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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

**DIVISION OF ENVIRONMENTAL PROTECTION**

Capitol Complex
Carson City, Nevada 89710

June 4, 1996

ZAKI NASER
ENVIRONMENTAL MANAGER
AMERICAN ECOLOGY CHEMICAL SERVICES
PO BOX 578
BEATTY NV 89003

RE: PRELIMINARY REVIEW OF THE MINIMUM TECHNOLOGY REQUIREMENT FOR THE PROPOSED LANDFILL TRENCH 12 DESIGN

Dear Mr. Naser:

Based on a preliminary review by NDEP, it has been determined that the Minimum Technology Requirement (MTR) Equivalency Demonstration for the proposed Trench 12 design does not prove equivalency with the prescribed EPA design. Therefore, the design will not be part of the Part B permit renewal process. It is the opinion of NDEP that the use of a GCL combined with a compacted clay liner cannot be considered equivalent to the MTR. The basis for this determination is discussed in the Attachments to this letter.

The location and capacity of Trench 12 will be included in the Part B renewal permit in anticipation of receipt of a design that is equivalent to the MTR or an exemption pursuant to 40 CFR 264.301(b) is received. In order to receive an exemption, US Ecology should submit all the information required by 264.301(b). At such time as U.S. Ecology wishes to submit a revised Trench 12 design which addresses NDEP comments, a permit modification will be required.

The response to this letter and Attachment shall be due 30 days after the date of this letter. Any request for extension shall be made in writing. Please call either myself or Catherine Pool with any questions regarding this letter at 702/687-4670 ext. 3004 or 3005 respectively.

Sincerely,

Jeffrey C. Denison, P.E.
Supervisor, RCRA Permitting Branch
Bureau of Waste Management

US ECOLOGY
JUN - 4 1996
BEATTY, NV

CRP:gf

cc: (w/attachments)
David Tolbert, American Ecology, Beatty
Catherine Pool, NDEP
Don Brady, American Ecology, Houston

# ATTACHMENT

EXHIBIT D-March 11, 1996

1) D.4.2.4 NDEP agrees that the cell sideslopes do not have the same potential as the bottom portion of the liner to experience the same magnitude of head build-up. In order to approve a design with a bottom liner on the sideslopes of only a GCL, NDEP would have to approve an exemption pursuant to 40 CFR 264.301(b).

2) D.4.2.4 Please provide NDEP with a copy of the referenced document *Geosynthetic Composite Liner System for Subtitle D*, (Snow et al., 1994).

3) Table D.4.1 This Table does not reflect the fact that a compacted clay liner is required in combination with a geosynthetic clay liner (GCL) in order to prove equivalency. Please add the actual liner configuration which was used to obtain the results on this Table.

4) D.4.3.2 Test results need to be provided which show that the GCL can obtain the lower hydraulic conductivity listed in the manufacturers specifications. Additionally, the landfill will need to be filled to approximately 36 feet to achieve the weight necessary to achieve the lower hydraulic conductivity. During the time the landfill is in operation until the 36 foot mark is reached, the liner would not be equivalent. For this reason, NDEP may require a steeper slope for the drainage system to allow any leachate entering the landfill to reach the leachate collection and removal system as quickly as possible.

5) D.4.3.5 The statement "the length of time for solute breakthrough to occur is so great that such steady state conditions will never occur" lacks justification. Leachate is routinely observed breaking through landfill liners and steady state conditions may be occurring.

6) D.4.4.1 In terms of the relative chemical adsorption capacity of the two liners, the Cation Exchange Capacity (CEC) of the two liners has not been directly evaluated, even though the referenced report states this exercise should be done. Based the attached evaluation of the CEC of the two liners, a bottom liner of a GCL combined with 2' 9" of site soils would be needed to prove equivalency. NDEP considers CEC to be a critical parameter in demonstrating equivalency with the MTR. In order for the design as currently proposed to be approved, US Ecology will have to obtain an exemption from the MTR pursuant to 40 CFR 264.301(b).

7) D.4.5.3.1 No justifications or calculations were provided to show the basis for allowing particle sizes of 6" to be placed next to the HDPE liner.

8) D.4.6 The use of solute breakthrough time as the method of showing equivalency is incomplete. Equivalency must be demonstrated by the CEC of the liner and this was not done.

Supplement to MTR Equivalency Demonstration-April 11, 1996

9) Appendix 1 The assumptions state that "the Beatty site cannot create such a large head.", meaning one foot of leachate on top of the liner. The Beatty facility has produced greater than one foot of head in the past and this scenario is very possible.

***ATTACHMENT***

6/21/14 LEW

# CATION EXCHANGE CAPACITY

Eq. 7.14 ref 1

$C = CEC\, \rho_d\, L$

where: CEC = "n" in exchange capacity (mass of sorbate (sorbed) / unit dry soil)

$\rho_d$ = dry density of site soil

L = thickness of liner

| | | |
|---|---|---|
| SITE SOILS | CEC = 16-35 MEQ/100 g, $\rho$ = 108 lb/ft³ | MARK GROUP |
| Clay | CEC = 3-30 MEQ/100 g, $\rho$ = 108 lb/ft³ | Report of Workshop on GCL's |
| BENTONITE | CEC = 150 MEQ/100 g | " |

then

$$C_{SITE\ SOIL} = 35 \frac{\text{MG EQUIV}}{100\text{g liner soil}}\left(\frac{3}{1000\text{mg}}\right)\left(108\frac{\text{lb}}{\text{ft}^3}\right)\frac{4.53\times10^{2}\ \text{g/lb}}{2.8317\times10^{-2}\ \text{m}^3/\text{ft}^3}\left(\frac{9''}{12''}\right)\left(\frac{.3048\ \text{m}}{\text{ft}}\right)$$

$$= 138.2\ \text{EQUIV}/\text{m}^2$$

$$C_{GCL} = \frac{150\ \text{MG EQUIV.}}{100\ \text{g GCL}}\left(\frac{3}{1000\text{mg}}\right)(2.9)\left(\frac{\text{liner}}{\text{ft}^3}\right)\left(\frac{4.53\times10^{2}\ \text{g/lb}}{2.8317\times10^{-2}\ \text{m}^3/\text{ft}^3}\right)(.007\ \text{m})^{*}$$

$$= 30.39\ \text{EQUIV}/\text{m}^2\ \text{BENTONITE}$$

* Assumed thickness of liner = all bentonite

$\gamma_{BENTONITE}$ = 2.9 Geotechnical [illegible]

① $C_{TOTAL} = C_{SITE\ SOIL} + C_{GCL} = 138.2 + 30.39 = 168.59\ \text{EQ}/\text{m}^2$

② $$C_{CCL} = \frac{35\ \text{MG EQ}}{100\text{g}\cdot1000\text{MG}}\left(108\frac{\text{lb}}{\text{ft}^3}\right)\left(\frac{4.53\times10^{2}\ \text{g/lb}}{2.8317\times10^{-2}\ \text{m}^3/\text{ft}^3}\right)(3')\left(\frac{.3048\ \text{m}}{\text{ft}}\right)$$

$$= 552.9\ \text{EQUIV}/\text{m}^2$$

CALC. ADDITIONAL SITE SOIL NEEDED TO ACHIEVE EQUIVALENCY.

$$C_{NEEDED} = C_{CCL} - (C_{GCL} + C_{SS}) = 552.9 - 168.59 = 384.35 \ \frac{EQ}{m^2}$$

Eq 7.14 $$384 \frac{MEQ}{g} = \frac{35 \ MEQ/g}{100g \cdot 1000 \ mg} \left( \frac{108 \ lb}{ft^3} \right) \left( \frac{4.53 \times 10^{-2} \ g/lb}{2.831 \times 10^{-2} \ m^3/ft^3} \right) L$$

$X = .636 \ m$ = 2' + 9" original

= 2' 9"

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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
**DIVISION OF ENVIRONMENTAL PROTECTION**
Capitol Complex
Carson City, Nevada 89710

September 13, 1996

ZAKI NASER
ENVIRONMENTAL MANAGER
US ECOLOGY INC
PO BOX 578
BEATTY NV 89003

RE: US Ecology, Inc. - Beatty, Nevada Facility
Permit No. NEV-HW002
RCRA Part B Renewal Application

Dear Mr. Naser:

The Nevada Division of Environmental Protection (NDEP) has reviewed the revised Cell 12 Design Report, March 12, 1996, prepared by TRC Environmental Solutions and the Geotechnical Investigation for Cell 12, Grant Environmental, July 14, 1994. There were several areas in need of clarification or revision, therefore, a Notice of Deficiency (NOD) is being issued under cover of this letter (Attachment A).

Please respond to this NOD by October 18, 1996. If an extension to this deadline is needed, US Ecology must submit a written request to the Division at least ten (10) days in advance of the deadline, describing why an extension is necessary, and the request must also include a date when US Ecology can provide all the information.

If you have any questions on the deficiencies noted, please contact me at (702) 687-4670, ext. 3005.

Sincerely,

Catherine R. Pool, P.E.
RCRA Facilities Branch
Bureau of Waste Management

CRP:gf
Attachment

cc(w/attachment): Jeffrey C. Dension, NDEP
Donald Brady, US Ecology, Houston

**ATTACHMENT A**

US ECOLOGY, INC.
BEATTY, NEVADA
**NOTICE OF DEFICIENCY**
Nevada Permit NEV-HW002

**GENERAL COMMENTS**

The response to the following comments should be in the form of revised or new pages which can be inserted into the original submittal. For each new page submitted, indicate if it is a revision to a page in the original submittal or a new page not contained in the original submittal. Each revised or new page must be dated. Please submit two copies of all revised pages.

The executive officer signing the Part B Permit Application must make the certification specified exactly as in 40 CFR 270.11 (a) each time material is submitted in response to the deficiency comments. The certification must be a signed original.

**SPECIFIC COMMENTS**

**Geotechnical Investigation Report Cell 12, Grant Environmental, July 14, 1996**

1. Pg 3-3 — This report utilizes a maximum horizontal acceleration (MHA) which has a 90% probability of not being exceeded within a 50 year period. NDEP is requiring the landfill design meet the design requirements for solid waste landfills in Nevada. Pursuant to 40 CFR 270.32(b)(2), the design must resist a MHA of 90% probability of not being exceeded within a 250 year period (see NAC 444.6793). Please re-run the slope stability models using a MHA value of 0.42g as reported by TRC in the Cell 12 design.

2. Pg 4-4 — Table 4-1 is not complete. Several values for the shallow strata (i.e. up to 30 feet) were not obtained for static and dynamic cases. These values are needed in order to approve the excavation slope.

**Cell 12 Design Report, TRC Environmental Solutions, Inc., March 1996**

3. Pg 2-1 — The results of the above required revised slope stability analysis must be reviewed for to determine the effect on the design of Cell 12. The results of this analysis shall be applied to the design of Cell 12 and any necessary revisions made. Also, 0.42 shall be used in all pseudostatic stability analyses for the Cell 12 design.

4. Pg.2-3 [Bullet 3]- A stability analysis must be done on the 50' buffer between Trench 11 and 12.

5. Pg 2-4 Provide justification for removing angular rock with a diameter greater than 1" from the sidewalls, but allowing rocks with a diameter of greater than 6" in the operations layer cover soil.

6. Pg.2-4 Define the size of the depression in the side wall which will require repair with gunite.

7. Pg.3-1 3.2.1.1, #3, Drawing 010 shows a 20' drainage swale on the west side but it does not appear that the east portion of the landfill has an equivalent drainage swale, please explain.

8. Pg 3-3 3.2.2, #5, [First bullet]-After settlement occurs and the weakest interface (i.e. the interface between the geonet and nontextured interface of the 100 mil HDPE) has slipped, explain the forces realized by each interface of the liner system.

9. Pg 3-4 3.2.2, #5, [Second bullet]-Compare the GCL manufacturer's requirements for subgrade conditions to the design subgrade specifications with respect to cohesion.

10. Pg 3-4 3.2.3, #1, The geonet is doubled at the toe of the slope. Is the flow expected to double in this area?

11. Pg 3-6 Exhibit C.5, Provide a peak shear stress for each interface in the liner system. Include a reference for each value, and provide the normal stress at which the each shear stress was obtained.

12. Pg 3-7 3.6-As required above, re-evaluate this section based on the revised evaluation of the excavated sideslope.

13. Pg 3-7 3.6.2, #1-Stability has been evaluated for Cell 12-A only. Stability analysis must be done on the other Phases before they can be permitted.

14. Pg 3-7 3.6.2, #2-List source for the chosen factor of safety. Other analyses did not achieve a factor of safety of 1.3, explain the disparity between factors of safety utilized in the Cell 12 design.

15. Pg 3-8 3.6.2, #4-The ~~y~~ pseudo-static evaluation should use a MHA of 0.42g as stated above. Please justify and provide references for allowing any deformation at the design event.

16. Pg 3-8 Unexpected closure costs should include completion of the liner since the landfill may require

closure after construction of just one or two phases.

**Exhibit C.1, Slope Stability Final Configuration**

17. Pg C.1-4 Assumption #2, Provide documentation on waste characteristics which show that the cohesion value of 300 psf is reasonable.

18. Pg C.1-4 Assumption #3, The design requires native soil amendment to achieve a cohesion of 1000 psf. Table B on Pg C.1-5 lists the cohesion for native soils as also being 1000 psf at 175' out from the excavated sideslope. The Grant Environmental Report (see Figures 3.1-3.4) indicates that the cohesion of native soils in the top 19 feet is 0 psf. Provide a justification or explanation for using a cohesion value of 1000 psf for native soils this far away from the sideslope.

19. Pg C.1-6 NDEP will not accept a factor of safety of less than one (1) in the design of Cell 12. The design must be able to resist the MHA event without impacting the integrity of the liner. A factor of safety less than one indicates that the system will fail at the design event

20. Pg C.1-10 The values calculated for displacement are standardized maximum displacement values. What is the margin of error associated with these values? Are these values the absolute maximum values theoretically possible with the given seismic event? Provide a range of values using worst case values in the evaluation.

21. Pg C.1-14 If at the "design earthquake" (MHA 0.42g), there will be permanent displacement, provide an evaluation of the effect of this displacement on the liner system after displacement has occurred.

22. Pg C.1-14 Provide documentation that a 12 inch displacement is allowed at the design earthquake. Provide documentation that a 12 inch displacement is acceptable in a hazardous waste landfill design.

23. Pg C.1-108 Provide documentation that the cohesion values for the interfaces between the soil and Texnet and between Texnet and 60 mil HDPE increase during a pseudostatic event.

24. Pg C.1-108 Provide a reference for where the value of 35 degrees for PHI came from for native soils.

25. Pg C.1-110 NDEP will not accept a design that utilizes a pseudostatic safety factor of less than 1.

**C.2 Slope Stability Interim Configuration**

26. Pg C.2-5 Not all the interfaces on the sideslope are evaluated. Provide interface strength parameters for the following interfaces 1) non-woven geotextile/ LCRS geonet, 2) GCL/ textured 80 mil HDPE, 3) GCL/ native soils.

27. Pg C.2-5 Evaluate the slope stability of the interface between the doubled sections of the geonet at the toe of the slope.

28. Pg C.2-5 Provide additional supporting documentation (e.g. manufacturers data) of the interface strength parameters for materials which have values obtained from Reference 1.

29. Pg C.2-8 Bullet #1, The static factor of safety obtained is only 1.45, recommended FS for static is 1.5, justify using this safety factor.

30. Pg C.2-8 Bullet #2, The design acceleration used is 0.2g, NDEP requires that the design resist (i.e. not fail) a 0.42g acceleration event as described above, re-evaluate the interim stability of the waste fill at the 0.42g event.

**C.3 Surficial Soil Improvement**

31. Pg C.3-2 The purpose needs to include specifying the dimensions of the soil amendments required to achieve stability. A depth of 20' is specified but no horizontal dimension is given.

**C.4 Settlement**

32. Pg C.4-33 The conclusion does not state whether 60 inches is an acceptable amount of settlement and does not describe the effect of this settlement on the integrity of the liners.

**C.5 Liner Stresses**

33. Pg C.5-8 Provide the reference for the value for the ultimate stress, $T_{ULT.}$ used for the geotextile, Reference 9 has three Trevira products only one of which appears to meet the 150 lb/in yield strength used in the calculations. The values used for these calculations must be specified in the design as the minimum product specifications which can be used for the actual construction.

34. Pg C.5-8 Provide justification for using the factor of safety of 4 for the geonet allowable stress, Reference 10 lists typical safety factors as 10-100.

35. Pg C.5-11 Table 1 is incomplete, values are needed for the ultimate stress, $T_{ULT.}$ for the geonet and the GCL.

36. Pg C.5-18 Provide a more detailed description of how $F_u$ and $F_L$ are calculated.

37. Pg C.6-6 Provide a reference for the assumption that $K_o$=0.5.

38. Pg C.6-10 Provide manufacturer's data which confirms the values used for Table 1.

**C.7 Sump and Riser Design**

39. Pg C.7-7 Justify the use of the dry density of the waste to determine the overburden load.

**C.8 LCRS Flow Capacity and Pump Sizing**

40. Pg C.8-1 The design of the LCRS must ensure that the head on the primary liner does not exceed 1 foot.

41. Pg C.8-2 The design of the LCRS assumes that run-off from the sideslopes is intercepted and directed away from the LCRS. This should be included in the design specifications, materials chosen and interceptor shown on the design drawings or the volume of run-off needs to be included in the design of the LCRS.

42. Pg C.8-5 Does the design provide any protection (e.g. geotextile around the pipes) for the slots in the 3" pipe to prevent clogging?

43. Pg C.8-25 Calculate the flow capacity for the gravel in the sump to ensure the gravel can transmit the flow entering the sump.

44. Pg C.8-25 Show the maximum flow which can be transmitted into each sump for a 24 hour period on Table 1.

**C.9 LDS Flow Capacity**

45. Pg C.9-3 Show the maximum flow capacity which can be transmitted to each sump in a 24 hour period on Table 1.

46. Pg C.9-4 Designing the sump to be able to pump only 200 GPAD does not meet the intent of the regulations. The regulations require that the LDS be able to remove the volume of leachate which will maintain the head on the liner at less than one foot. If the sump can only handle 200 GPAD and the LDS can deliver 400 GPAD, then leachate will begin to back up on the drainage layer which is unacceptable.

**Exhibit D MTR Equivalency Demonstration**

47. NDEP responded, in a letter dated June 4, 1996, to the minimum technology requirements (MTR) section of the Cell 12 Design. US Ecology responded to NDEP comments in a letter dated July 9, 1996. US Ecology proposed to

install the GCL mat above a 36" of select soil compacted to a density that will achieve a hydraulic conductivity of $1 \times 10^{-5}$ cm/sec. NDEP finds that this design is equivalent to the MTR for the bottom.

48. The MTR does not provide a demonstration that the sideslopes do not require the same cation exchange capacity as the bottom. Please provide justification for this design specification.

49. The MTR must be revised to incorporate the final liner configuration.