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(43) From: Vernon R (Vern) Dronen 1/18/95 9:49AM (56644 bytes: 1 ln, 1 fl)
To: Denise F Trentdad
Subject: Final Version of 60 % Design Comments
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From: Pamela S Innis at ~TPA1 1/17/95 4:25PM (56415 bytes: 1 ln, 1 fl)
To: Michael A (Mike) Casbon at ~BHI001, Vernon R (Vern) Dronen at ~WHC85
Subject: Final Version of 60 % Design Comments
---------- Message Contents ----------

Text item 1:

See Attached

INTRODUCTION

The U.S. Environmental Protection Agency reviewed Draft A of the 60 Percent Design Analysis (Contract No. DE-AI06-90RL12107, Task Order DE-AT06-93RL12107) dated December 19,1994, 60 Percent Drawings (Contract No. DE-AI06-90RL12074, Task Order DE-AT06-93RL121070) dated December 19, 1994, 60 Percent Construction Specifications, Volumes 1 and 2 (Contract No. DE-AI06-90RL12107, Task Order DE-AT06-93RL12107) dated December 19,1994, Surface Water Management Plan (Contract No. DACW68-94-D-0002, Delivery Order 15) dated November 17, 1994, and Trench Liner System Construction Quality Assurance Plan 60 Percent Submittal (Contract No. DE-AI06-90RL1274, Task Order DE-AT06-93RL121070) dated December 19, 1994, all for the Construction of W-296 Environmental Restoration Disposal Facility at the Hanford Site, Richland, Washington. These documents were prepared by the Department of the Army, Walla Walla District, Corps of Engineers (COE) for the U.S. Department of Energy (DOE), Richland Operations Office. General and specific comments on each report are provided in the following sections.

GENERAL

1. The project specifications require the submittal of numerous plans (i.e.,admix preparation plan, soil liner placement plan, etc.) and test data (i.e., geomembrane manufacturer's test results) for approval. A mechanism should be put in place to assure that sufficient time is allowed to also provide these documents to the regulatory Agencies for review and acceptance as the project progresses.

2. The 60% package does not address a plan for operation, maintenance and inspection during the operational phase of the trench. A plan addressing these elements should be included in the 100% package. However, due to time constraints, submittal of the documents shall occur prior to operation. A mechanism should be put in place to assure that sufficient time is allowed to also provide these documents to the regulatory Agencies for review and acceptance as the project progresses.

3. The final package should include a requirement to submit a construction completion report to the regulatory Agencies, including as built drawings and copies of all CQA documentation from the construction contractor and the CQA team).

60 PERCENT DESIGN ANALYSIS

GENERAL COMMENTS

Overall, the 60 percent design analysis for the ERDF is not well organized, and it is difficult to follow the decision making process. The background and setting of the site are described in adequate detail. However, additional information should have been provided for several areas, and the information provided should be better organized. The purpose of 60 percent design analysis is to identify inconsistencies within the design itself and correct them before the 100 percent design submittal. The following issues should be addressed:

- The output for the hydrologic model used to estimate runoff quantities and flow rates should be clearly presented in the appendix.

- The 60 percent design analysis does not clearly outline the various tasks to be conducted during the 60 percent design phase nor during the 90 or 100 percent design phases.

- The information may be adequate for a 60 percent design, but is not adequately organized or clarified for a 60 percent design review by regulators. Since the 60 percent design sets the pattern and direction of the entire 100 percent design process, regulators should have sufficient opportunity to identify any deficiencies and inconsistencies within the design itself before the COE proceeds with the 100 percent detailed design. For example, the drawings should be referenced in the design analysis to verify the values used.

- Design criteria and design analysis should be included for clean area drainage and trench drainage ditches according to Montgomery (1994).

- Reuse of storm water from potentially contaminated areas and clean areas should be evaluated for landscape irrigation if the water is nonhazardous and meets the effluent criteria for landscape irrigation.

- Design criteria and design analysis for leachate piping (Drawing T-19) should be included.

- Main gravity flow leachate piping is designed based on the assumption of a maximum of two cells operating on each side of the trench at a time. It is not clear from the design or the drawing whether the flows from the future cells are considered in the design.

- A hydraulic profile diagram should be included for the flow system to different structures such as distribution

box, detention tanks, and manholes.

- A present worth cost comparison for sanitary wastewater systems is presented for three scenarios. A design flow of 750 gallons per day (gpd) is used for two scenarios. The third scenario uses a design flow of 3000 gpd. For a realistic cost comparison, the design flow should be same for all scenarios.

- The metric units of measurement used should be followed by british units in parentheses throughout the documents for construction specifications and construction quality assurance (CQA) so that the values may be compared to values in the appropriate guidance documents (EPA 1993).

- Several deviations from U.S. Environmental Protection Agency (EPA) guidance 1993 were noticed in presenting the recommended tests and testing frequencies for liner materials in the 60 percent construction specifications and trench linear system CQA plan. A few of these deviations are addressed in the specific comments section.

- Design criteria and design analysis for leachate pumps, sumps, and pumping stations should be included.

- Leachate tanks are designed for the leachate volume estimated by the Hydrological Evaluation of Landfill Performance (HELP) model using the rainfall data for the 60 wettest days. It should be clarified whether this model takes into account the snow melt data for leachate volume estimation.

- Design criteria as well as design analysis and specifications should be included for conveyor belts and equipment to be used for container decontamination in the decontamination building.

SPECIFIC COMMENTS

1. **ERDF DESIGN CRITERIA, Site Layout, pages 1 and 2.** The site layout is described in these pages. Reference figures should be cited while discussing the site layout for clarity and verification. Many of the facilities described in the site layout are not easily identifiable in the 60 percent drawings for verification. This discrepancy should be addressed in the draft final design submittal.

2. **ERDF DESIGN CRITERIA, Site Layout, page 2.** The basis for the assumptions stated in the third, fourth, fifth, and sixth bullets should be provided, or a reference source should be cited.

3. **ERDF DESIGN CRITERIA, Trench, page 2.** It is strongly recommended that face of the geomembrane against the admix along the bottom of the trench not be textured to better facilitate the composite action along this face.

4. **ERDF DESIGN CRITERIA, Trench, page 2, second bullet.** This criterion must be amended to include Federal Regulations under Part 264 Subpart N, since the WAC has not been updated to include requirements specified under this part which were mandated by Hazardous and Solid Waste Amendments of 1984 and are self implementing notwithstanding state authorization.

5. **ERDF DESIGN CRITERIA, Trench, page 2, sixth bullet.** This is not consistent with the leachate system design analysis provided in Document 1, which indicates it is designed to address the 60 wettest days not both.

6. **ERDF DESIGN CRITERIA, Trench, page 2, seventh bullet.** Sufficient calculations have not been provided in this document to support these proposed slopes. See comment on Sideslope Liner Seismic Stability below.

7. **ERDF DESIGN CRITERIA, page 3 of 7, second bullet.** A foundation settlement analysis was not provided in this Document to support the 1.5 to 3% slope. See comment on Leachate System Design Analysis below.

8. **ERDF DESIGN CRITERIA, page 3 of 7, fourth and fifth bullets.** The area of the sump which is used to accumulate sufficient quantities of liquid for pumping should not be included in the determination of the depth over the liner. Leachate should be removed to the extent practicable within 24 hours of detecting the liquid. The design of the leachate collection system should be based on the ability to maintain the level below 12" during the design storm event (i.e., 25 year 24 hour storm event). See comment on Leachate System Design Analysis below.

9. **ERDF DESIGN CRITERIA, page 4 of 7.** This criterion must be amended to include Federal Regulations under Part 264 Subpart N and 264.19, since the WAC has not been updated to include requirements specified under this part which were mandated by Hazardous and Solid Waste Amendments of 1984 and are self implementing notwithstanding state authorization.

10. **ERDF DESIGN CRITERIA, page 6 of 7, fourth bullet.** This criterion must be amended to state that the leachate tanks will be designed and constructed to comply with RCRA Subtitle C requirements as implemented in WAC 173-303-640.

11. **ERDF DESIGN CRITERIA, leachate collection and storage, page 6, seventh bullet.** The text references the wastewater facilities at C-018 for transportation of leachate. The location of wastewater facilities at C-018, should be identified.

12. **ERDF DESIGN CRITERIA, Sanitary Wastewater, page 7, third bullet.** The text states that sanitary wastewater from the decontamination shower will be stored in a vault located near

the facility. The disposal options for this sanitary wastewater should be specified.

13. **CIVIL, Roadways, first page.** The Route 4 tie-in was not considered in the public comment period for the ERDF, therefore, a separate NEPA analysis for the construction of this road must be completed. Construction of the Route 4 tie-in would further segment the shrub steppe habitat found in this area. It is strongly recommended that existing roads be considered for transport of waste to the ERDF.

    Also, Design criteria were stated for Route 4 pavement design in the ERDF design criteria section. The design analysis should be included in the Roadways section.

14. **CIVIL, Stormwater Drainage.** This section should be amended to also address the construction phases of the project to support Document 3, page 02221-3, §3.3.1.

15. **CIVIL, Stormwater Drainage, Distribution box, page 1.** The text references ERDF drawings for pipe length. Drawing numbers should be specified to facilitate verification of the pipe lengths used in the calculation.

    This comment is also applicable to distribution box overflow.

16. **CIVIL, Stormwater Drainage, Distribution box, pages 5 and 6.** The drawing shows that the pipe for discharging water from the distribution box to the west/east detention tank will be laid underneath the tank. The rationale for the pipe layout should also be included.

17. **TRENCH, Leachate System Design Analysis.** This must be upgraded to include calculations addressing, drain pipe loading (i.e., wall crushing, wall buckling, deflections) during construction and post construction phases, drainage

layer effectiveness, support for selection of geolayers for filtering and cushioning, and peak flows and velocities to support expeditious drainage to sumps and removal of leachate from sumps. A trench foundation settlement analysis should be performed to support that the slopes of 1.5% to 3% to the collection sumps will be able to be maintained overtime in the cell.

18. **TRENCH, Sideslope Liner Seismic Stability.** This section should document that a search for critical failure surfaces was performed (i.e., simplified Bishop Method for circular failure surfaces). Also, temporary slopes should also be evaluated as well as the friction angle under wet conditions. A factor of safety of 1.2 is recommended to be utilized for the seismic conditions ("Stability Analysis for Earth Slopes", Huang, Y.).

19. **TRENCH.** The calculations section of this document is incomplete for supporting the trench system design. The following supporting calculations also need to be addressed:

    a. anchor trench design
    b. trench bearing capacity analysis
    c. liner integrity analysis, stresses during construction, operation and after closure.

20. **TRENCH, Daily Dust Suppressant Requirement.** Does the Dust Suppressant Pilot Study address whether proposed dust suppressants are compatible with the wastes and waste containers placed in the trench, and treatable in the wastewater treatment system? Also, it is recommended that a reevaluation of use of soil seal as it appears to provide a reduction of approximately 100 gallons/shift with a minimal increase in cost. A copy of the pilot study should be provided for regulatory Agency review.

60% CONSTRUCTION SPECIFICATIONS, Volume 1.

GENERAL

There are numerous sections in Documents 3 and 4, which are either blank or specified as TBD (i.e., 02210-4,§3.5 (moisture content), §3.6 (density), 02275-18 and 19, (geomembrane properties), 02776-7, (geotextile properties, etc.) This missing information should be provided as early as possible for Agency review prior to submittal of the 100% package.

SPECIFIC COMMENTS

1. **Section 01030, Part 1.5, Page 01030-2.** The language under this section must be revised to preclude the contractor performing certain activities during weather conditions that other specifications in this document have specifically precluded, (i.e., pages 02275-8, 02150-15, 02230-4).

2. **Section 02224, Part 2.1, Page 02224-2.** The liquid limit, the bentonite grade, gradation and type should be specified. Also, the method to be used to determine free swell should be specified.

3. **Section 02224, Part 3.4.2, Page 02224-4.** See comment 1(e) on Trench Liner System Construction Quality Assurance Plan for addressing establishing a density/moisture relationship.

4. **Section 02226, Part 2.1, Page 02226-2.** This section should include recommended tests and testing frequencies for drainage material in accordance with 1993 EPA guidance. The location of the borrow source and processing of the drainage materials should also be described.

5. **Section 02226, Part 2.2, Page 02226-2.** A reference source should be cited for the drainage layer gravel gradation requirements.

6. **Section 02275, Page 02275-2.** See comment 3 on 60% Design Analysis, on use of textured geomembrane. Also specify the minimum experience/qualification for geomembrane manufacturer and installer (i.e., quantity of square feet produced and installed).

7. **Section 02275, Part 2.2.1, Page 02275-2.** The 2% recycled polymer shall not include any finished sheet material that has actually seen some type of service performance. Regrind, reworked or trim materials in the form of chips or edge strips that have not actually seen some type of use may be added, if the material is from the same manufacturer and is exactly the same formulation as the geomembrane being produced.

8. **Section 02275, Section 2.2.5, Page 02275-3.** This part should specify ASTM-5321, simulating site specific conditions as closely as possible.

9. **Section 02275, Part 2.3.2, Page 02275-3, item g.** Add minimum test results for puncture, seam strength, and dimensional stability.

10. **Section 02275, Part 2.3.5, pages 02275-4 and 02275-5.** The acceptance and conformance testing does not follow the 1993 EPA guidance. For example, tests for possible puncture (Federal Testing Method [FTM] std 101C) and tear resistance (American Society of Testing Materials [ASTM] D-1004, Die C) are not included.

11. **Section 02275, Part 3.6.1, Page 02275-11.** Change in environmental conditions (i.e., weather) should be added to testing seam frequency.

12. **Section 02276, Page 02276-1.** This Section should include minimum experience/qualifications for geotextile manufacturer and installer.

13. **Section 02276, Part 2, Section 2.3, page 02276-2.** The resolution of failing conformance tests should be clearly stipulated in the specifications based upon ASTM D-4759, "Determining the Specification Conformance of Geosynthetics."

    This item should be identified in the conformance testing, or a reference document should be cited.

14. **Section 02277, Page 02277-1.** This Section should include minimum experience/qualifications for geocomposite manufacturer and installer.

15. **Section 02277, Part 2, Section 2.3, Page 02277-3.** The ASTM methods for conformance tests are different from the methods specified in the 1993 EPA guidance for geonets. For example, ASTM D-3776 is specified for mass per unit area in the 60 percent construction specifications, whereas ASTM D-5261 is specified for mass per unit area in the 1993 EPA guidance. This discrepancy should be corrected.

    Also, the acceptance and conformance testing of the geotextile portion of a drainage geocomposite is not presented or referenced to other sections. The following recommended conformance tests for geocomposite drainage cores should be specified:

    - Thickness of sheet (ASTM D-5199) or thickness of the geocomposite (ASTM D-5199)
    - thickness of cusps (ASTM D-1821)
    - spacing of raised cusps (ASTM D-1621)

    These discrepancies should be addressed.

16. **Section 02277, Part 3.2, Page 02277-4, item d.** The use of a clean panel of smooth geomembrane should be required to assure that combing of the textured liner does not occur. This

procedure should also be used for placement of geotextile under Section 02276.

17. **Section 02277, Part 3.3, Page 02277-4.** Minimum overlap distance must be specified for roll edges (i.e., 3-4 inches) and ends (i.e., 6-8 inches).

60% DESIGN CONSTRUCTION SPECIFICATIONS, VOLUME 2

GENERAL COMMENTS

Seismic loading calculations should be consistently included in the structural analysis. In the design calculations for the portal frame, the seismic load calculations are not shown.

The soil bearing capacity for the design of the column footing is 2,500 pounds per square foot (psf) instead of the 3,000 psf mentioned in the design criteria. The use of a lower bearing capacity should be justified on the basis of the borehole logs or soil test data.

The wind load calculation for the container storage structure for the vertical projection case indicates that an importance factor (I) value of 1.0 was used; however, the equation for calculating wind pressure (p) has a value of 1.5 for I. This discrepancy should be resolved.

Section 13205. Assuming that this is the specification for the leachate storage tanks it needs to be amended to address the written assessment of the tank's design and installation in accordance with WAC 173-303-640. Also, a similar specification for the wash water tanks must also be provided.

Section 15150. This section must also address recording of leachate flowrate separately for the primary and secondary sumps.

60% DRAWINGS

GENERAL COMMENTS

The structural drawings are incomplete and do not reflect all the design details shown in Volume 2.

Engineering drawings (i.e., elevation, plan, and sections) could not be found for the wash down and leachate tanks systems.

SPECIFIC COMMENTS

1. **Drawing C-2.** Explanation should be provided for not including grading plans for portions of trench cells and the soil stockpile areas in the facilities area.

2. **Drawing C-11.** Several of the abbreviations in this drawing are not explained in drawing G-4 for verification. Examples include SFM, HPW, CN, ELL, PD, NAD, and NAVD. This comment is also applicable to other drawings.

3. **Drawing T-26 through T-28.** The soil boring logs T-26 through T-28, do not show the N values, water content, and water level. These values should be provided in the final drawings.

4. **Drawing S-6.** The loading and unloading concrete slab plan section and details do not show the way the building is segregated into loaded and unloaded containers. This is critical because the slab on grade design is significantly different for the two loading conditions. Provision should be made to avoid moving loaded containers in the portion of the floor designed for unloaded containers.

SURFACE WATER MANAGEMENT PLAN

SPECIFIC COMMENTS

1. **Section 1.1, page 1-6, first paragraph.** The significance of the information presented in the first sentence is not clear. This information is not relevant to any of the calculations used to estimate site runoff. Instead, the hydrologic information associated with the design storm event should be described. All runoff estimates presented in the appendix appear to be based upon a 25-year, 24-hour storm (1.6 inches of precipitation). This design storm event should be compared against storms events with a longer return period to provide the degree of risk assumed using a 25-year, 24-hour storm event for design purposes instead of a storm event of different return or duration. For example, a 50-year, 24-hour storm is estimated to result in a total precipitation amount of approximately 1.8 inches and would result in roughly 10 percent greater runoff quantity.

2. **Section 1.1, page 1-6, second paragraph.** The significance of the information on snowfall and snow accumulation presented in this paragraph is not clear. This information is not relevant to any of the calculations used to estimate site runoff. The impact of a design storm event occurring during a period when snow remains on the ground at the site should be addressed. This type of event could generate significantly higher quantities of runoff than the same storm event without snow cover.

3. **Section 2.1, page 2-1, fourth paragraph.** The justification for selecting the 25-year, 24-hour storm event as the design storm should be provided in the text.

4. **Section 2.2.2, Page 2-3, second paragraph.** The paragraph indicates that the leachate collection tanks are designed to contain the 25 year 24 hour storm, in addition to the wettest 60 days. This is inconsistent with the leachate system design

analysis provided in the 60 % Design Analysis which indicates it is designed to address the 60 wettest days not both.

5. **Section 3.1, page 3-1, third paragraph.** The text should state that Table 3-1 only includes information for watershed subbasins C, D, and E. Runoff for subbasins A and B is described in Table 3-2.

6. **Section 3.2, page 3-3, first paragraph.** Figure A-3 better illustrates the area being discussed than the referenced Figure A-2. The text should mention A-3. In addition, the text does not indicate the way water from this area is directed into the tanks. Further explanation should be provided to describe whether the water is pumped into the tanks or whether the water flows by gravity into the tanks. If pumped, an emergency power supply should be provided to supply power to the pumps to prevent runoff during a power outage. In addition, the location of the storage tanks discharge to allow disposal of the clean water by infiltration and evaporation should be described.

7. **Section 3.2, page 3-3, third paragraph.** The text should describe the probability of a second storm occurring before the south detention basin is empty. This could result in an overflow from this basin. The potential impact of such an overflow should be described. In addition, the south detention basin has excess capacity (in terms of available volume) of approximately 23 percent based on a 25-year, 24-hour storm event. The justification for selecting this level of excess volume should be described.

8. **Appendix A, Figures A-1, A-2, A-3, and A-4.** The contour intervals on these figures are not clear. This information should be added to all the figures. In addition, it is difficult to identify drainage pathways from the information presented in these figures. A drainage plan map to clearly

identify the various drainage pathways and subbasins should be provided.

9. **Appendix A, HydroCAD 3.02 Output.** The model output file pages are not in order, and not all pages are included in the appendix. The model output file should be included in its entirety and in the proper order.

TRENCH LINER SYSTEM, CONSTRUCTION QUALITY ASSURANCE PLAN, 60 PERCENT SUBMITTAL

SPECIFIC COMMENTS

1. **Table 4-1.** This table should be revised to include the following:

   a. Identify structural backfill (i.e., berms, etc.) separately, require testing as specified for other backfills, as well as, shear strength and compressibility index.

   b. Specify that at least two test fills will be evaluated.

   c. Bentonite should also be evaluated for liquid limit, free swell, gradation, type and grade.

   d. Admix should also be tested using methylene blue test.

   e. The relationship between density and water content for the preconstruction admix should also be evaluated for the acceptable zone of water content/dry unit weights determined by superposing hydraulic conductivity with shear strength (See §2.1.4.5 of "Technical Guidance Document Quality Assurance and Quality Control for Waste Containment Facilities", EPA/600/R-93/182).

2. **Section 4.2, pages 10 and 11.** The reference specification section for the Admix Soil Liner should be provided for comparison to the 1993 EPA guidance. In addition, the recommended CQA tests and testing frequencies for bentonite quality and gradation as well as bentonite content are not described. Also, the recommended CQA tests and minimum testing frequency for soil liner materials sampled after placement in a loose lift (just before compaction) and for compacted soil should be specified.

3. **Section 4.3, page 16.** The reference specification section for the Gravel Drainage Layer should be included.

4. **Section 4.3.1, page 16.** Preconstruction testing does not include test for carbonate content (ASTM D-4373). The sampling frequency is specified as one sample per 20,000 cubic yards (yd^3) of materials. A metric unit should be used or given in parenthesis to facilitate a comparison with the recommended values in the 1993 EPA guidance. One sample per 2,000 cubic meter (2,614 yd^3) is recommended for grain size and permeability in EPA guidance, approximately 10 times less than prescribed value of one per 20,000 yd^3 in this section. This discrepancy should be corrected.

5. **Section 4.3.2, page 17.** Recommended tests and testing frequencies for post-construction should be specified for drainage material.

6. **Section 4.4, page 17.** The reference specification section for the operations layer should be provided for verification.

7. **Section 4.6.1.2, Page 21, second paragraph.** Add puncture and seam strength to the list of properties to be tested.

8. **Section 4.6.2.2, Page 26, second paragraph.** Add the requirement for additional test seams after changes in environmental conditions (i.e., weather).

9. **Section 4..2.3, Page 34, installation.** Include the requirement on page 02277-4, §3.2, item d, of the specification for use of a clean panel of smooth geomembrane when placing geonets or geotextile over textured geomembrane to assure that combing of the textured liner does not occur.

10. **Section 5.4, Page 39.** This should also include the regulatory Agencies for acceptance of design changes.

REFERENCES

EPA 1993. Technical Guidance Document. Quality Assurance and Quality Control for Waste Containment Facilities. EPA/600/R-93/182. U.S. Environmental Protection Agency. September.

Montgomery 1994. Contract 1. Definitive Design: 60 Percent Design Analysis. Environmental Restoration Disposal Facility. Montgomery Watson Americans, Inc. June 1.

U.S. Department of Agriculture, Soil Conservation Service 1986. Urban Hydrology for Small Watersheds. 210-VI-TR-55, Second Edition. June.