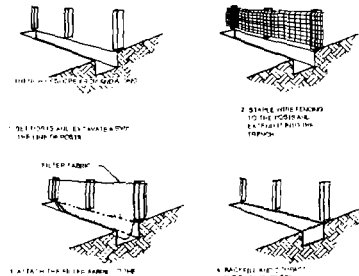
6.9 PRELIMINARY CONSTRUCTION HEALTH AND SAFETY PLAN

A Preliminary Construction Health and Safety Plan (HSP) has been developed to protect field personnel and authorized site visitors during execution of the remedial action (Appendix L). The HSP has been prepared in fulfillment of the requirements that are contained in the CD and the SOW. A new HSP was submitted by Conestoga-Rovers & Associates (CRA) under separate cover on May 20, 2009 to address the RA construction activities and Remedial Investigation (RI) activities at Plainwell Mill. This HSP will be revised as needed to remain current with anticipated activities at both sites. After the U.S. EPA's approval of the remedial design, and prior to implementing the remedial action construction activities, a final construction health and safety plan will be prepared and may be submitted to the U.S. EPA. A separate health and safety plan, specific to the O&M activities, is included in Appendix J.

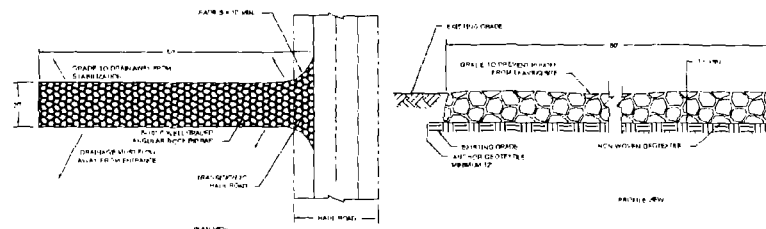
6.10 EQUIPMENT DECONTAMINATION

Decontamination of equipment utilized during the remedial action will be performed at a decontamination pad constructed ~~near the site entrance~~ at a location directly adjacent to the proposed final limits of paper residuals as discussed in Section 6.1 (refer to Section 6.1.3 of the FSP [RMT, 2008d]; copies in Appendix N of the RMT Pre-Final Design Report for additional information regarding the construction of the decontamination pad). Decontamination water will be collected and containerized in ~~55-gallon barrels that will be properly labeled and temporarily stored on-site as discussed in Section 6.2.2.~~ Following completion of the construction activities, a sample of the decontamination water will be collected and tested for parameters required by a permitted offsite disposal facility. Following receipt of the analytical results, the decontamination water will be transported and disposed at the off-site facility.

~~Documentation of off-site disposal activities will be included in report documenting the remedial action construction.~~

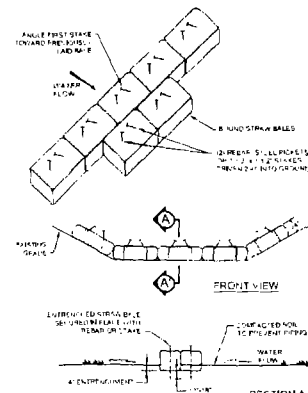


DETAIL 1 SILT FENCE
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DETAIL 3 STABILIZED CONSTRUCTION ENTRANCE
NTS

DETAIL 2 STRAW BALE BARRIER
NTS



- GENERAL NOTES FOR THE ABOVE DETAILS:
1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL HEALTH DEPARTMENT AND THE LOCAL BOARD OF HEALTH.
 2. AFTER THE PROJECT HAS BEEN COMPLETED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL STRAW BALE BARRIERS AND RESTORING THE AREA TO ITS ORIGINAL CONDITION.
 3. SOIL EROSION AND SEDIMENT CONTROL SHALL BE MAINTAINED AT ALL TIMES DURING THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING THE AREA AND REPORTING ANY PROBLEMS TO THE LOCAL HEALTH DEPARTMENT AND THE LOCAL BOARD OF HEALTH.
 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL HEALTH DEPARTMENT AND THE LOCAL BOARD OF HEALTH.
 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING THE AREA AND REPORTING ANY PROBLEMS TO THE LOCAL HEALTH DEPARTMENT AND THE LOCAL BOARD OF HEALTH.
 6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL STRAW BALE BARRIERS AND RESTORING THE AREA TO ITS ORIGINAL CONDITION.
 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL HEALTH DEPARTMENT AND THE LOCAL BOARD OF HEALTH.
 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING THE AREA AND REPORTING ANY PROBLEMS TO THE LOCAL HEALTH DEPARTMENT AND THE LOCAL BOARD OF HEALTH.

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12th STREET LANDFILL
Otsego Township, Michigan

PRE-FINAL DESIGN REPORT ADDENDUM No. 1

SOIL EROSION AND
SEDIMENT CONTROL DETAILS

COMESTOGA-ROVERS & ASSOCIATES

DATE: 6/1/08

PROJECT: 12th STREET LANDFILL

CLIENT: OTSEGO TOWNSHIP

SCALE: 1" = 10'

DATE: 6/1/08

PROJECT: 12th STREET LANDFILL

CLIENT: OTSEGO TOWNSHIP

SCALE: 1" = 10'



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DRAWING STATUS

12th STREET LANDFILL
Otsego Township, Michigan

PRE-FINAL DESIGN REPORT ADDENDUM No. 1

PASSIVE GAS MANAGEMENT SYSTEM



CONESTOGA-ROVERS & ASSOCIATES

Source: *Indefinite*

PAGE ADAPTED FROM PREVIOUS PUBLICATION

Project Manager:	Responsible By	Date
G. CARL	T. HENNINGSEN	6-08-2008
Status	Project #	Budget #
In Progress	56393-05	002
		C-06

2025 RELEASE UNDER E.O. 14176