

Robert D. Coney
DIRECTOR



Planning and Development Department
12200 Foces Street
Westminster, CO 81234
PHONE 303.453.8800
FAX 303.453.8829
www.co.adams.co.us

January 28, 2005

Mr. Ron Chacon, Site Manager
WM Conservation Services
41800 E. 88th Ave.
Bennett, CO 80102

RE: CSI Request to Eliminate Leachate Collection Piping

Dear Mr. Chacon:

This Department has completed its review of the request to modify construction of the leachate collection system in new cell construction. The modification will eliminate the use of piping and rely on cell floor slopes averaging 3 percent and a leachate drainage layer with hydraulic conductivity of at least 1×10^{-1} cm/sec. The report included in the modification request packet includes calculations by a Professional Engineer demonstrating compliance with State Health Regulation Standards for leachate collection.

The design has been approved by Tri-County Health Department (TCHD) by letter dated September 30, 2004, and the Colorado Department of Public Health and Environment (CDH&PH) by letter dated November 30, 2004.

Based upon review of the construction modification demonstration and the approvals from TCHD and CDH&PH, this Department approves the change in leachate collection design for new cell construction.

Should you have any questions regarding this action, please do not hesitate calling me at 303-453-8813.

Sincerely,

Craig Tossmer
Environmental Analyst

cc: Director Planning and Development
TCHD
CDH&PH

BOARD OF COUNTY COMMISSIONERS

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Denver, Colorado 80230-6928
(303) 692-3090

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Colorado Department
of Public Health
and Environment

November 30, 2004

Mr. Ron Chacon, Site Manager
WM Conservation Services
41800 E. 88th Avenue
Bennett, Colorado 80102

Re: Conservation Services, Inc. Request to Eliminate Leachate Collection Piping

Dear Ron:

I have reviewed the letter report written by American Environmental Consulting, LLC, entitled Request to Eliminate Leachate Collection Piping, dated September 3, 2004, and resent on November 3. This letter report requests a minor design modification at the Conservation Services, Inc. (CSI) facility which eliminates the requirement for leachate collection piping in the base of all disposal cells constructed in the future. Calculations in the letter report demonstrate that leachate will continue to be transported to the sump within the regulation 12 month time period, and less than 12 inches of leachate will be maintained over the barrier layer. The letter report was stamped and dated by a Professional Engineer.

Our staff believes that the proposed change to the leachate collection piping system is consistent with the requirements of the Solid Waste Regulations, and will be protective of public health and environment. Therefore, the change is approved.

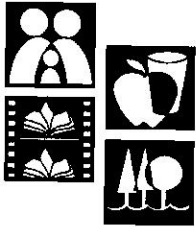
Thank you for your efforts to stay within compliance of Colorado solid waste regulations. If you have any questions, please call me at 303-692-3446.

Sincerely,

Patricia C. Martinek
Solid Waste Unit, Hazardous Materials and Waste Management Division

Cc: Alan Scheere, Waste Management
~~Mark McMullen~~, AEC
Deanne Kelly/Rick Kinshella, Tri-County Health Department
Craig Tessmer, Adams County Planning

File: SW/ADM/CSI 2.2



Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Richard L. Vogt, M.D.
Executive Director

September 30, 2004

Mark [REDACTED]
American Environmental Consulting, LLC
6885 South Marshall Street, Suite 3
Littleton, CO 80128

RE: Request to Eliminate Leachate Collection Piping
Conservation Services, Inc. Landfill
Adams County, Colorado

Dear Mr. McMullen:

This letter is in response to your request for a minor design modification at the Conservations Services, Inc. (CSI) disposal facility in Adams County. According to your written request, CSI would like to eliminate the requirement for leachate collection piping in the base of all disposal cells constructed in the future, including all future phases of Cell 18/21/22/23. There are several reasons behind this proposal, the first being the fact that CSI does not accept MSW (with the exception of Cell 25 which is not currently constructed). The second reason stated in the proposal is that because of the size of the disposal cells at the facility, the leachate travel distances are on the order of hundreds of feet as opposed to thousands of feet in many MSW landfills.

Your proposal includes calculations that were conducted to determine travel times for leachate to be transported from the furthest point in a cell to the sump for each cell and included evaluations for different flow pathways within each cell to identify the "worst-case" flow path. Based on review of the calculations provided, Tri-County has no objection to the elimination of the leachate collection piping at the base of the disposal cells. It is understood that the sump riser pipes will remain for each future cell to provide access to a pump for leachate removal from the sumps.

If you have questions, please do not hesitate to call me at 720-322-1509.

Sincerely,

Deanne Kelly, R.E.H.S.
Solid Waste Specialist

CC: Alan Scheere, CSI
Bill Hedberg, CSI
Brian Hlavacek, TCHD
Rick Kinshella, TCHD
Patricia Martinek, CDPHE
Craig Tessmer, Adams County

September 3, 2004

Mr. Craig Tessmer
Adams County Planning Department
12200 N. Pecos Street, 3rd Floor
Westminster, CO 80234

Ms. Pat Martinek
Colorado Department of
Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530

Ms. Deanne Kelly
Tri-County Health Department
4201 East 72nd Ave., Suite D
Commerce City, CO 80022

**Re: Request to Eliminate Leachate Collection Piping
Conservation Services, Inc. Landfill
Adams County, Colorado**

Dear Sir and Madams:

Conservation Services, Inc. (CSI) is requesting a minor design modification at their disposal facility in Adams County, Colorado. CSI wishes to eliminate the requirement for leachate collection piping in the base of all disposal cells constructed in the future, including all future phases of Cell 18/21/22/23.

Section 3 of the Colorado Regulations Pertaining to Solid Waste Sites and Facilities (6 CCR 1007-2) contains two requirements for design of a leachate collection and removal system. As stated in the regulation, these requirements are specific to Municipal Solid Waste (MSW) landfills and are as follows:

1. The system must be designed to promote the transport of leachate from the most distant point of the collection system to the leachate removal system (sump) in less than 12 months, and,
2. The system must be designed and constructed to maintain less than a twelve-inch depth of leachate over the barrier layer.

The CSI site is different than many landfills, and Section 3 of the regulations may not be applicable even though both the existing and proposed designs meet both of the above conditions. First, CSI is a non-hazardous industrial waste landfill that does not accept MSW with the potential exception of Cell 25 (which is permitted for MSW but not constructed). Second, unlike many MSW landfills that are "area fills", and that may have leachate travel distances of over 1,000 feet, the CSI site consists of individual, discrete disposal cells, each with its own sump, and leachate travel distances on the order of hundreds of feet.

During construction of a portion of Cell 18, CSI experienced difficulty in procuring suitable leachate collection pipe. The primary issue with the existing design is matching pipe that meets the specifications with leachate drainage material that meets the specifications. The perforations in the leachate collection pipe must be sufficiently large to effectively receive leachate from the drainage layer, but small enough to avoid entry of the leachate drainage material. Commercially-available HDPE piping that can both withstand the landfill loads placed upon it and that is perforated at a sufficient size is difficult to obtain and costly. Likewise, the leachate drainage material must be large enough to avoid entry into the leachate collection pipe perforations, but it cannot be so large as to potentially damage the underlying High Density Polyethylene (HDPE) membrane. The percentage of fines in the drainage layer must also be very low to minimize the potential for clogging the piping. Suitable leachate drainage material was identified for the construction of Phase 1 in Cell 18/21/22/23, but it was difficult to find this material at a reasonable cost. Drainage material with an acceptable hydraulic conductivity and a higher percentage of fines, but still within specification, is far more readily available. A higher percentage of fines will not affect the performance of the material for conveying water in the absence of the leachate-collection pipe.

With all other variables consistent (precipitation, moisture content of refuse, soil cover, etc.) the two variables that influence both the amount of leachate head on the bottom liner system and the travel times within the leachate collection system are the base grades (slopes) and permeability of the leachate drainage layer. The higher the permeability of the leachate drainage material and the grades on the base, the more efficient the system works in minimizing the leachate head and travel times. The base grades designed at CSI are generally over three percent across the floor. This grade is greater than that found at many MSW landfills. Moreover, the minimum design hydraulic conductivity of the CSI drainage layer is 1×10^{-1} cm/sec: a value that is also greater than that specified for the drainage layer in many MSW landfills. These two factors, along with the short travel distances, allow for the elimination of the leachate collection piping while still meeting the standards presented above.

The above conclusion can be validated by analyzing travel times based upon a design that does not include flow through leachate-collection pipes. Base grades change within some of the cells so the pathway that the leachate may take from the farthest point in a cell to the removal sump may encompass different grades or change flow directions along the way (i.e., leachate may flow along the base of the cell for a certain distance, and then be diverted along the toe of

a slope to the sump). We have evaluated the travel times for leachate to be transported from the farthest point in a cell to the sump for each cell and, in many cases, evaluated different flow pathways within a single cell to identify the "worst-case" (i.e., longest travel time) flow path. Darcy's equation was used for this evaluation, assuming a saturated media, as follows:

$$V = Ki/\text{effective porosity}$$

Where: V = velocity in feet per day
 K = hydraulic conductivity in centimeters per second, converted to feet per day
 i = Gradient, a unitless number

For this evaluation, K was input as the minimum design permeability of the leachate drainage layer of 1×10^{-1} cm/sec, and converted to feet per day (283 ft/day). The gradient was calculated from the approved individual cell design for each cell, and the effective porosity was conservatively assumed at 25 percent (0.25) since a lower effective porosity value will result in a more rapid calculated velocity.

Table 1 presents the results of this evaluation, indicating a maximum travel time in Cell 25 of less than approximately 42 days, well within the 1-year requirement.

It is also important to note that the current cell designs and evaluation were included in the Conservation Services Incorporated Facility Expansion Revised Design and Operation Plan that was approved by the Colorado Department of Public Health and Environment and Adams County Commissioners in an August 23, 1995 resolution. In that document, the Hydrological Evaluation of Landfill Performance (HELP) model was used to evaluate the performance of the leachate collection and removal system to ensure that no more than 12 inches of leachate head would exist on the liner. That evaluation ignored the piping system, and the design was still found to be acceptable.

In summary, eliminating the leachate collection pipes designed in the base of the CSI cells will not adversely affect the ability of the system to gather and convey any generated leachate in compliance with regulations governing MSW landfills. The sump riser pipes will remain to provide access to a pump for removal of leachate from the sumps.

Mr. Craig Tessmer
Ms. Pat Martinek
Ms. Deanne Kelly

August 4, 2004
Page 4

Thank you for your review of this request, and please feel free to call me at 303-948-7733 if you have any questions.

Respectfully,

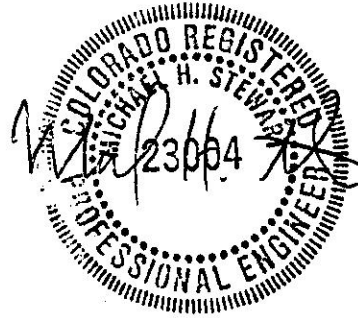
American Environmental Consulting, LLC



Mark A. McMullen
Principal

cc: Mr. Alan Scheere, CSI
Mr. Bill Hedberg, CSI

Reviewed by:



Michael H. Stewart, P.E.

TABLE 1

TRAVEL TIME CALCULATIONS FOR CSI DISPOSAL CELLS						
Darcy Equation:	V=Ki/n					
Where:	V =velocity in cm/sec					
	K =minimum permeability of drainage layer= 1×10^{-1} cm/sec for all cells					
	i =Unitless gradient - specific to cell					
	n = effective porosity=0.25					
Cell No.	K	i	Actual Distance at Flow Line Gradient (feet)	Calculated Flow/Day (feet)	Actual Days Along Flow Line	Less than One Year?
Cell 18/21/22/23						
	0.1	0.033	515	37.4	13.8	
	0.1	0.013	118	14.7	8.0	
Total days to sump					21.8	YES
Cell 13-17						
Total days to sump	0.1	0.039	930	44.2	21.0	YES
Cell 24						
	0.1	0.0328	360	37.2	9.7	
	0.1	0.013	400	14.7	27.1	
Total days to sump					36.8	YES
Cell 6/7/9						
	0.1	0.0326	640	37.0	17.3	
	0.1	0.031	140	35.1	4.0	
Total days to sump					21.3	YES
Cell 25						
Total days to sump	0.1	0.0329	673	37.3	18.0	YES
OR						
	0.1	0.0329	726	37.3	19.5	
	0.1	0.0107	265	12.1	21.8	
Total days to sump					41.3	YES
OR						
Total days to sump	0.1	0.033	520	37.4	13.9	YES
OR						
Total days to sump	0.1	0.0104	445	11.8	37.7	YES
Cell 10/11/12						
Total days to sump	0.1	0.033	510	37.4	13.6	YES
OR						
	0.1	0.034	230	38.6	6.0	
	0.1	0.031	478	35.1	13.6	
Total days to sump					19.6	YES
Cell 4/5/8						
	0.1	0.0328	210	37.2	5.6	
	0.1	0.0324	155	36.7	4.2	
Total days to sump					9.9	YES
OR						
	0.1	0.0328	211	37.2	5.7	
	0.1	0.0324	232	36.7	6.3	
	0.1	0.0105	64	11.9	5.4	
Total days to sump					17.4	YES
OR						
Total days to sump	0.1	0.0105	276	11.9	23.2	YES
OR						
	0.1	0.0325	237	36.9	6.4	
	0.1	0.0328	170	37.2	4.6	
Total days to sump					11.0	YES