ROCKY FLATS SITE
REGULATORY CONTACT RECORD

Purpose: Path Forward for Original Landfill (OLF) Seep 7 Drain Extension, Berm Maintenance and Repair, Perimeter Channel Slope Cut and Fill, and Modification of the OLF Monitoring and Maintenance Plan (M&M Plan)

Contact Record Approval Date: September 2, 2008

Site Contact(s) / Affiliation(s): Scott Surovchak, DOE; Linda Kaiser, S.M. Stoller; John Boylan, S.M. Stoller; Rick DiSalvo, S.M. Stoller

Regulatory Contact(s) / Affiliation(s): Carl Spreng, CDPHE; Larry Bruskin, CDPHE; Vera Moritz, EPA

Discussion: Conditions that warranted repair and that triggered further investigation in accordance with the OLF M&M Plan were found at the OLF during the 2007 inspections. Inspection details are included in the Rocky Flats Legacy Management Agreement (RFLMA) quarterly and annual reports for 2007. These conditions involved localized slumping and settling of the OLF cover, seeps observed to daylight intermittently on the cover, and the development of a continuous seep at the eastern toe of the buttress (identified as Seep 8). In addition, ponding in lengths of the diversion berm channels from precipitation and snowmelt runoff were observed, and a topographic survey showed that portions of the diversion berms did not meet the minimum M&M Plan–specified 2-foot height.

An action plan for the Phase 1 (near-term) repair, Phase 2 geotechnical investigation, and Phase 3 design and construction for long-term repair was approved by the Colorado Department of Public Health and Environment (CDPHE) on July 16, 2007. Phase 1 repairs to address localized differential settlement, slumping, and surface cracks were made in 2007 by filling, grading, and compacting.

CDPHE approved the Phase 2 *Rocky Flats Original Landfill Geotechnical Investigation/Engineering Work Plan* (Work Plan) on November 30, 2007. The purpose of the work plan is to determine subsurface conditions and the possible causes of observed localized slumping and settling of the OLF cover, and to develop feasible alternatives for mitigating the localized areas of slope instability. The investigation also considered the possible impacts of the seeps and the maintenance of berm heights and channel slopes to ensure adequate water run-on and runoff controls.

Investigation field work for Phase 2 began in December 2007 and was completed in April 2008. Work began with a geophysical survey to help determine the thickness and extent of waste placement and to aid in positioning investigative test pits and boreholes. Next, eight test pits, approximately 20 feet long and 11 to 13 feet deep, and a ninth test pit, approximately 20 feet long and 3 feet deep, were excavated. Seven boreholes, approximately 28 to 39 feet deep (into bedrock), were drilled to obtain continuous core samples and to install inclinometers to accurately measure movement. Field observations by a geologist were made throughout the work, and laboratory analyses were conducted to determine mechanical properties of the test pit and borehole samples. Figure 1 shows the location of the test pits and inclinometer boreholes in relation to the observed conditions being investigated.

The *Rocky Flats Original Landfill Geotechnical Investigation Report* (Geotech Report) (June 2008) describes the Phase 2 work performed and concludes that a clay layer containing organic materials at

or near the bedrock contact appears to be a weak interface area. As described in the Geotech Report, modeling predicts small-scale instability due to percolating moisture that lubricates this weak interval. The OLF buttress is providing stability as intended, and there is no large-scale instability predicted; therefore, the observed conditions do not appear to indicate a need for urgent or major responses.

Alternatives to address the instability caused by a weak layer condition include increasing the soil strength by soil grouting or dynamic soil compaction. Steep side slopes in the perimeter channels that are outside of the areas supported by the buttress can also be regraded to improve side slope stability in some locations. Alternatives to address moisture include improving the drainage of surface water and reducing standing water. More robust approaches that involve considerable excavation and construction include slurry walls and drainage systems.

On May 22 and June 19, 2008, the RFLMA parties consulted regarding the outcome of the investigation. The Geotech Report was submitted to CDPHE on June 5, 2008. Based on consideration of the localized nature of the instability and continued monitoring, it was agreed that cost-effective construction approaches that minimize intrusion into the OLF and the continued implementation of OLF M&M Plan maintenance steps should be implemented. The parties agreed that alternatives for bringing berm heights up to the OLF M&M Plan minimum of 2 feet should be reconsidered because the 2-foot height is difficult to maintain with the cobbly soils specified for the cover (Rocky Flats Alluvium), and the berms have flattened out or settled since construction. DOE developed further information and modeling regarding the berm heights necessary to contain the runoff water from a 100-year 24-hour storm event. CDPHE notified DOE on June 24, 2008 that the Geotech Report, having met the criteria agreed to in the Work Plan for the investigation, was acceptable.

CDPHE and DOE met again on July 29, 2008, to review the outcome of the berm height analysis, discuss preliminary construction designs, and finalize the path forward for completion of the Phase 3 designs and construction. The berm height analysis was based on a high-resolution OLF topographic survey completed in late June 2008 and application of the HEC-RAZ modeling program used for the initial OLF closure design. Conclusions from this survey and the berm height analysis are discussed below within the text, focusing on the individual actions to be taken.

Based on consultation, the following actions will be taken by DOE. Some of these actions will require that conforming modifications be made to the OLF M&M Plan, and these are also noted.

1. Berm height – Minimum heights will be based on smaller subdrainage areas calculated for 200-foot lengths of each berm, and the minimum calculated height to convey the 1,000-year, 24-hour event. This provides freeboard capacity to convey the 100-year, 24-hour event, which is a design criterion for the berms. Approximately 24 percent of the total berm lengths will need several inches of soil (after compaction) added to the top to meet this minimum height (which will represent the required berm height). This soil will be added, compacted, and covered with erosion matting. This approach will minimize the impact to established vegetation because it will not require wholesale regrading or use of heavy construction equipment. An “as built” topographic survey will be completed after this work to serve as a baseline for continued observation of berms for future maintenance.

The following points were agreed to:

- Inspection of berm heights will be based on an annual topographic survey, and subsequent repairs will be made, if necessary, to maintain required minimum heights.

- Routine inspection walkdowns (which the OLF M&M Plan currently mandates to be conducted monthly) will focus on observable signs of slumping, settling, cracking, and erosion, and repairs to any of these observed conditions will be made as part of routine maintenance.

- Major storm events that could possibly promote significant erosion or otherwise damage the berms may also be assessed by topographic survey, if appropriate, and repairs will be made, if necessary, to maintain required minimum heights.

The OLF M&M Plan will be modified to incorporate the subdrainage areas used to calculate the minimum berm heights and to describe the topographic survey method and criteria and other inspection requirements.

2. Berm channels – DOE will continue to implement the OLF M&M Plan maintenance approach and regrade as needed, based on observations of significant ponding, to promote drainage to the perimeter channels. The annual topographic survey will also be used to address any areas which indicate that slopes are conducive to ponding.

The following points were agreed to:

- Minor ponding (short lengths, narrow, and shallow) is expected over time, and observations during precipitation events will be made from time to time and noted on the OLF monthly inspection form.

- Inspections are also required after significant precipitation per the OLF M&M Plan and RFLMA.

- Steps will be considered to mitigate snow and ice buildup during winter months, such as the use of snow fencing to minimize drifts.

- Regrading involves filling in observed low spots, smoothing or reducing high spots, and removing blockages that may have resulted from vegetation buildup.

- DOE will maintain an average 2 percent minimum drainage slope over the length of each diversion berm (could be verified using annual topographic survey).

- If channel regrading requires trenching of more than 6 inches, DOE will consult with CDPHE regarding possible impacts to the soil cover.

The OLF M&M Plan will be modified, as necessary, to clarify the routine maintenance for these items.

3. Seep 7 drain extension – An extension to the current drain will be installed upgradient within the 2-foot cover depth in the general area where this seep has expressed ("day lighted") on the surface and resulted in saturation of surface soil. This will be carefully constructed in the cover layer so as not to intrude into the underlying soil/waste. At its southern end, the excavation will extend below the cover material for a short distance to a depth of 4 to 5 feet to tie into the existing drain. Figure 2 shows the conceptual design for the drain extension.

The OLF M&M Plan will be modified to document the drain extension, including updating the drawings to show the location.

4. Inclinometers – Movement will be monitored on the same frequency as the settlement monuments. It was agreed that surveys of consolidation monitors installed as part of the Phase 1 work (3-foot pieces of steel rod driven into the soil cover to monitor movement) will be discontinued, and these monitors will be removed. Settlement monument E, located between Berms 1 and 2, was not installed pending completion of investigative field work and construction decisions. This monument will be installed.

The OLF M&M Plan will be modified to incorporate the inclinometer locations and monitoring requirements, including updating the drawings to show the locations.

5. West perimeter channel side slope stability – An area generally between the western ends of Berms 1 and 3 (see Figure 1) will be regraded by cutting and filling to lessen the OLF side slope and improve stability. The perimeter channels' depth and size are much greater than the design drain capacity requires. The regrading plan will be based on cost-effective use of soils available in the areas adjacent to the slope areas being adjusted. Regrading will also be considered at other locations in the east and west perimeter channels to reduce side slopes and improve cover and channel stability. The permanent erosion control mat will be replaced where necessary.

The OLF M&M Plan will be modified to document the regraded channels, including updating the drawings to show the new contours, as necessary.

6. Other repairs and maintenance – Localized slumping or differential settling will be evaluated and generally can be addressed through routine repairs, such as adding soil and regrading, crack filling, and so forth, as currently specified in the OLF M&M Plan. Woody plants may be left where they appear on the buttress, but will still need to be removed on the OLF cover. The OLF M&M Plan modification will clarify the woody plant removal requirement accordingly.

7. OLF M&M Plan – Anticipated modifications to the OLF M&M Plan to implement the path forward are noted in the foregoing action items.

The OLF M&M Plan was written before the Corrective Action Decision/Record of Decision (CAD/ROD) was approved in September 2006 and before RFLMA (generated to implement the CAD/ROD) was drafted and became effective in March 2007. The OLF M&M Plan is incorporated by reference as an enforceable requirement of RFLMA (see RFLMA Attachment 2, Section 5.3.1, and Tables 1–3). RFLMA terminated and supersedes the Rocky Flats Cleanup Agreement (RFCA), and the OLF M&M Plan references RFCA in certain sections.

Thus, revisions to the OLF M&M Plan will include updates to the document to reflect the implementation of the remedy under RFLMA, similar to what was done for the Present Landfill M&M Plan pursuant to Contact Record 2007-08.

Pursuant to RFLMA, paragraph 66, DOE and CDPHE do not consider these items to constitute a significant change from existing requirements of RFLMA, and this contact record shall be used to provide public notice of modifications to the OLF M&M Plan. Also, CDPHE may approve modifications to RFLMA attachments pursuant to RFLMA, paragraph 65.

The groundwater and surface water monitoring plans in the OLF M&M Plan reference RFCA and the RFCA Integrated Monitoring Plan. These have been superseded by RFLMA. Therefore, the OLF M&M Plan revision will reflect the RFLMA requirements, which include the following RFLMA attachment tables and figures:

- Table 1, Surface Water Standards;
- Table 2, Water Monitoring Locations and Sampling Criteria;
- Table 3, Present and Original Landfill Inspection and Maintenance Requirements; and
- Figure 10, RCRA Wells.

Surface water standards may change from time to time, based upon regulatory actions, and RFLMA Attachment 2, Table 1, will be updated periodically to reflect these changes. Since the OLF M&M Plan will be revised to defer to the RFLMA analyte list, no changes to the OLF M&M Plan will be required if surface water standards change in the future. Currently, there are no changes needed for RFLMA Attachment 2, Table 1.

Resolution: The final design of the Seep 7 drain extension will be submitted to CDPHE for approval. Construction of the Seep 7 drain extension will take place after CDPHE approval.

The minimum berm height specification drawings based on the June 2008 topographical survey will be submitted to CDPHE for approval. Maintenance and repairs to the berm channels and berm heights may be commenced prior to CDPHE's approval of the drawings, and DOE will complete the work based on the CDPHE-approved minimum berm height.

The final design of the west perimeter channel will be submitted to CDPHE for approval. Construction work will commence after CDPHE's approval.

The OLF inspection and monitoring criteria discussed in this contact record shall be incorporated in a modification to the OLF M&M Plan; RFLMA, Attachment 2, Table 3, will also be modified accordingly. The modifications shall be submitted to CDPHE for approval.

Closeout of Contact Record: This contact record will be closed when:

- Maintenance, repairs, and construction work, including an "as built" topographical survey after adding soil to achieve minimum berm height requirements, are completed as described in this contact record;

- Modified RFLMA, Attachment 2, Table 3, is approved by CDPHE and posted to the DOE website;

- Notification of the availability of the modification is made by DOE in accordance with RFLMA, Appendix 2, "Public Involvement Plan";

- The modified OLF M&M Plan is approved by CDPHE and posted to the DOE website; and

- Notification of the availability of the modification is made by DOE in accordance with RFLMA, Appendix 2, "Public Involvement Plan."

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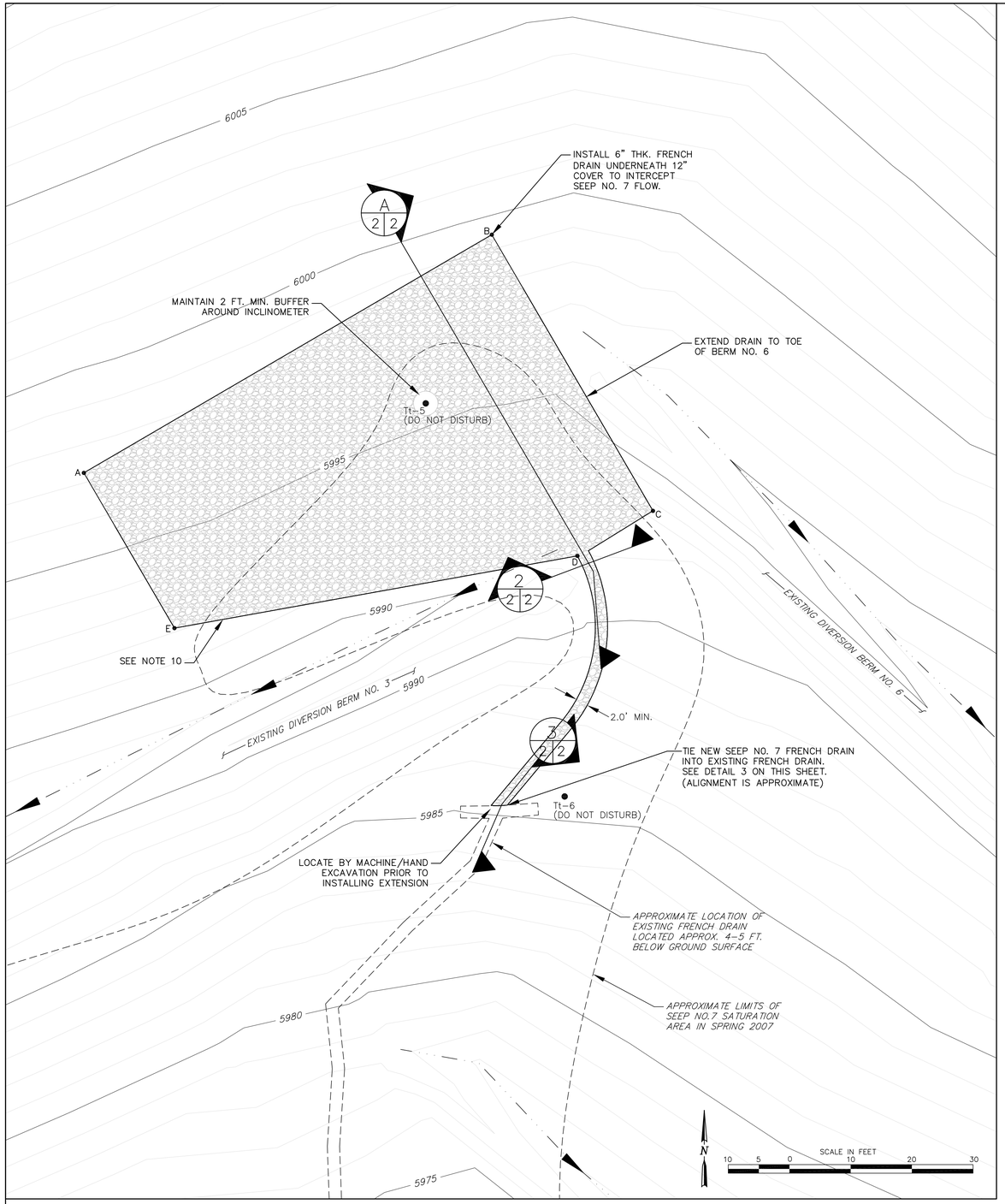
Distribution:
Carl Spreng, CDPHE
Scott Surovchak, DOE
Linda Kaiser, Stoller
Rocky Flats Contact Record
File

Figure 1. Location of the Test Pits and Inclinometer Boreholes and Observed Conditions at the OLF

Figure 2. Seep 7 Extension Conceptual Plan

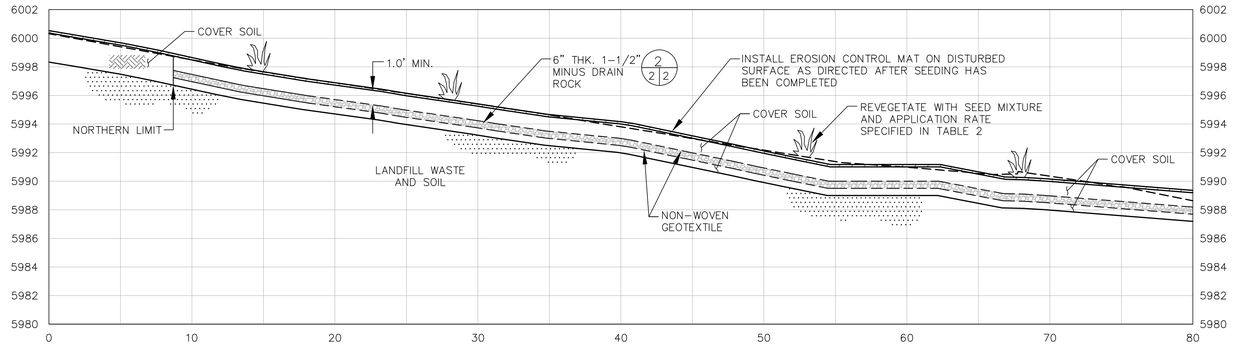
See .pdf file



LEGEND:

- DITCH/CHANNEL/CREEK
- EXTENT OF SATURATED SOIL
- ROAD
- 6000 CONTOURS
- Tt-5● INCLINOMETER LOCATION

1 / 2 2 SEEP NO. 7 PLAN



A / 2 2 SECTION

SCALE IN FEET
5 2.5 0 5 10 15

TABLE 1

POINT ID	NORTHING	EASTING
A	747769.53	2081511.74
B	747808.43	2081578.39
C	747763.33	2081604.71
D	747755.97	2081592.37
E	747744.17	2081526.54

TABLE 2

SPECIES	COMMON NAME	LBS./ACRE (PLS)
GRAMINOLDS		
AGROPYRON DASYSTACHYUM	THICKSPIKE WHEATGRASS	0.73
AGROPYRON SMITHII	WESTERN WHEATGRASS	4.17
AGROPYRON TRACHYCAULUM	SLENDER WHEATGRASS	2.72
BOUTELOUA CURTIPENDULA	SIDE-OATS GRAMA	1.49
BOUTELOUA GRACILIS	BLUE GRAMA	0.74
BUCHLOE DACTYLOIDES	BUFALO GRASS	4.84
STIPA VIRIDULA	GREEN NEEDLE GRASS	1.21
TOTAL		15.90

1) THIS POUNDS PER ACRE ASSUMES DRILL-SEEDING IS USED. IF THE SEED IS TO BE BROADCAST, THE APPLICATION RATES ARE TO BE DOUBLED.

2) PLS - PURE LIVE SEED. BE SURE TO SPECIFIY TO THE SEED DEALER WHEN ORDERING.

3) THE SEED IS TO BE CERTIFIED WEED FREE.

NOTES:

1) GEOTEXTILE FOR USE IN THE DRAIN EXTENSION SHALL BE A NON-WOVEN POLYESTER OR POLYPROPYLENE MATERIAL HAVING A MINIMUM WEIGHT OF SIX OUNCES PER SQUARE YARD. (MIRAFI® 160N OR APPROVED EQUAL).

2) DRAIN ROCK (EST. 63 CY) SHALL BE A POORLY-SORTED CLEAN GRAVEL, HAVING A MAXIMUM PARTICLE SIZE OF 1 1/2" AND NOT MORE THAN FIVE PERCENT, BY WEIGHT, OF THE MATERIAL PASSING THE NO. 40 SIEVE.

3) DO NOT DISTURB INCLINOMETERS. MAINTAIN 2 FT. BUFFER AWAY FROM INCLINOMETER CASING.

4) ROUGHEN SURFACE PRIOR TO SEED APPLICATION. AFTER SEEDING, INSTALL EROSION CONTROL MAT PER MANUFACTURER'S SPECIFICATIONS.

5) FOLLOW CONTRACTOR HEALTH AND SAFETY PROCEDURES WHEN EXCAVATING INTO LANDFILL WASTE.

6) EROSION CONTROL MAT SHALL BE A GREENFIX AMERICA CF072B OR NORTH AMERICAN GREEN C125BN. INSTALL PER MANUFACTURER'S SPECIFICATIONS.

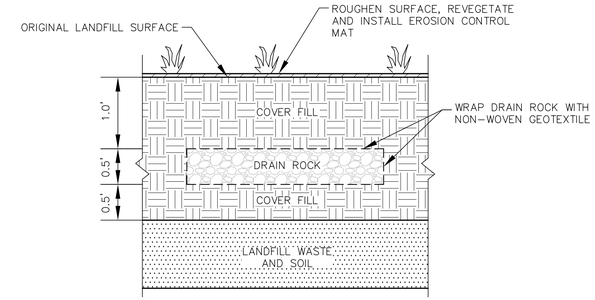
7) NO COMPACTION IS REQUIRED FOR COVER SOIL. MATERIAL PLACED WITH MINIMAL PASSES OF EQUIPMENT USED FOR BACKFILLING.

8) FOR DRAIN TRANSITION TO EXISTING FRENCH DRAIN, BACKFILL LANDFILL WASTE IN MAX. 12-INCH LIFTS AND COMPACT AROUND THE DRAIN WITH A JUMPING JACK OR APPROVED EQUIVALENT.

9) OVERLAP EDGED OF NON-WOVEN GEOTEXTILE A MINIMUM OF TWO FEET OR SEW SEAMS TOGETHER WITH MANUFACTURER APPROVED METHOD TO COMPLETELY WRAP DRAIN ROCK.

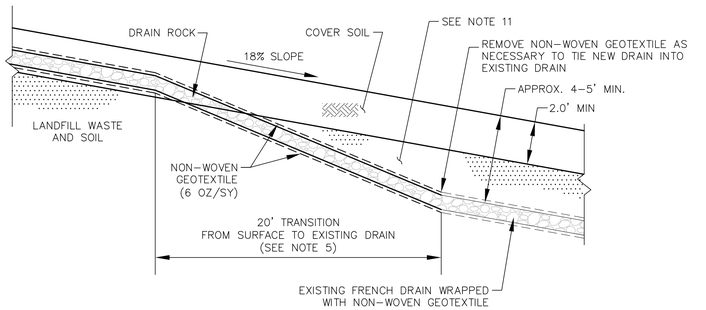
10) THE SLOPE BETWEEN POINT D AND E SHALL BE A MINIMUM 2.0% TO PREVENT PONDING WITHIN THE DRAIN ROCK.

11) SUBCONTRACTOR TO NOTIFY CONTRACTOR PRIOR TO EXCAVATING INTO POTENTIAL LANDFILL WASTE IN ORDER FOR CONTRACTOR TO MONITOR EXCAVATIONS.



2 / 2 2 SEEP NO. 7 DRAIN-DETAIL

NOT TO SCALE



3 / 2 2 SEEP NO. 7 TIE-IN DETAIL

NOT TO SCALE

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	PROJECT A/E	APPROVAL

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AM01-07LM00060

PROJECT LOCATION
ROCKY FLATS SITE
GOLDEN, COLORADO

REFERENCE

TETRA TECH

APPROVALS		
DRAWN BY: T. BOEHLER	DATE: 07/30/08
ENGINEER: J. KIENHOLZ	07/30/08
PROJECT ENGINEER: Jim Kienholz	08/12/08
APPROVED BY: D. NORDEEN	08/12/08
PROJECT MANAGER: L. KAISER	08/12/08
DOE CONCURRENCE: (SEE RECORD)	08/12/08

ORIGINAL LANDFILL
SEEP NO. 7 DRAIN EXTENSION

SEEP #7 - PLAN AND SECTION

PROJECT NO. LTS-111-0056-07-001B
DRAWING NO. S03200-R00-C01-D+
SHT. 3 OF 3