DESIGN ANALYSIS

"ESF / GROA Interface Drawing Update - FY1995"

B00000000-01717-0200-00124, Rev 00C

Originated By: D.G. McKenzie, III

ENCLOSURE 4

CRWMS/M&O

Design Analysis Review Summary

Complete only applicable items.

(1.)

QA: L

Page: 1 Of: 1

DESIGN ANALYSIS TITLE

ESF / GROA Interface Drawing Update - FY1995

3. DOCUMENT IDENTIFIER (Including Rev. No.)

B00000000-01717-0200-00124 Rev 00

4. REV. NO.

00

5. ORIGINATOR

D.G. McKenzie, III D.G. McK

6. DATE

08/09/95

7. CHECKER

Ray D. CLARK Ray D. Clark

8. DATE

8/21/95

9. Due Date	10. Discipline	11. Review		Comments		12. Backcheck	
		Signature	Date	Yes	No	Signature	Date
8/29/95	ESF SUBSURFACE	Laura L. Rogers	8/28/95	✓		Laura S. Rogers	9/7/95
8/29/95	DIE	Douglas W Gunn	8/28/95	✓		Douglas W Gunn	9/6/95
8/29/95	SYSTEMS ENGR.	Kenneth J Ashbaker	8/31/95	✓		Kenneth J Ashbaker	9/7/95
8/29/95	REGULATORY	M. A. Haghi	8/28/95		✓		
8/29/95	QA	Hyde Tuttle	8/29/95	✓		Hyde Tuttle	9/28/95
~~9/15/95~~	~~ESF TCO~~	~~James T. Hollins~~ JBM 9/28/95	~~9/1/95~~	~~✓~~		~~James T. Hollins~~	~~9/20/95~~

13. REMARKS

ESF TCO ADDED TO ID REVIEW IN ERROR.

IDR.272

14. APPROVED:

Originator Signature — Date

Checker Signature — Date

LDE Signature — Date

QA Signature — Date

0486 (Rev. 02/03/95)

QAP-3-9

CRWMS/M&O

Design Analysis Cover Sheet

Complete only applicable items.

(1.)

QA: ± N DGM 9/4/95

Page: 1 Of: 32

2. DESIGN ANALYSIS TITLE			
ESF/GROA Interface Drawing Update - FY1995			
3. DOCUMENT IDENTIFIER (Including Rev. No.)		4. REV. NO.	5. TOTAL PAGES
B00000000-01717-0200-00124		00C	32
6. TOTAL ATTACHMENTS	7. ATTACHMENT NUMBERS - NO. OF PAGES IN EACH		8. SYSTEM ELEMENT
0	N/A		MGDS

	Print Name	Signature	Date
9. Originator	Daniel G. McKenzie, III		08/09/95
10. Checker			
11. Lead Design Engineer			
12.QA Manager			
13. Department Manager			

14. REMARKS

TBV-081-MGD located on pages 3 and 15 H.C.

DESIGN ANALYSIS TITLE	
ESF/GROA Interface Drawing Update - FY1995	
3. DOCUMENT IDENTIFIER (Including Rev. No.)	4. REVISION NO.
B00000000-01717-0200-00124	00

5. Revision No.	6. Total Pages	7. Description of Revision
00A	31	Initial Submittal to PCG
00B	31	PCG Back Check / ID Review
00C	32	ID Review Comment Closure / External Review

1. PURPOSE

The purpose of this analysis is to document the changes, and the rationale for those changes, which are proposed to the baseline ESF/Geologic Repository Operations Area (GROA) Interface Drawings. The ESF- repository configuration has undergone change, both technical and programmatic in nature, since the original interface drawings were baselined in mid-1994. This analysis contains discussion which supports each of the adjustments to be made to the baseline ESF/GROA configuration. Other design analyses have also been developed in support of this effort. These analyses, one for the repository (Ref. 5.10) and another for the ESF (Ref 5.9), contain the coordinate geometry calculations which support the actual configurations shown on the drawings.

It is not the purpose of this analysis to justify fully nor completely detail either the ESF or Repository designs. Specific references are made within this document to those project documents wherein the supporting information resides.

2. QUALITY ASSURANCE

Evaluations of repository Advanced Conceptual Design (ACD) design activities were performed in accordance with QAP-2-0. This activity was covered in the evaluation entitled "Repository Design Basis Accident and Design Analyses," BC0000000-01717-2200-00011, Rev 00 (Ref 5.16). The results of that evaluation indicated that the QA Program applies to this analysis.

The final configuration of the ESF is not fixed, due to programmatic uncertainty and unresolved issues primarily regarding access to, and exploration in, the Calico Hills unit. The configuration of the ESF, exclusive of the main "loop" formed by the North Ramp, Topopah Spring Main Drift, and South Ramp, has therefore been assigned TBV-081-MGD. This TBV has been established, and will be administered and ultimately removed, in accordance with NLP-3-15.

3. METHOD

As noted above in section 1, the purpose of this document is to collect and present the rationale for changes which are proposed to the baseline ESF/GROA interface drawings. The method is to present each potential change along with a discussion of the reasoning for making the change. Extensive use of references to other program documents is made to support the analysis and present a cohesive picture of the ESF/GROA evolution.

4. DESIGN INPUTS

4.1 Design Parameters

No design parameters were used in the development of this analysis as it contains only descriptive information. Reference is made to supporting project documentation as needed.

4.2 Criteria

This document describes changes in the configurations of the ESF and GROA for the purpose of maintaining proper interface control between the two entities.

The ESF/GROA interface drawings demonstrate compliance with ESFDR requirements (Ref 5.22) 3.2.1.1.E, 3.2.1.4.H, 3.2.2.4.L.7, and 3.2.2.4.M, which require that interfaces be established between ESF design and Repository design. These requirements are consistent with the requirements documented in the QARD (Ref 5.21), Section 3.2.9, Design Interface Control.

At the level of the interface of the ESF and repository, the operative requirements are those found in 10 CFR 60.15 (c). Paragraphs 2, 3, and 4 all apply to the interface between site characterization (ESF) and repository. These requirements are cited below (Ref 5.20):

"60.15 Site Characterization"

"(c) The program of site characterization shall be conducted in accordance with the following:"

"(2) The number of exploratory boreholes and shafts shall be limited to the extent practical consistent with obtaining the information needed for site characterization."

"(3) To the extent practical, exploratory boreholes and shafts in the geologic repository operations area shall be located where shafts are planned for underground facility construction and operation or where large unexcavated pillars are planned."

"(4) Subsurface exploratory drilling, excavation, and in situ testing before and during construction shall be planned and coordinated with geologic repository operations area design and construction."

NOTE: 10 CFR 60.15 (c)(2) and 10 CFR 60 (c)(3) have been interpreted to apply to ramps as well as shafts, as documented by ESFDR requirements 3.2.2.E, 3.2.2.F, 3.2.2.4.B, and 3.2.2.4.L.

The interface drawings are intended to assist the project in maintaining and demonstrating compliance with these regulations.

4.3 Assumptions

Not Used

4.4 Codes and Standards

Not Used

5. REFERENCES

Six Current ESF/GROA Interface Drawings:

5.1 BC0000000-01717-2100-89100, Rev 00
5.2 BC0000000-01717-2100-89101, Rev 00
5.3 BC0000000-01717-2100-89102, Rev 00
5.4 BC0000000-01717-2100-89103, Rev 00
5.5 BC0000000-01717-2100-89104, Rev 00

5.6 BC0000000-01717-2100-89105, Rev 00

5.7 CRWMS M&O, "Initial Summary Report for Repository/Waste Package Advanced Conceptual Design," B00000000-01717-5705-00015, Rev 00.

5.8 CRWMS M&O, Recommended Layout Concepts Report, BCAA00000-01717-5705-00001, Rev 00.

5.9 CRWMS M&O, "ESF Layout Calculation," BABEAD000-01717-0200-00003, Rev 03.

5.10 CRWMS M&O, "Conceptual Repository Coordinate Geometry Calculation," BCAA00000-01717-0200-00125, Rev 00.

5.11 NOT USED

5.12 DOE, Civilian Radioactive Waste Management Program Plan," DOE/RW-0458.

5.13 CRWMS M&O, "Controlled Design Assumptions Document," B00000000-01717-4600-00032, Rev 01.

5.14 CRWMS M&O, "Definition of the Potential Repository Block," BC0000000-01717-5705-00009, Rev 00.

5.15 CRWMS M&O (Skorseth), "Disposition of NCR No. YMSCO 95-0043." December 23, 1994.

5.16 CRWMS M&O, QAP-2-0 Evaluation, "Repository Design Basis Accident and Design Analyses," BC0000000-01717-2200-00011, Rev. 00.

5.17 Bahney, R.H., and T.W. Doering, 1993. *Temperatures of Drift-Emplaced Waste Packages,* Letter from R.H. Bahney III and T.W. Doering (Civilian Radioactive Waste Management System Management & Operating Contractor) to S.F. Saterlie (Civilian Radioactive Waste Management System Management & Operating Contractor), June 9, 1993.

5.18 CRWMS M&O, "Description and Rationale for Enhancement to the Baseline ESF Configuration," B00000000-01717-0200-00089, Rev 01.

5.19 CRWMS M&O, "Systems Study of Options for Characterizing the Calico Hills Nonwelded Hydrogeologic Unit at Yucca Mountain, Nevada," B00000000-01717-5705-00021, Rev 00.

5.20 Code of Federal Regulations (CFR), Volume 10, *Energy*, Part 60, *Disposal of High-Level Radioactive Waste in Geologic Repositories*, Federal Register, U.S. Government Printing Office, Washington, D.C., October 29, 1993.

5.21 OCRWM, "Quality Assurance Requirements and Description," (QARD), DOE/RW-0333P, Revision 4.

5.22 OCRWM, "Exploratory Studies Facility Design Requirements," YMP/CM-0019, Rev 1, ICN-2.

6. USE OF COMPUTER SOFTWARE

No computer software was used in the development of this analysis.

7. DESIGN ANALYSIS

7.1 Background

The original ESF/GROA interface drawings (Refs. 5.1 through 5.6), baselined in 1994, are reproduced as Figures 7-1 through 7-6. In the past 12 months, the ESF and GROA layouts have undergone changes of both programmatic and technical origin. This document is intended to catalog those changes and present the rationale for the changes. It is intended to provide the "historical" continuity needed by the program to show the evolution of the designs of the ESF and GROA. Such historical information is likely to be important at the time of repository license application and subsequent licensing proceedings.

7.2 Description / Rationale of Changes

A variety of changes have been proposed to the ESF/GROA configuration since the baselining of Revision 00 of the interface drawings in 1994. Some of the changes, notably in the planned ESF configuration, have been brought on by the development

and implementation of the Program Approach in late FY1994 (The Program Approach is described in the Program Plan, Ref 5.12). These changes include the elimination of the South Ramp Extension, the Imbricate Fault Drift, and the Main Test Area. Other ESF changes have been the result of evaluations performed to assess options for access and testing in the Calico Hills unit. Changes in the repository layout have resulted from technical refinements as well as the continuing maturation of the 3-Dimensional (3-D) site geologic model.

The balance of this analysis contains discussions of each adjustment planned to be incorporated in the update of the ESF/GROA Interface drawings. Reproductions of the six existing baseline ESF/GROA interface drawings are included as Figures 7-1 through 7-6. Figures 7-7 through 7-13 include representations of the proposed revisions to the current baseline drawings, and include a new drawing planned for inclusion with the original six.

The changes discussed in this analysis include:

- Removal of curve in ESF main drift
- Removal of Grade Break in ESF Main Drift
- Removal of Potential Waste Main
- Removal of South Ramp Extension, Imbricate Fault Drift, and Main Test Area
- Minor Changes in Alignment along the North Ramp
- Re-alignment of North Ramp Extension
- Change in Calico Hills Access and Drifting
- Adjustments in the Shape of the GROA Layout
- Change in Emplacement Drift Spacing
- Change in Flow Direction of Development Ventilation System

7.2.1 Removal of curve in ESF main drift

Original Condition

Figure 7-1 shows that the original layout contained a short horizontal curve at about the mid-point of the ESF Main Drift. This curve was originally employed to allow the main drift to better conform to the apparent non-linearity of the Ghost Dance Fault trace and thus preserve the maximum amount of emplacement area. This is because

any area left between the ESF main drift and the trace of the Ghost Dance Fault would likely not be usable for repository operations even if the ground conditions were ultimately found to be good.

Proposed Change

The proposed revision to the ESF/GROA interface drawings shows a straight ESF main drift from the bottom of the north ramp at approximately Station 28+04 to the bottom of the south ramp at approximately Station 56+54. See Figures 7-7 and 7-8.

Rationale

The curve proved to be problematic to the development operation in the repository conceptual design. The concept is based on being able to launch a 5 meter diameter TBM out of a 9 meter diameter tunnel without a starter tunnel. A system incorporating a launch tube is envisioned. Alignment of the launch tube and the azimuth of the emplacement drift is critical, and it was determined that the curve would be a hindrance to development operations. Further discussion of this change can be found in Reference 5.7, Chapter 8, pages 8-94 to 8-96.

7.2.2 Removal of Grade Break in ESF Main Drift

Original Condition

The vertical alignment of the ESF main drift started at approximately Station 28+00, elevation approximately +1067 meters with a grade of +0.5%. It continued at this grade to about Station 39+58 where the grade transitioned to +2.0%. This grade continued to the bottom of the South Ramp, at about Station 54+51, where the grade increased to +2.63%. This grade was then maintained throughout the south ramp to its intersection with the surface. The straight segments were connected by short vertical curves. This can be seen on Figures 7-1 and 7-5.

Proposed Change

The ESF Main Drift starts at the bottom of the north ramp, at an invert elevation of

approximately +1065 meters and at approximately Station 28+04, at a grade of +1.35%. The grade remains unchanged throughout the main drift. The grade changes at the bottom of the south ramp, at about Station 56+54, to +2.57%. See Figures 7-7 and 7-12.

Rationale

The original grade was developed to avoid an apparent low spot in the TSw1-TSw2 contact. Because the repository is to be developed within the TSw2 thermomechanical unit (Ref 5.13, p.6-26), it was necessary to "bend" the tunnel vertically around the apparent low spot. The low spot indicated on the structure maps which were used to develop the original layout has since been determined not to exist. The development of more accurate 3-D stratigraphic modeling (Ref. 5.14) has eliminated the need for the grade break in mid-drift. The technical rationale for removing the break is the same as discussed above for the horizontal curve and is further discussed in Reference 5.7, Chapter 8, pages 8-94 to 8-96.

7.2.3 Removal of Potential Waste Main

Original Condition

Figures 7-1 and 7-2 show a drift, running roughly north-south, which bisects the upper block and called out as the "Potential Waste Main" on the figures. Figure 7-7 does not show this drift. This drift, if employed, would be used as an additional access to the emplacement drifts. It would, in effect, cut the length of the drifts in half. This could be an advantage if, for example, backfilling of emplacement drifts were to be required at decommissioning.

Proposed Change

The potential waste main has been removed.

Rationale

The primary reason was to preserve as much emplacement area as possible. If this

drift were used, it would be necessary to leave some amount of "thermal buffer" to prevent the drift from getting too hot (if post-emplacement human access were envisioned). Shielding arrangements would also be required to protect individuals traveling in this drift. Because of the additional cost, and the resulting loss of emplacement area, it was decided that the drift would not be shown. It will still be possible to return to this concept if subsequent repository design efforts indicate that it is warranted. The removal of this drift is discussed in Reference 5.8, Section 9, pp 9-4 and 9-5.

7.2.4 Removal of South Ramp Extension, Imbricate Fault Drift, and Main Test Area

Original Condition

The ESF as shown on the original interface drawings contained a "South Ramp Extension" (SRE), an "Imbricate Fault Drift," and an area designated as a "Main Test Area," or MTA. These are shown on Figures 7-1 and 7-2, and a cross-section partially along the Imbricate Fault Drift is shown in Figure 7-3. A cross-section partially along the South Ramp Extension is shown in Figure 7-6.

Proposed Change

The South Ramp Extension, Imbricate Fault Drift, and Main Test Area (MTA) have been dropped from the ESF configuration.

Rationale

This action was undertaken as a part of the "Program Approach" developed during the latter part of FY1994. It was determined that the objectives of "Technical Site Suitability" and License Application could be met by a drifting configuration which included the North Ramp, ESF Main Drift, and South Ramp; the North Ramp Extension (NRE), two Ghost Dance Fault exploratory alcoves, and an abbreviated Calico Hills drifting plan. The ESF configuration showing this layout is included as Figure 2-1 on page 16 of Volume II of the final "Civilian Radioactive Waste Management Program Plan" (Ref 5.12). Subsequent changes involving the NRE and Calico Hills access and drifting are described elsewhere in this analysis.

The MTA had already been reduced to a "reserved area" without definite drifting plans in the original ESF/GROA interface drawings (Figures 7-1 and 7-2). The rationale was that there was likely to be adequate opportunity to perform testing from alcoves arranged along the north ramp, main drift, south ramp, and north ramp extension; and that, therefore, a dedicated MTA was not necessary. The most recent change simply removes the "Main Test Area" label from that area of the drawings. A discussion of the removal of the MTA is found in Reference 5.8, Chapter 9, p. 9-5.

The SRE was to have been later utilized by repository construction and operations. This drift will have to be constructed as part of the pre-emplacement development phase of the repository, as it is still required under the current layout.

7.2.5 Re-alignment of North Ramp Extension

Original Condition

The North Ramp Extension (NRE) is shown on Figures 7-1 and 7-2 as it was originally envisioned.

Proposed Change

The alignment was altered at the same time as the changes described in 7.2.8. The NRE / North Ramp intersection was moved eastward, or up the ramp. The alignment was changed to show the NRE starting off at a more northerly bearing before curving back to the west and penetrating the Solitario Canyon Fault.

Rationale

The point of beginning of the NRE was moved in order to avoid having to start the NRE in the area of the Drill Hole Wash structure. The change in initial bearing and subsequent curve allowed more room to add repository emplacement drifts at the north end of the upper block to partially offset the loss of emplacement area described in section 7.2.8. The rationale for this change is discussed more fully in Reference 5.7, Chapter 8, pages 8-91 to 8-93.

7.2.6 Minor Changes in Alignment along the North Ramp

Original Condition

The original "loop" defined by the North Ramp, Main Drift, and South Ramp, is shown in Figure 7-1. Minor adjustments have been made to the geometry of the north ramp in addition to those resulting from the changes described in Section 7.2.1 and 7.2.2. These changes have resulted in small movements of design points. One such design point is the bottom of the North Ramp. The original interface drawings, shown in Figures 7-1 and 7-2, had this point at a Northing of approximately 234,092.4 meters, an Easting of about 171,314.5 meters, and an elevation of approximately +1,067.1 meters.

Proposed Change

The proposed location of this point is now at approximately: Northing = 234,087.7 meters; Easting = 171,313.8 meters; elevation = +1065.0 meters. This location is approximately 5 meters from the original location of the point in the interface drawings.

Rationale

This change is representative of a slight movement of the entire north ramp. During the startup of TBM operations for the ESF, the TBM experienced control problems which caused the alignment to deviate approximately 0.8 meters to the south of the planned alignment. A decision was made during the resolution of the ensuing Non-conformance report (NCR) (Ref. 5.15) not to attempt to regain the originally planned alignment. This would have resulted in a more complex alignment than simply straightening out the ramp and achieving a parallel alignment. The north ramp alignment was, therefore, altered to be parallel to the originally planned alignment and about 0.8 meters to the south. A discussion of this sequence of events can be found in Reference 5.9 and 5.15. Some of the movement of the North Ramp PT/VPI is also attributable to the changes described in sections 7.2.1 and 7.2.2 above.

7.2.7 Change in Calico Hills (CH) Access and Drifting

A series of changes has been proposed for the CH exploratory configuration over the past year. The following sections describe the sequence of the proposed changes.

Original Condition

The current baseline CH access and drifting concept is shown on Figure 7-2. It consists of a CH North Ramp, originating along the lower end of the ESF north ramp; a CH Main Drift, oriented at approximately N 34° E running the length of the primary area, and a CH South Ramp, which connects with the SRE in the TSw2 level. Several side drifts are also shown to explore geologic structures. Approximately 9,635 meters of drifting is shown in this configuration.(Ref 5.18, p.17)

Changes Resulting from the Program Approach

As noted above, during the development of the Program Plan in late FY1994, the SRE was eliminated. This required a change in the CH configuration simply because the SRE provided the connection point of the CH South ramp to the overlying TSw2 level. For the purposes of the Program Approach, it was assumed that the CH drifting would consist of the CH North Ramp and the northern half of the CH Main Drift. The southern end of the CH Main Drift would curve to the east, intersect the Ghost Dance Fault directly under the southernmost of the two upper level Ghost Dance Fault alcoves, and terminate shortly after passing through the fault. The CH South Ramp was thus eliminated. This arrangement is shown as Figure 2-1 on page 16 of Reference 5.12.

Subsequent Change

A Systems Engineering Study (Ref. 5.19) was performed in early FY1995 to evaluate various CH access routes and amounts of drifting in the CH as they related to attainment of sufficient scientific understanding of the CH unit for site characterization. At about the same time, an initiative was undertaken by the project to evaluate cost effective means for early CH access. The concept developed by the ESF design team is shown on Figures 7-8 and 7-13. It is important to note that the configuration of the CH access and drifting shown on the interface drawings is only a concept, and is not supported by detailed design. It is included in the interface drawing revision because it

represents the most current thinking on the course of site characterization. TBV-081-MGD is carried in this analysis because there has been no final decision on the execution of this course of action.

This configuration is shown in plan view on Figure 7-8 and again in cross-section on Figure 7-13. The CH layout consists of a vertical shaft, sited about 450 meters southeast of the repository block near the site of Drillhole UZ-16; and approximately 2,500 meters of drifting to the west from the shaft bottom. The CH Exploratory Drift will pass through the Ghost Dance Fault directly beneath the southernmost Ghost Dance Fault alcove in the upper level and continue to the west to intersect the Solitario Canyon Fault. The drift would end shortly after passing through the Solitario Canyon Fault.

Rationale

The proposed CH access and drifting (the off-block vertical shaft and east-west cross-drift) would have no physical connection with the rest of the ESF, nor with the repository as currently conceived. This CH concept offers advantages in both cost and schedule over the current baseline plan. Since the CH excavation will not become part of the repository, it is less likely (when compared to options which are physically connected to the subsurface repository) to fall within any of the seven Quality Assurance (QA) classifications, or require extensive QA controls to limit waste isolation and/or site characterization impacts. Because there would be no physical interference between the excavation of the ESF loop and the CH shaft/drift, each could proceed independently of the other.

The need for the NRE may ultimately be obviated by the CH shaft/cross-drift effort. This is because the CH cross-drift may provide the east-west cross-block drift needed to discover (or provide assurance that there are no undiscovered) major north-south trending structural features in the primary repository block. The NRE is still shown on the drawings because a final decision to eliminate it has not been made. This situation is the subject of TBV-081-MGD.

7.2.8 Adjustments in the Shape of the GROA Layout

Original Condition

The original shape of the upper emplacement block is shown in Figures 7-1 and 7-2.

Proposed Change

The shape of the upper emplacement block has changed primarily in two areas, the north end and the southwest area. Multiple adjustments have been made which have resulted in the shape shown on Figures 7-7 and 7-8. The adjustments are related, as discussed below. The current baseline drawing shows, in the southwest area of the upper block, that the southernmost 30-35 emplacement drifts extend to the west to an Easting of approximately 169,800 meters. In the update, the western ends of the southernmost emplacement drifts extend only to an Easting of between 170,000 and about 170,300: i.e., they will be 200-400 meters shorter than they are shown in the current baseline drawings.

The shape was further changed by the addition of several emplacement drifts at the north end of the block. These northern drifts were added in order to offset the loss of emplacement area described above.

A complete discussion of these adjustments can be found in Ref 5.7, Chapter 8.

Rationale

Geologic modeling work which has been ongoing in the last year has indicated that the TSw3 unit is at a higher elevation in this area (southwest) than previously thought. A repository design assumption involves a minimum 30 meter vertical standoff from the closest approach of the repository layout to the basal vitrophyre (TSw3) (Reference 5.7, p 8-79). For this reason, the southwest edge of the upper block was moved to the east and assumed a new shape.

The 30 meter minimum vertical standoff assumption is based on the attainment of a thermal goal contained in the Controlled Design Assumptions (CDA) document (Ref 5.13. p.6-155). That goal states that the temperature of the Calico Hills nonwelded unit (CHn) (which immediately underlies the relatively thin TSw3) should not rise

above 115°C. This goal is intended to protect the Calico Hills unit from heat related degradation of its zeolitic content.

The LYNX geologic modeling program is used to produce the 3-D stratigraphic model of the repository area. As new information is added and the model is refined, the area available for repository use changes slightly. It is this process of refinement to the model which led to the alteration of the shape of the block. Because this development led to a loss of available emplacement area, several emplacement drifts were added to the north end of the block to partially offset the loss of area. This issue is discussed in Reference 5.7, Chapter 8, pp. 8-13 to 8-15.

7.2.9 Change in Emplacement Drift Spacing

Original Condition

The original interface drawings show an emplacement drift spacing of 30.5 meters, or 100 ft. This was a preliminary assumption, and was essentially a "place holder" which was used for diagrammatic purposes. A great deal of detailed study remains before a final drift spacing can be defined.

Proposed Change

The spacing in the proposed revision to the interface drawings shows a drift spacing of 22.5 meters.

Rationale

While still essentially a "place holder" requiring further analysis, the change has the following rationale.

Preliminary thermal modeling using the large Pressurized Water Reactor (PWR) 21 assembly MPC-based waste package (WP) (Ref 5.17) indicated that approximately 16 meters was the minimum spacing between WPs of this type in order to maintain compliance with the peak temperature goal for fuel cladding of 350°C (Ref 5.7). (ie: spacings closer than 16 meters led to violation of this thermal goal)

The current upper bound on areal mass load of the repository is "about 100 MTU/acre" (Ref 5.13, p.6-24). The drift spacing of 22.5 meters is the result if one derives the drift spacing knowing that the areal mass loading is about 100 MTU/acre, the minimum package spacing is 16 meters, and the mass of heavy metal in the 21 PWR package is about 9 metric tonnes. It is noted that the average MTU content of the large PWR MPC package can vary depending on the waste receipt strategy and the amount of derating, if any, required to keep the package within transportation and emplacement heat output limitations. A discussion of emplacement drift spacing is included in reference 5.7, Chapter 8, p.8-79 and 8-100.

7.2.10 Change in Flow Direction of the Development Ventilation System

Original Condition

The original interface drawings, Figures 1 and 2, show the development shaft as an intake. The south ramp would act as the exhaust airway.

Proposed Change

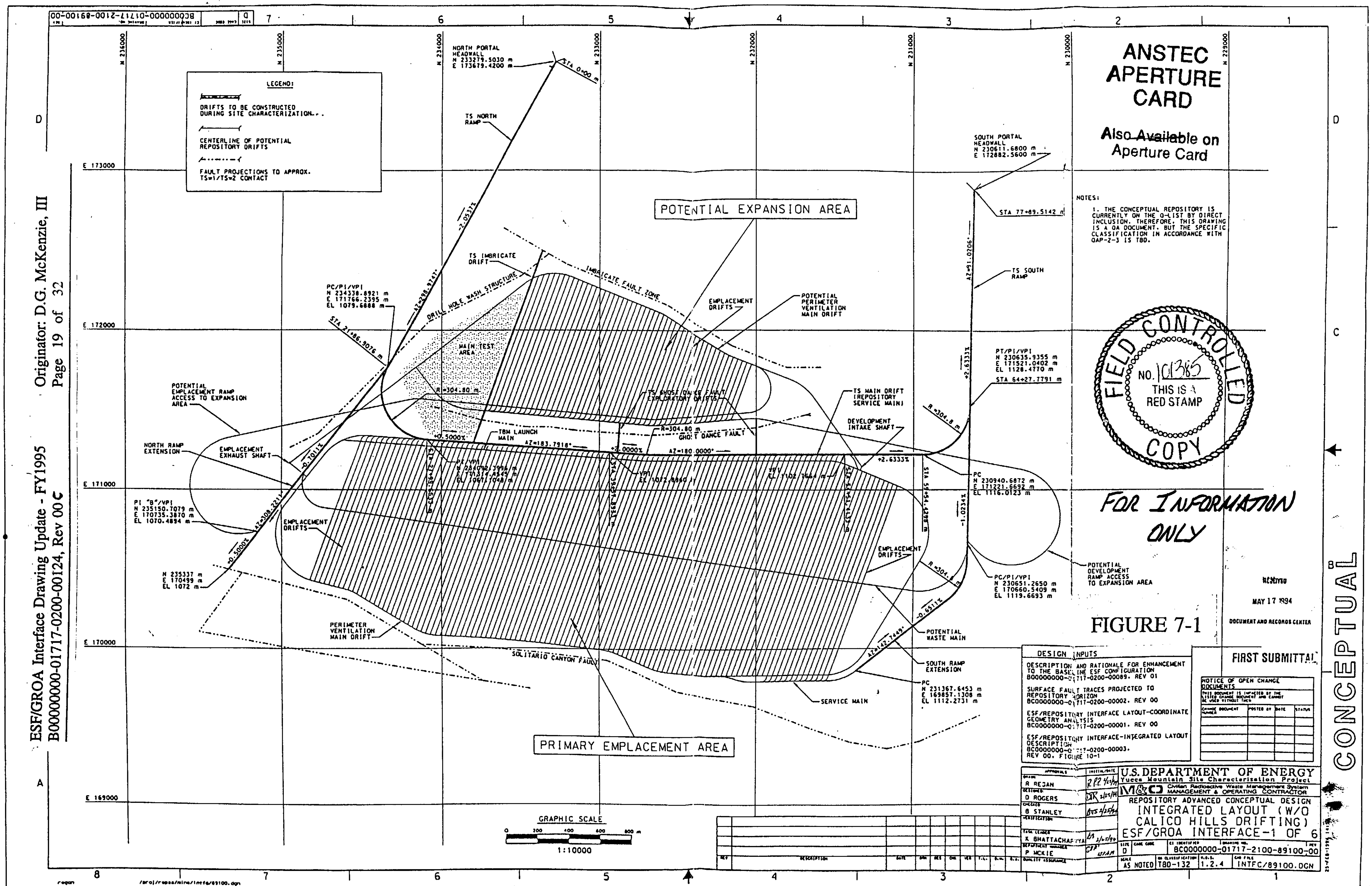
The development shaft is now shown as an exhaust airway, with the south ramp serving as the development system intake.

Rationale

It was felt that, since the south ramp serves as the main travelway for personnel in and out of the development side, that it should be on intake air to provide as clean and dust free an environment as possible. The presence of the muck conveyor in the ramp complicates the decision on flow direction, as there is some incentive to place the conveyor route on the exhaust flowpath to avoid entraining dust from the conveyor in the intake airstream, and to mitigate possible conveyor-related fires. The final decision has not yet been made, but the current ventilation work (Ref 5.7) shows the flow path as intake down the south ramp and exhaust up the development shaft.

ESF/GROA Interface Drawing Update - FY1995
B00000000-01717-0200-00124, Rev 00C

Originator: D.G. McKenzie, III
Page 19 of 32



9511200269 -01

LEGEND:
- DRIFTS TO BE CONSTRUCTED DURING SITE CHARACTERIZATION
- CENTERLINE OF POTENTIAL REPOSITORY DRIFTS
- FAULT PROJECTIONS TO APPROX. TSw1/TSw2 CONTACT

NORTH PORTAL HEADWALL
N 233279.5030 m
E 173679.4200 m

SOUTH PORTAL HEADWALL
N 230611.6800 m
E 172882.5600 m

PI
N 234076.5150 m
E 172240.0750 m
EL 1090.8122 m

PI
N 230774.4090 m
E 170308.3210 m
EL 1117.1259 m

POTENTIAL EXPANSION AREA

PRIMARY EMPLACEMENT AREA

TS NORTH RAMP
CH NORTH RAMP (-10%) (SEE NOTE 1)
TS IMBRICATE DRIFT
IMBRICATE FAULT ZONE
DRILL HOLE WASH STRUCTURE
CH IMBRICATE DRIFT
EMPLACEMENT DRIFTS
POTENTIAL PERIMETER VENTILATION MAIN DRIFT
TS SOUTH RAMP
MAIN TEST AREA
TS GHOST DANCE FAULT EXPLORATORY DRIFTS
TS MAIN DRIFT (REPOSITORY SERVICE MAIN)
POTENTIAL EMPLACEMENT RAMP ACCESS TO EXPANSION AREA
NORTH RAMP EXTENSION
EMPLACEMENT EXHAUST SHAFT
CH GHOST DANCE FAULT DRIFT
TBM LAUNCH MAIN
GHOST DANCE FAULT
DEVELOPMENT INTAKE SHAFT
POTENTIAL DEVELOPMENT RAMP ACCESS TO EXPANSION AREA
CH MAIN DRIFT
EMPLACEMENT DRIFTS
POTENTIAL WASTE MAIN
SOUTH RAMP EXTENSION
PERIMETER VENTILATION MAIN DRIFT
SOLITARIO CANYON FAULT
CH SOUTH RAMP (-10%) (SEE NOTE 1)
SERVICE MAIN
CH SOLITARIO DRIFT

E 173000
E 172000
E 171000
E 170000
E 169000
N 236000
N 235000
N 234000
N 233000
N 232000
N 231000
N 230000
N 229000

GRAPHIC SCALE
0 200 400 600 800 m
1:10000

NOTES:
1. REFER TO RSN TITLE I DRAWING NO. YMP-025-2-MING-W113, REV 1. FOR DETAILS REGARDING DRIFTING ALONG CALICO HILLS (CH) MAIN DRIFT.
2. THE CONCEPTUAL REPOSITORY IS CURRENTLY ON THE Q-LIST BY DIRECT INCLUSION. THEREFORE, THIS DRAWING IS A QA DOCUMENT. BUT THE SPECIFIC CLASSIFICATION IN ACCORDANCE WITH QAP-2-3 IS TBD.

FOR INFORMATION ONLY

FIGURE 7-2

DESIGN INPUTS

DESCRIPTION AND RATIONALE FOR ENHANCEMENT TO THE BASELINE ESF CONFIGURATION B00000000-01717-0200-00089, REV 01

SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON BC0000000-01717-0200-00002, REV 00

ESF/REPOSITORY INTERFACE LAYOUT-COORDINATE GEOMETRY ANALYSIS BC0000000-01717-0200-00001, REV 00

ESF/REPOSITORY INTERFACE-INTEGRATED LAYOUT DESCRIPTION BC0000000-01717-0200-00003, REV 00, FIGURE 10-2

NOTICE OF OPEN CHANGE DOCUMENTS

THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

FIRST SUBMITTAL

APPROVALS	INITIAL/DATE
DRAWN R REGAN	PFR 5/9/94
DESIGNED D ROGERS	STR 2/25/94
CHECKED D STANLEY	DWS 4/25/94
VERIFICATION	
TASK LEADER K BHATTACHARYYA	KB 4/25/94
DEPARTMENT MANAGER P MCKIE	PM 4/26/94
QUALITY ASSURANCE	

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System Management & Operating Contractor

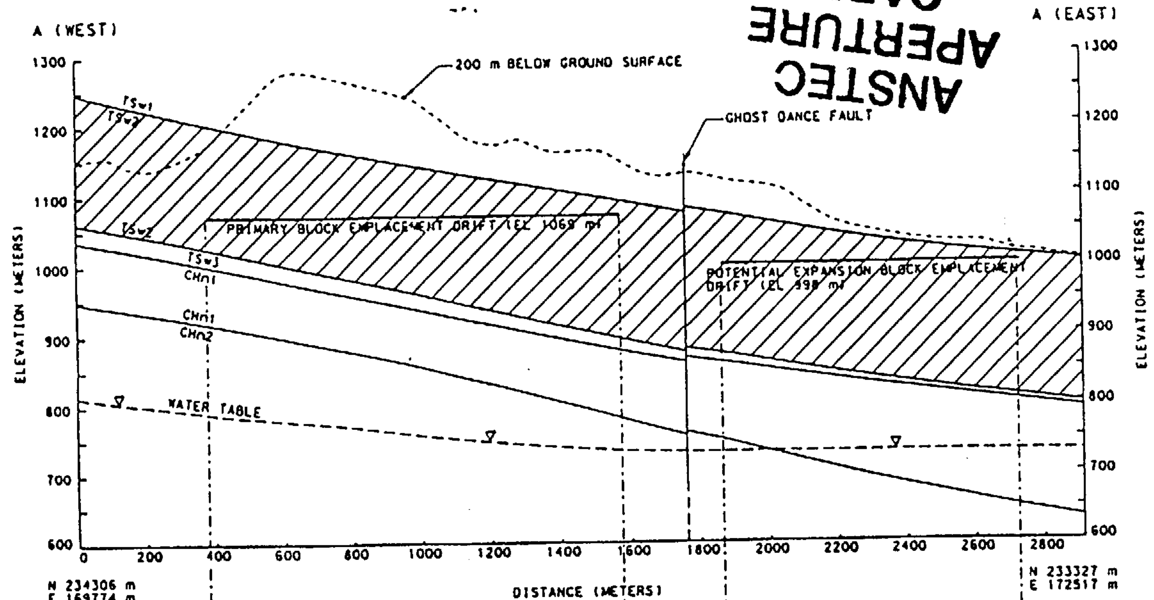
REPOSITORY ADVANCED CONCEPTUAL DESIGN
INTEGRATED LAYOUT (W/ CALICO HILLS DRIFTING)
ESF/GROA INTERFACE-2 OF 6

SIZE	CAGE CODE	CI IDENTIFIER	DRAWING NO.	REV
D		BC0000000-01717-2100-89101		-00

SCALE	QA CLASSIFICATION	V.B.L.	CAD FILE
AS NOTED	TBD-132	1.2.4	INTFC/89101.DGN

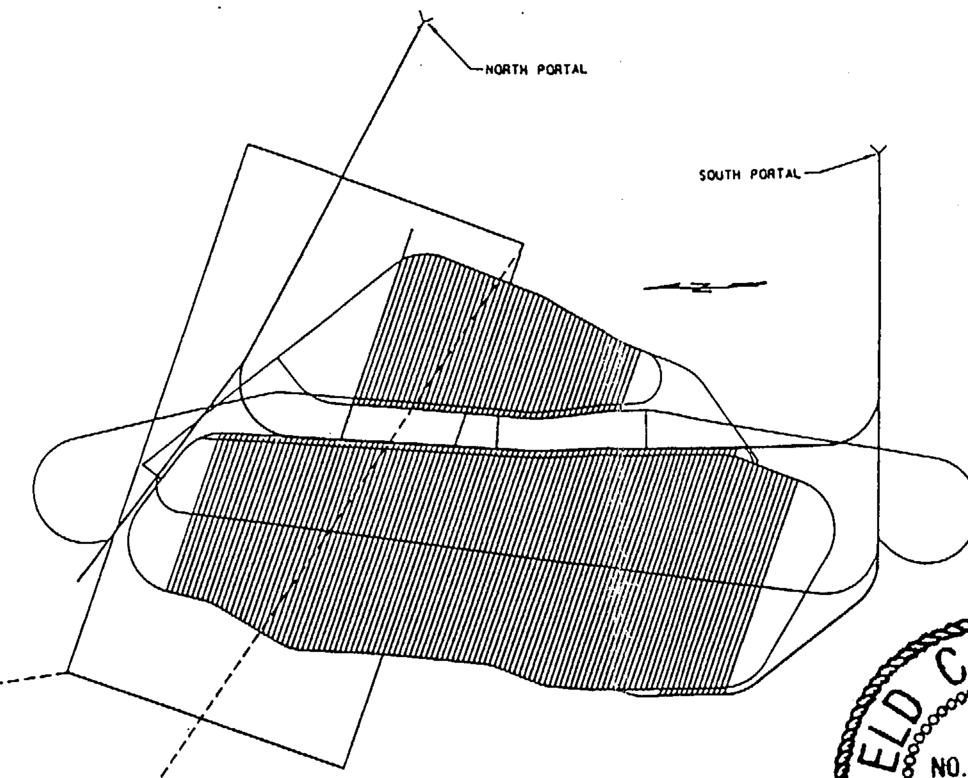
CONCEPTUAL

9511200269-02



SECTION (A)
SCALE: HORIZ = 1:10000
VERT = 1:5000

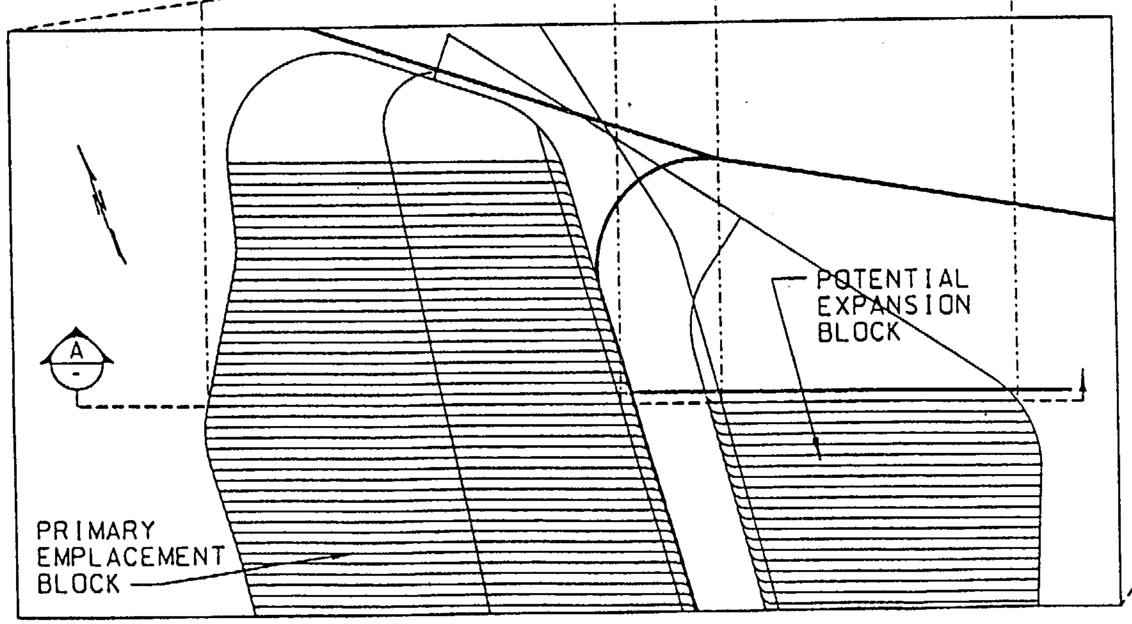
REFERENCE STRATIGRAPHY UNIT NAME (DESIGNATOR)
UPPER PAINTBRUSH NONWELDED UNIT (PTn)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-RICH (TSw1)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-POOR (TSw2)
TOPOPAH SPRING WELDED UNIT, VITROPHYRE (TSw3)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn1)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn2)



PLAN
SCALE: 1:20000

FOR INFORMATION ONLY

FIRST SUBMITTAL



ENLARGED PARTIAL PLAN
SCALE: 1:10000

GRAPHIC SCALE
0 200 400 600 800 m
1:10000

FIGURE 7-3

NOTES:

1. STATIONS AND ELEVATIONS SHOWN ARE ROUNDED TO NEAREST INTEGER VALUE. REFER TO BC0000000-01717-2100-89100 (SHT 1 OF 6) FOR MORE PRECISE DATA.
2. GEOLOGICAL AND OTHER BACKGROUND INFORMATION SHOWN ON SECTION HAS BEEN DIGITIZED FROM IGIS/CALMA PLOT NO. YMP-94-012.0 PROVIDED BY EG&G.
3. THE CONCEPTUAL REPOSITORY IS CURRENTLY ON THE Q-LIST BY DIRECT INCLUSION. THEREFORE, THIS DRAWING IS A QA DOCUMENT, BUT THE SPECIFIC CLASSIFICATION IN ACCORDANCE WITH QAP-2-3 IS TBD.

DESIGN INPUTS

DESCRIPTION AND RATIONALE FOR ENHANCEMENT TO THE BASELINE ESF CONFIGURATION B00000000-01717-0200-00089, REV 01

SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON BC0000000-01717-0200-00002, REV 00

ESF/REPOSITORY INTERFACE LAYOUT-COORDINATE GEOMETRY ANALYSIS BC0000000-01717-0200-00001, REV 00

ESF/REPOSITORY INTERFACE-INTEGRATED LAYOUT DESCRIPTION BC0000000-01717-0200-00003, REV 00, FIGURE 10-3

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

APPROVALS	INITIAL/DATE
DRAWN R REGAN	R.R. 2/25/94
DESIGNED D ROGERS	DR 2/25/94
CHECKED B STANLEY	BS 2/25/94
VERIFICATION	
TASK LEADER K BHATTACHARYYA	KB 2/25/94
DEPARTMENT MANAGER P MCKIE	2/25/1994
QUALITY ASSURANCE	

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

REPOSITORY ADVANCED CONCEPTUAL DESIGN
SECTION "A" THROUGH INTEGRATED LAYOUT
ESF/GROA INTERFACE-3 OF 6

SIZE	CAGE CODE	CI IDENTIFIER / DRAWING NO.	REV
D		BC0000000-01717-2100-89102	00

SCALE	QA CLASSIFICATION	W.B.S.	CAD FILE
AS NOTED	TBD-132	1.2.4	INTFC/89102.DGN

REV	DESCRIPTION	DATE	DRN	DES	CHK	VER	T.L.	D.M.	Q.A.

CONCEPTUAL

23-FEB-1994 15:29

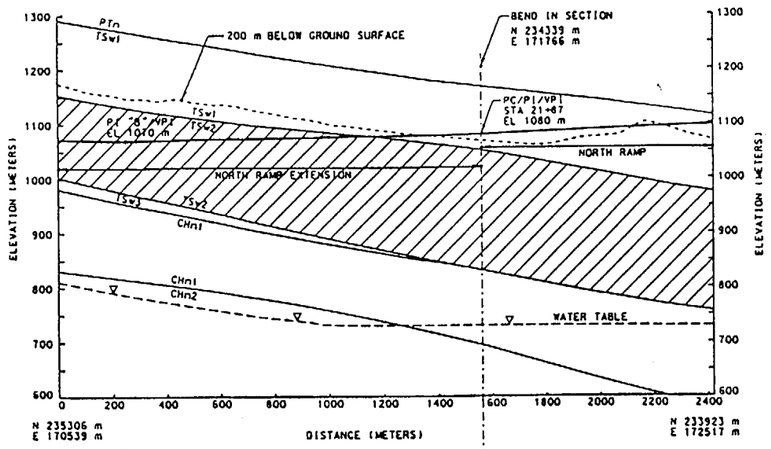
/proj/repos/mine/intfc/89102.dgn

9511200269-03

ESF/GROA Interface Drawing Update - FY1995
B0000000-01717-0200-00124, Rev 00C

Originator: D.G. McKenzie, III
Page 22 of 32

C (NORTHWEST) — C (EAST)

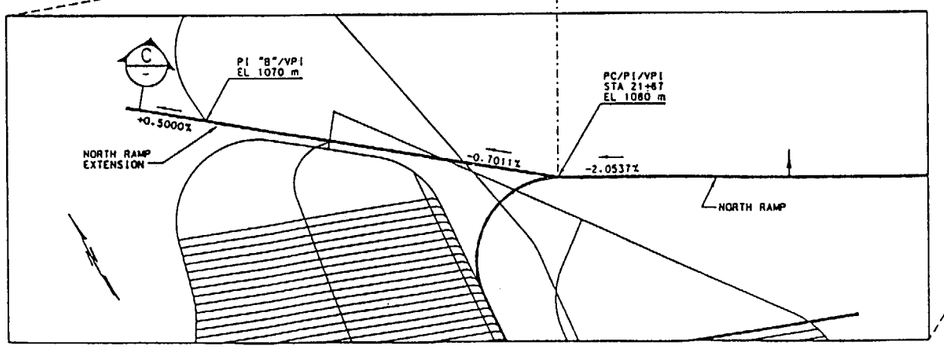


SECTION C
SCALE: HORIZ= 1:10000
VERT= 1:5000

REFERENCE STRATIGRAPHY UNIT NAME (DESIGNATOR)
UPPER PAINTBRUSH NONWELDED UNIT (PTn)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-RICH (TSw1)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-POOR (TSw2)
TOPOPAH SPRING WELDED UNIT, VITROPHYRE (TSw3)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn1)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn2)

ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE BC0000000-01717-2100-89100)

PLAN
SCALE: 1:20000



ENLARGED PARTIAL PLAN
SCALE: 1:10000

GRAPHIC SCALE
0 200 400 600 800 m
1:10000

NOTES:

1. STATIONS AND ELEVATIONS SHOWN ARE ROUNDED TO NEAREST INTEGER VALUE. REFER TO BC0000000-01717-2100-89100 (SHT 1 OF 6) FOR MORE PRECISE DATA.
2. GEOLOGICAL AND OTHER BACKGROUND INFORMATION SHOWN ON SECTION HAS BEEN DIGITIZED FROM IGIS/CALMA PLOT NO. TMP-94-020.0 PROVIDED BY EG&G.
3. THE CONCEPTUAL REPOSITORY IS CURRENTLY ON THE Q-LIST BY DIRECT INCLUSION. THEREFORE, THIS DRAWING IS A QA DOCUMENT, BUT THE SPECIFIC CLASSIFICATION IN ACCORDANCE WITH QAP-2-3 IS TBD.

DESIGN INPUTS

DESCRIPTION AND RATIONALE FOR ENHANCEMENT TO THE BASELINE ESF CONFIGURATION B0000000G-01717-0200-00089, REV 01

SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON BC0000000C-01717-0200-00002, REV 00

ESF/REPOSITORY INTERFACE LAYOUT-COORDINATE GEOMETRY ANALYSIS BC0000000G-01717-0200-00001, REV 00

ESF/REPOSITORY INTERFACE-INTEGRATED LAYOUT DESCRIPTION BC0000000G-01717-0200-00003, REV 00, FIGURE 10-4

NOTICE OF OPEN CHANGE DOCUMENTS			
THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM			
CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

APPROVALS	INITIAL/DATE
Drawn: R REGAN	JFF 4/4/94
Designed: D ROGERS	DR 4/4/94
Checked: B STANLEY	BJS 4/25/94
Verification:	
Task Leader: K BHATTACHARYYA	KB 4/26/94
Department Manager: P MCKIE	PM 4/27/1994
Quality Assurance:	

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

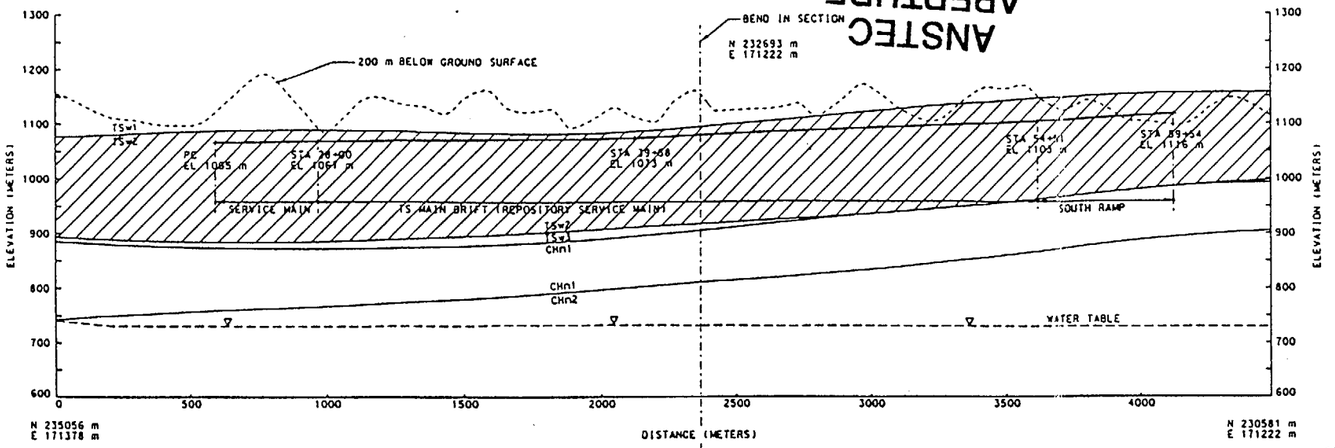
REPOSITORY ADVANCED CONCEPTUAL DESIGN
SECTION "C" ALONG NORTH RAMP AND EXTENSION
ESF/GROA INTERFACE-4 OF 6

SIZE	CAGE CODE	CS IDENTIFIER	DRAWING NO.	REV
D		BC0000000-01717-2100-89103		00
SCALE: AS NOTED	QA CLASSIFICATION: TBD-132	U.S.C.S.: 1.2.4	CAD FILE: INTFC/89103.DGN	

REV	DESCRIPTION	DATE	DRN	DES	CHK	VER	T.L.	D.M.	Q.A.

FIGURE 7-4

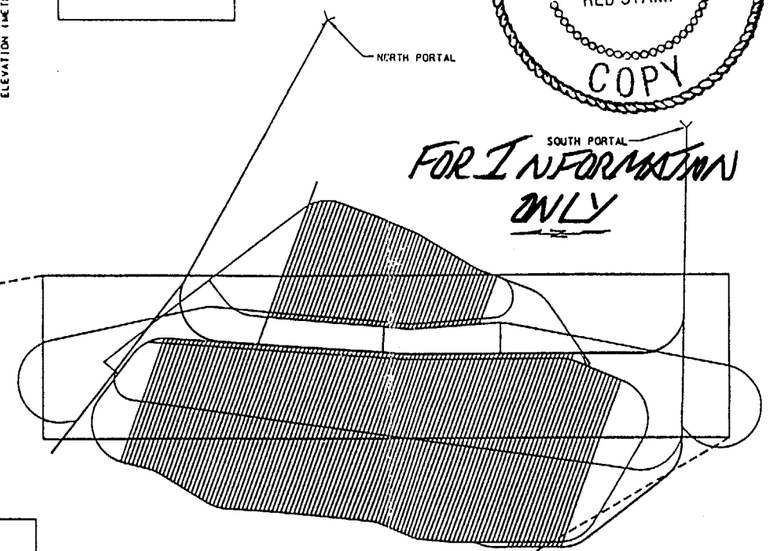
B (NORTH) — B (SOUTH)



SECTION B
SCALE: HORIZ= 1:10000
VERT= 1:5000

REFERENCE STRATIGRAPHY UNIT NAME (DESIGNATOR)
UPPER PAINTBRUSH NONWELDED UNIT (PTn)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-RICH (TSw1)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-POOR (TSw2)
TOPOPAH SPRING WELDED UNIT, VITROPHYRE (TSw3)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn1)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn2)

NOTES:
1. STATIONS AND ELEVATIONS SHOWN ARE ROUNDED TO NEAREST INTEGER VALUE. REFER TO BC0000000-01717-2100-89100 (SHT 1 OF 6) FOR MORE PRECISE DATA.
2. GEOLOGICAL AND OTHER BACKGROUND INFORMATION SHOWN ON SECTION HAS BEEN DIGITIZED FROM IGIS/CALMA PLOT NO. YMP-94-013.0 PROVIDED BY EG&G.
3. THE CONCEPTUAL REPOSITORY IS CURRENTLY ON THE QA-LIST BY DIRECT INCLUSION. THEREFORE, THIS DRAWING IS A QA DOCUMENT. BUT THE SPECIFIC CLASSIFICATION IN ACCORDANCE WITH QAP-2-3 IS TBD.

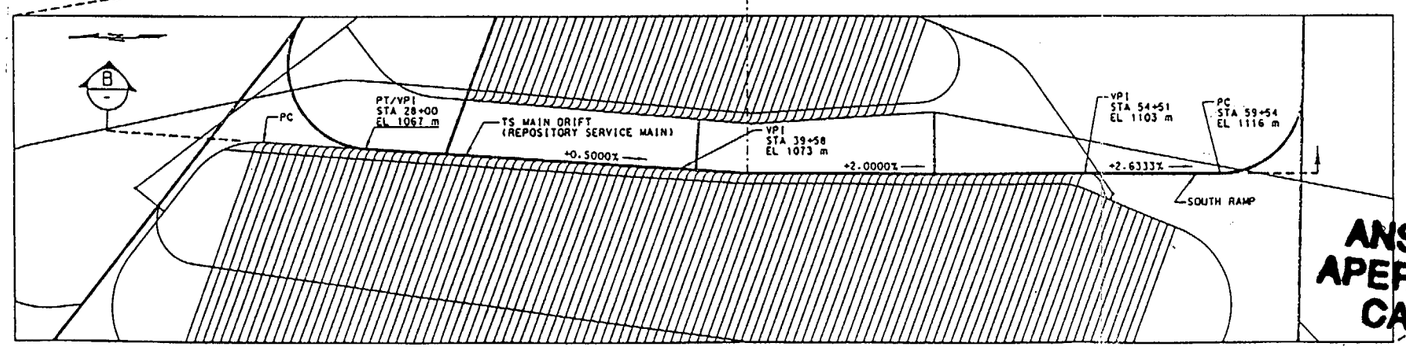


FOR INFORMATION ONLY

ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE BC0000000-01717-2100-89100)
PLAN
SCALE: 1:20000

FIGURE 7-5

ENLARGED PARTIAL PLAN
SCALE: 1:10000



GRAPHIC SCALE
0 200 400 600 800 m
1:10000

DESIGN INPUTS

DESCRIPTION AND RATIONALE FOR ENHANCEMENT TO THE BASELINE ESF CONFIGURATION B00000000-01717-0200-00089, REV 01

SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON BC0000000-01717-0200-00002, REV 00

ESF/REPOSITORY INTERFACE LAYOUT-COORDINATE GEOMETRY ANALYSIS BC0000000-01717-0200-00001, REV 00

ESF/REPOSITORY INTERFACE-INTEGRATED LAYOUT DESCRIPTION BC0000000-01717-0200-00003, REV 00, FIGURE 10-5

DOCUMENT AND RECORDS CENTER
FIRST SUBMITTAL

NOTICE OF OPEN CHANGE DOCUMENTS
THIS DOCUMENT IS IMPACTED BY THE LISTED CHANGE DOCUMENT AND CANNOT BE USED WITHOUT THEM

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

APPROVALS	INITIAL/DATE
DESIGN R REGAN	
DESIGNED D ROGERS	
CHECKED B STANLEY	
VERIFICATION	
TASK LEADER K BHATTACHARYYA	
DEPARTMENT MANAGER P MCKIE	
QUALITY ASSURANCE	

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

REPOSITORY ADVANCED CONCEPTUAL DESIGN
SECTION "B" ALONG TS MAIN DRIFT (REPOS SERV MAIN)
ESF/GROA INTERFACE-5 OF 6

SIZE	CAGE CODE	DRAWING NO.	REV
D		BC0000000-01717-2100-89104-00	
SCALE: AS NOTED	QA CLASSIFICATION: TBD-132	P.G.L.: 1.2.4	CAD FILE: INTFC/89104.DGN

REV	DESCRIPTION	DATE	DRN	DES	CHK	PER	T.L.	D.M.	Q.A.

CONCEPTUAL

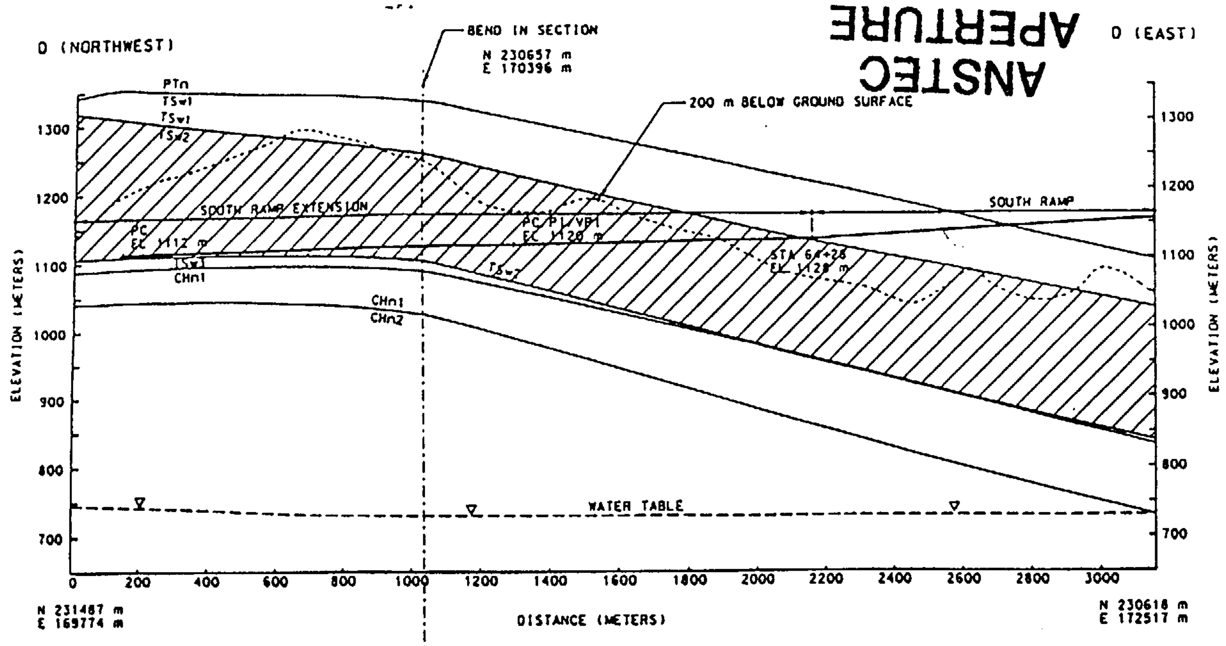
regan /proj/repos/almo/intfc/89104.dgn

23-FEB-1994 15:37

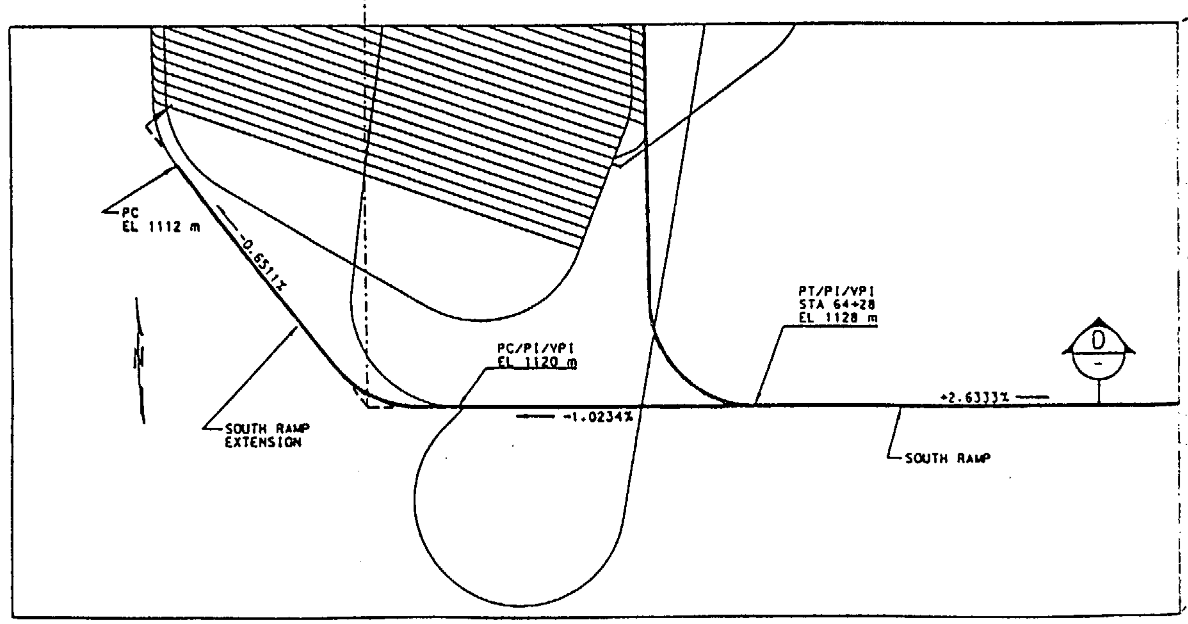
NOTES:

1. STATIONS AND ELEVATIONS SHOWN ARE ROUNDED TO NEAREST INTEGER VALUE. REFER TO BC0000000-01717-2100-89100 (SHT 1 OF 6) FOR MORE PRECISE DATA.
2. GEOLOGICAL AND OTHER BACKGROUND INFORMATION SHOWN ON SECTION HAS BEEN DIGITIZED FROM IGIS/CALMA PLOT NO. TMP-94-021.0 PROVIDED BY EG&G.
3. THE CONCEPTUAL REPOSITORY IS CURRENTLY ON THE Q-LIST BY DIRECT INCLUSION. THEREFORE, THIS DRAWING IS A QA DOCUMENT, BUT THE SPECIFIC CLASSIFICATION IN ACCORDANCE WITH QAP-2-3 IS TBD.

REFERENCE STRATIGRAPHY UNIT NAME (DESIGNATOR)
UPPER PAINTBRUSH NONWELDED UNIT (PTn)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-RICH (TSw1)
TOPOPAH SPRING WELDED UNIT LITHOPHYSAE-POOR (TSw2)
TOPOPAH SPRING WELDED UNIT, VITROPHYRE (TSw3)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn1)
CALICO HILLS AND LOWER PAINTBRUSH NONWELDED UNIT (CHn2)

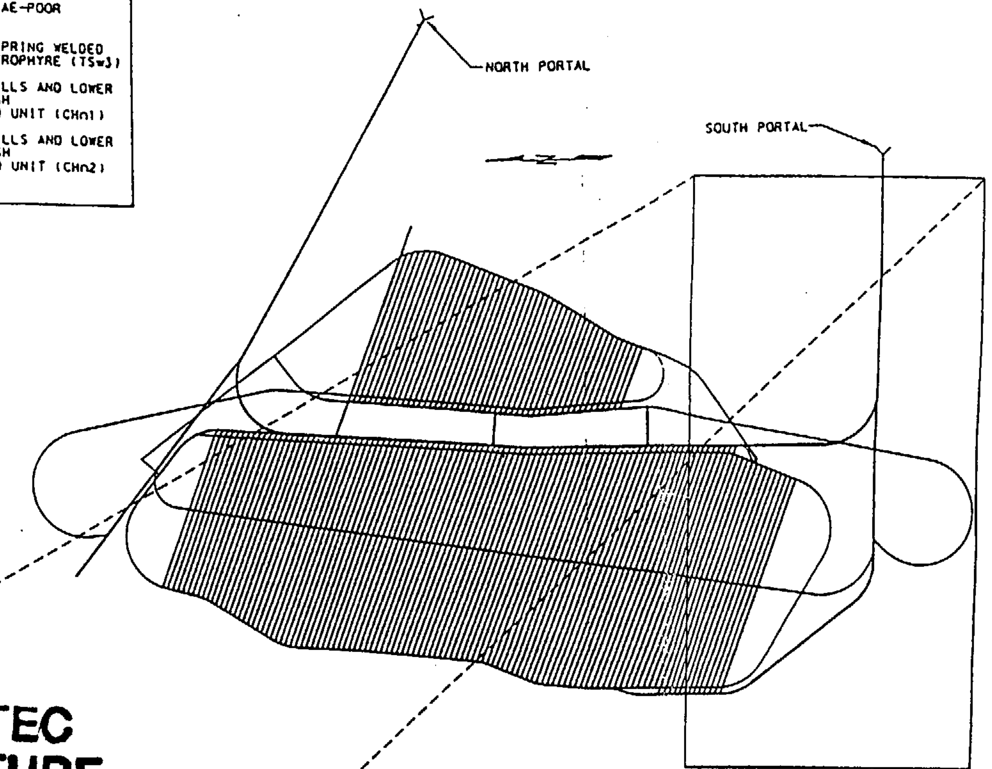


SECTION D
SCALE: HORIZ= 1:10000 VERT= 1:5000



ENLARGED PARTIAL PLAN
SCALE: 1:10000

GRAPHIC SCALE
0 200 400 600 800 m
1:10000



ESF/REPOSITORY INTEGRATED CONCEPTUAL LAYOUT (SEE BC0000000-01717-2100-89100)

PLAN
SCALE: 1:20000

FIGURE 7-6

FOR INFORMATION ONLY

DESIGN INPUTS

DESCRIPTION AND RATIONALE FOR ENHANCEMENT TO THE BASELINE ESF CONFIGURATION B00000000-01717-0200-00089, REV 01

SURFACE FAULT TRACES PROJECTED TO REPOSITORY HORIZON BC0000000-01717-0200-00002, REV 00

ESF/REPOSITORY INTERFACE LAYOUT-COORDINATE GEOMETRY ANALYSIS BC0000000-01717-0200-00001, REV 00

ESF/REPOSITORY INTERFACE-INTEGRATED LAYOUT DESCRIPTION BC0000000-01717-0200-00003, REV 00, FIGURE 10-6

NOTICE OF OPEN CHANGE DOCUMENTS

CHANGE DOCUMENT NUMBER	POSTED BY	DATE	STATUS

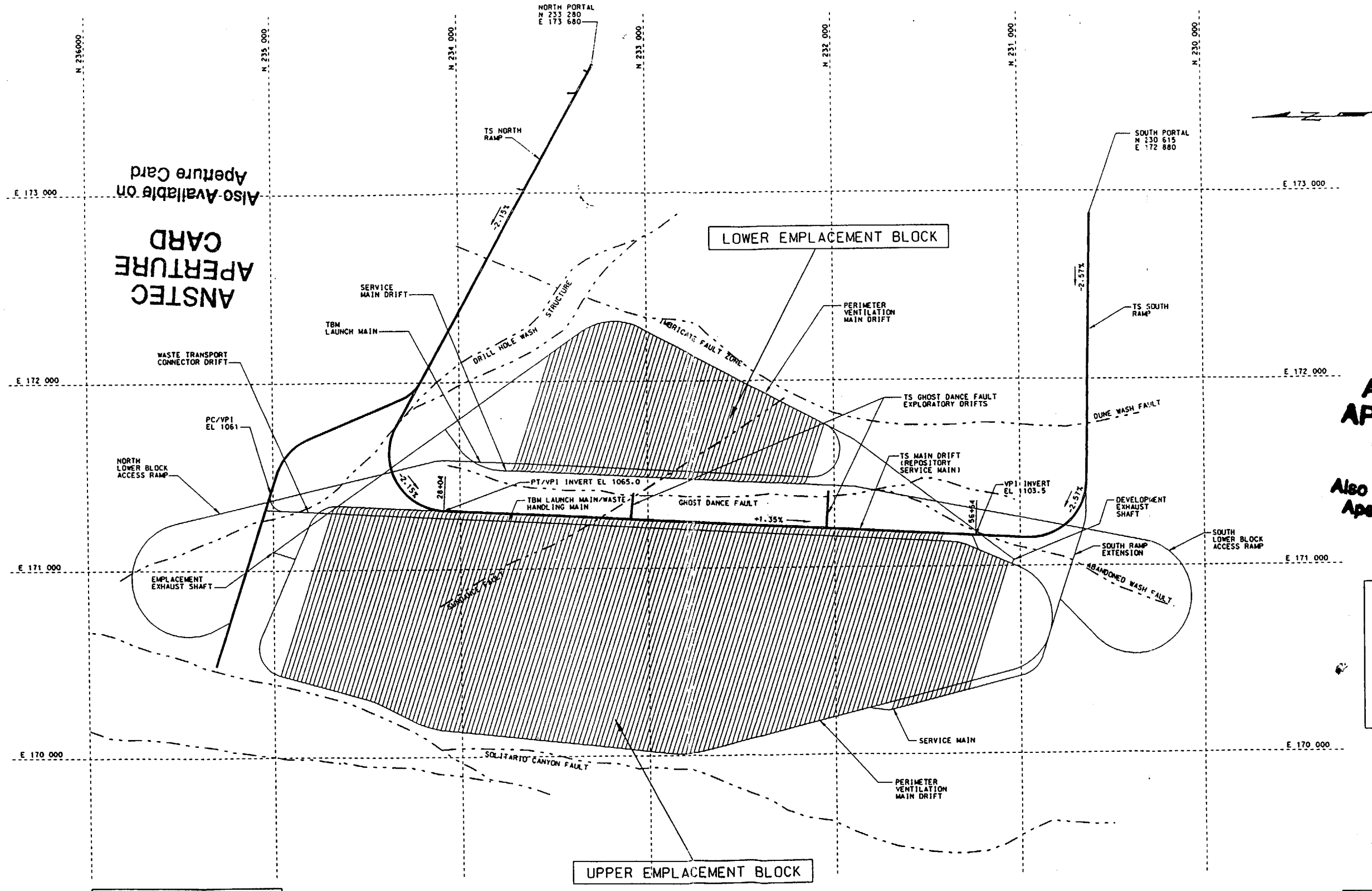
APPROVALS	INITIAL/DATE
DRAWN R. REGAN	RR 4/5/94
DESIGNED D. ROGERS	DDR 4/5/94
CHECKED B. STANLEY	BWS 4/5/94
TASK LEADER K. BHATTACHARYYA	KB 4/5/94
DEPARTMENT MANAGER P. MCKIE	

U.S. DEPARTMENT OF ENERGY
Yucca Mountain Site Characterization Project
M&O Civilian Radioactive Waste Management System MANAGEMENT & OPERATING CONTRACTOR

REPOSITORY ADVANCED CONCEPTUAL DESIGN
SECTION "D" ALONG SOUTH RAMP AND EXTENSION
ESF/GROA INTERFACE-6 OF 6

SIZE D | DRAWING NO. BC0000000-01717-2100-89105 | REV 00
SCALE AS NOTED | TBD-132 | 1.2.4 | INTFC/89105.DGN

CONCEPTUAL



LEGEND

- DRIFTS TO BE CONSTRUCTED DURING SITE CHARACTERIZATION
- CENTERLINE OF POTENTIAL REPOSITORY DRIFTS
- FAULT PROJECTIONS TO APPROX. REPOSITORY LEVEL

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER AND ELEVATIONS TO NEAREST TENTH OF A METER

NOT FOR CONSTRUCTION

THIS DRAWING CONTAINS CONCEPTUAL INFORMATION, AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

PLAN
SCALE: 1 : 10000

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

FIGURE 7-7

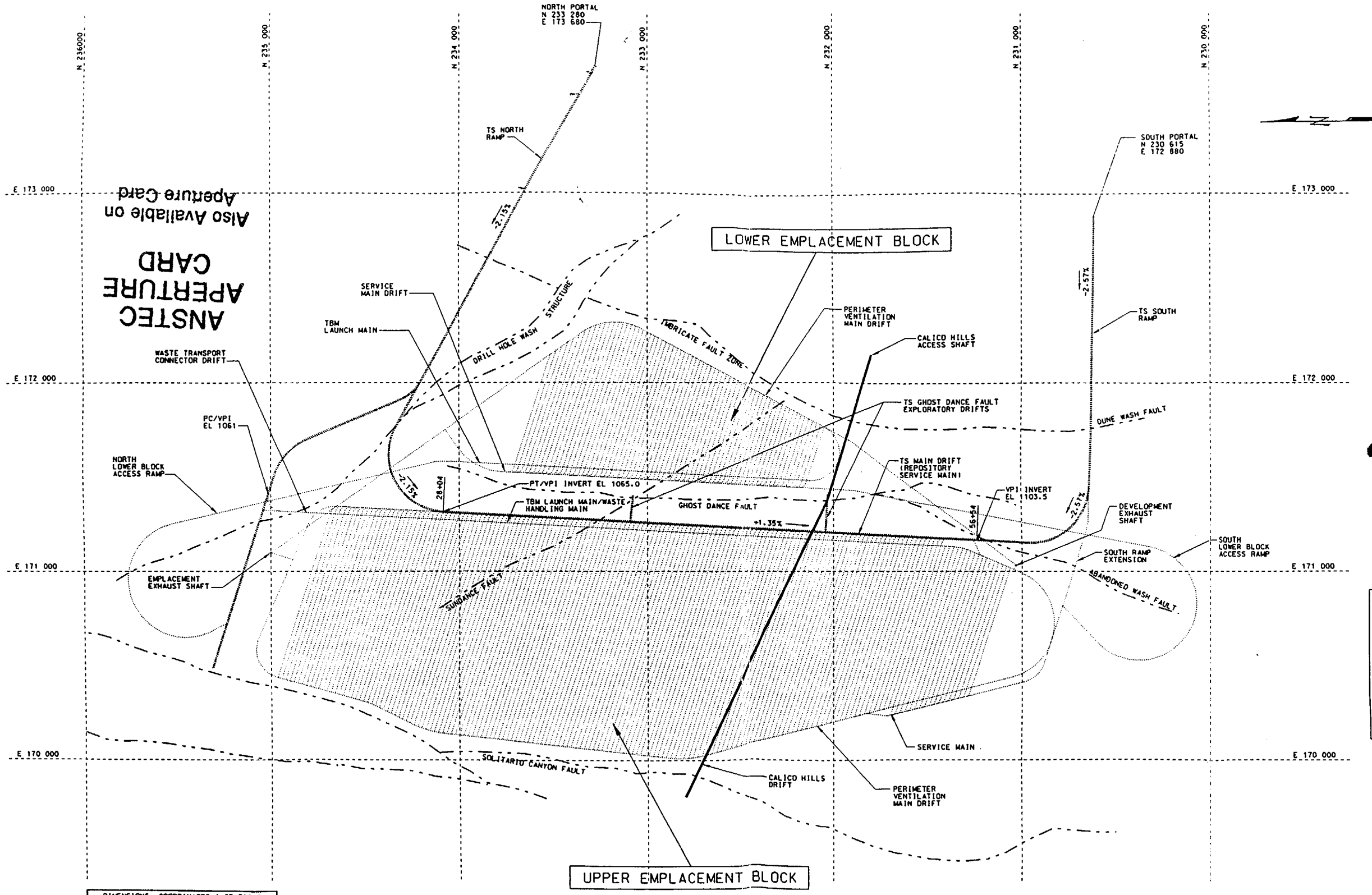
Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

INTEGRATED LAYOUT (W/O CALICO HILLS DRIFTING) ESF/GROA INTERFACE-1 OF 7

REFERENCE NUMBER | SKETCH NUMBER SK-382
SCALE NOTED | FOR/FIELD ECR NUMBER | ATTACHMENT NO. | CAD FILE asrm-sk382.dg

9511200269-07

/rep/repss/mine/intfc/asrm-sk382.dgn 6-SEP-1995 08:03



LEGEND

- DRIFTS TO BE CONSTRUCTED DURING SITE CHARACTERIZATION
- CENTERLINE OF POTENTIAL REPOSITORY DRIFTS
- FAULT PROJECTIONS TO APPROX. REPOSITORY LEVEL

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER AND ELEVATIONS TO NEAREST TENTH OF A METER

NOT FOR CONSTRUCTION

THIS DRAWING CONTAINS CONCEPTUAL INFORMATION, AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

PLAN
SCALE: 1 : 10000

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

FIGURE 7-8

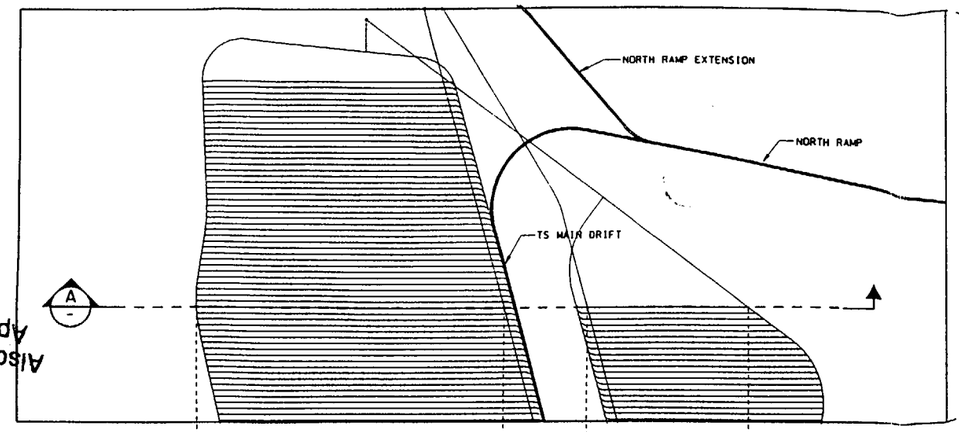
951200266-09

Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

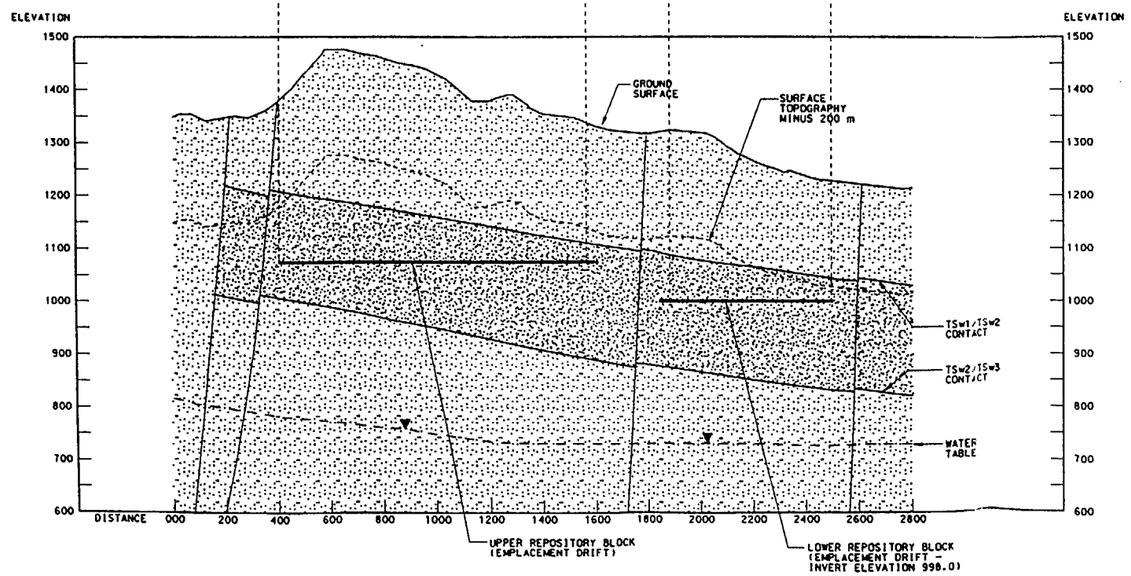
INTEGRATED LAYOUT (W/ CALICO HILLS DRIFTING) ESF/GROA INTERFACE-2 OF 7

REFERENCE NUMBER		SKETCH NUMBER
		SK-383
SCALE	FOR/FIELD SCR NUMBER	ATTACHMENT NO. / CAD FILE
NOTED		ssrm-sk383.dg

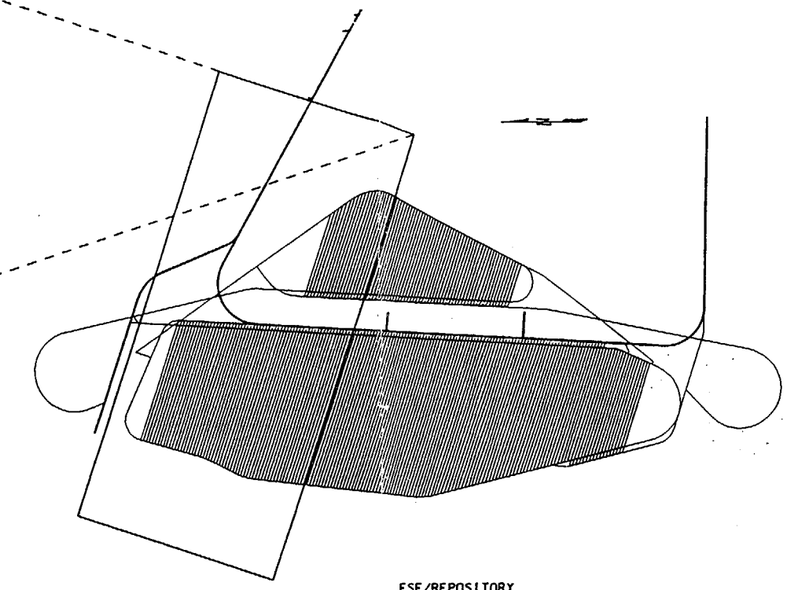
jon
/rep/repss/mine/intfc/ssrm-sk383.dgn 6-SEP-1995 08:51



ENLARGED PARTIAL PLAN
SCALE: 1:10000



SECTION A-
SCALE: HORIZ= 1:10000
VERT = 1: 5000



ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE SK-382)

PLAN
SCALE: 1:20000

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

ANSTEC APERTURE CARD
Also Available on Aperture Card

FIGURE 7-9

NOT FOR CONSTRUCTION

THIS DRAWING CONTAINS CONCEPTUAL INFORMATION, AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

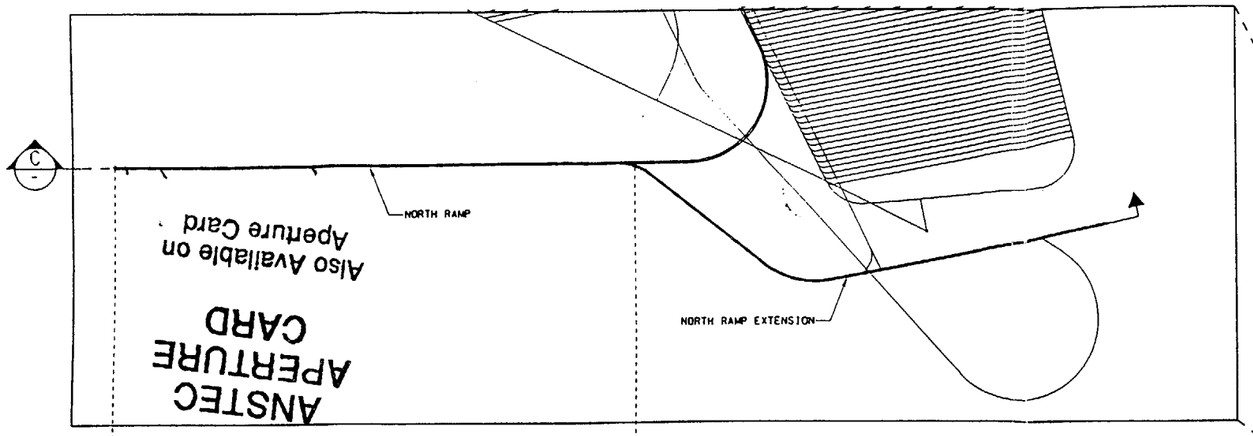
Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

SECTION "A" THROUGH INTEGRATED LAYOUT ESF/GROA INTERFACE-3 OF 7

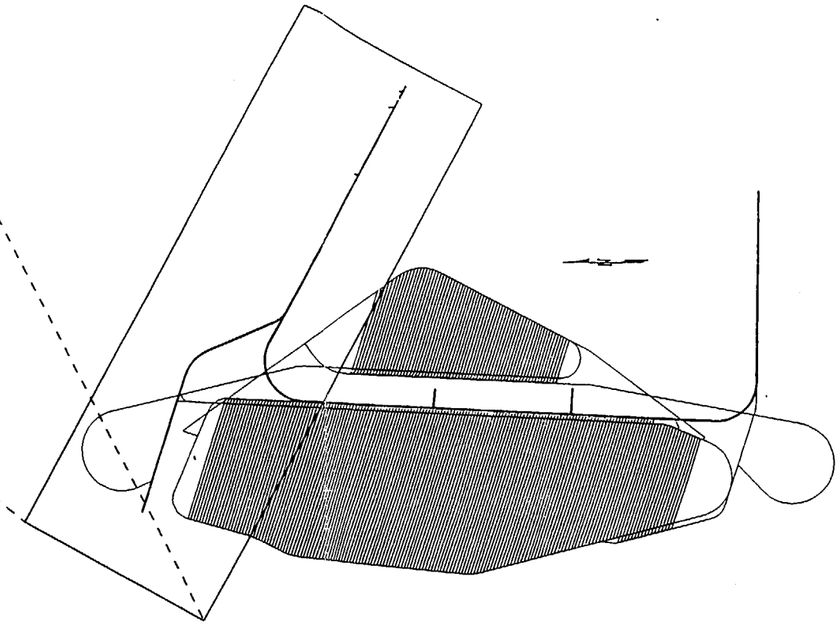
REFERENCE NUMBER		SKETCH NUMBER
		SK-384
SCALE	FOLLOW-ON ECR NUMBER	ATTACHMENT NO. / CAD FILE
NOTED		ssrm-sk384.dg

9511200269-09

/rep/repss/mine/intfc/ssrm-sk384.dgn 6-SEP-1995 08:00

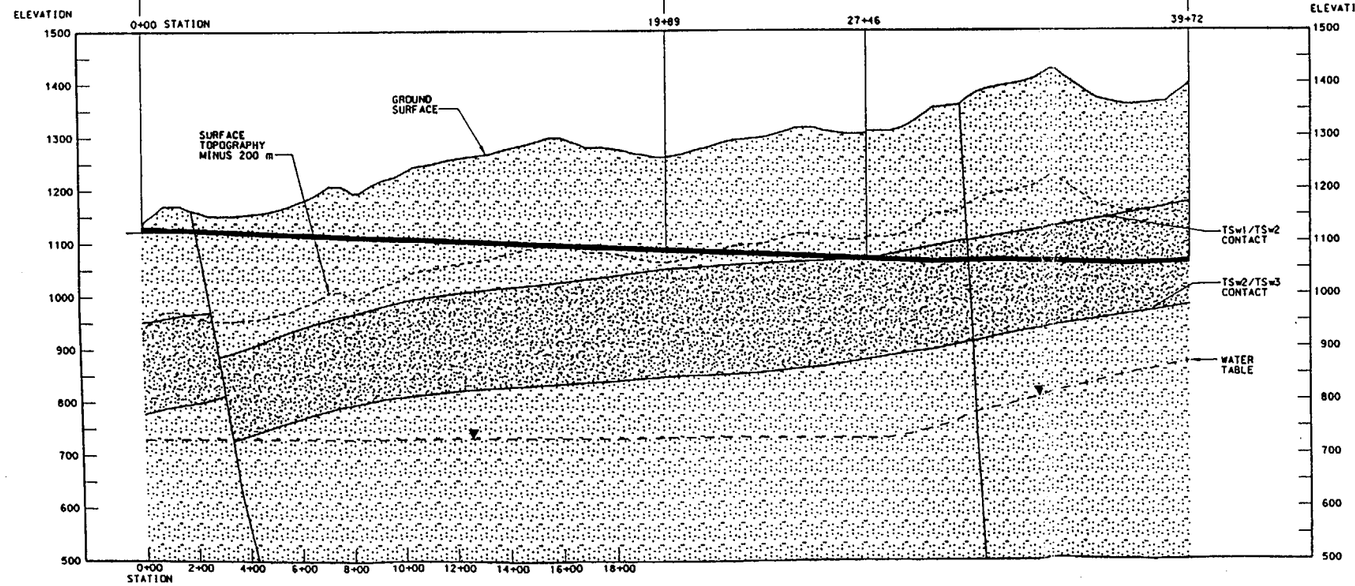


ENLARGED PARTIAL PLAN
SCALE: 1:10000



ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE SK-382)

PLAN
SCALE: 1:20000



SECTION C
SCALE: HORIZ = 1:10000
VERT = 1: 5000

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER

FIGURE 7-10

NOT FOR CONSTRUCTION

THIS DRAWING CONTAINS CONCEPTUAL INFORMATION AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

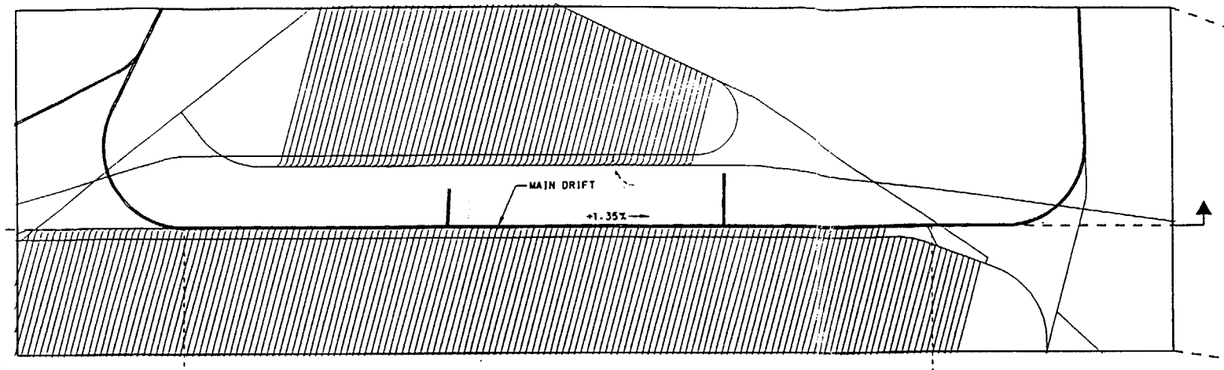
Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

SECTION "C" ALONG NORTH RAMP & EXTENSION
ESF/GROA INTERFACE-4 OF 7

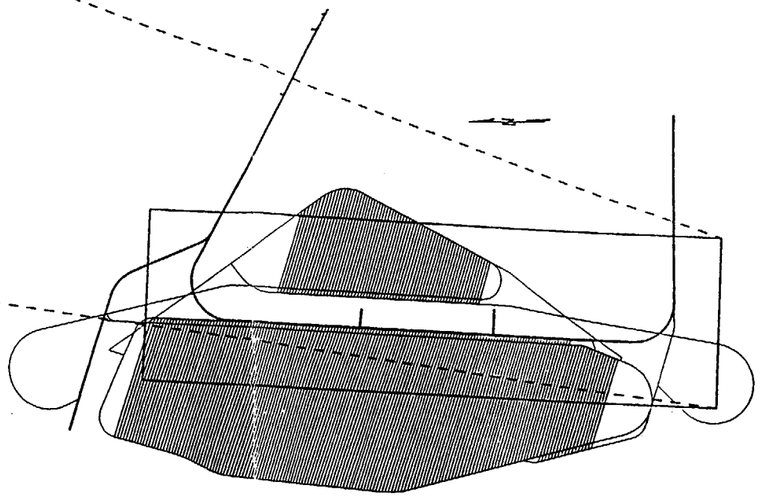
REFERENCE NUMBER		SKETCH NUMBER SK-385	
SCALE NOTED	FOR/FIELD ECR NUMBER	ATTACHMENT NO.	CAD FILE ssrm-sk385.dg

/rep/repss/mine/intfc/ssrm-sk385.dgn 6-SEP-1995 07:58

9511200269-10

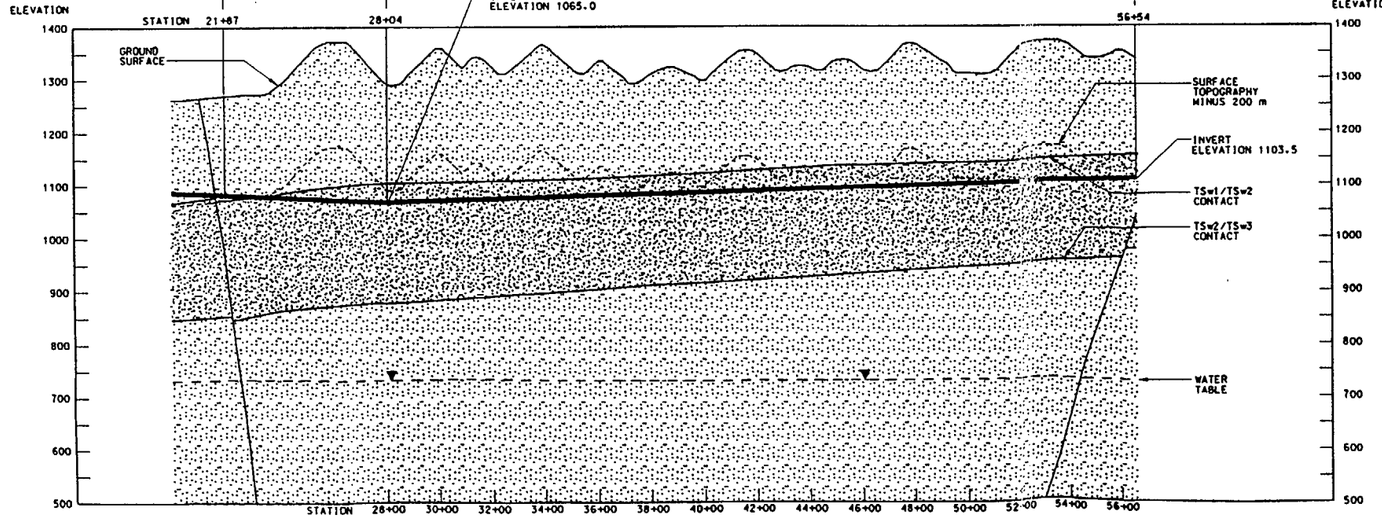


ENLARGED PARTIAL PLAN
SCALE: 1:10000



ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE SK-382)

PLAN
SCALE: 1:20000



SECTION B -
SCALE: HORIZ = 1:10000
VERT = 1: 5000

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

FIGURE 7-11

NOT FOR CONSTRUCTION

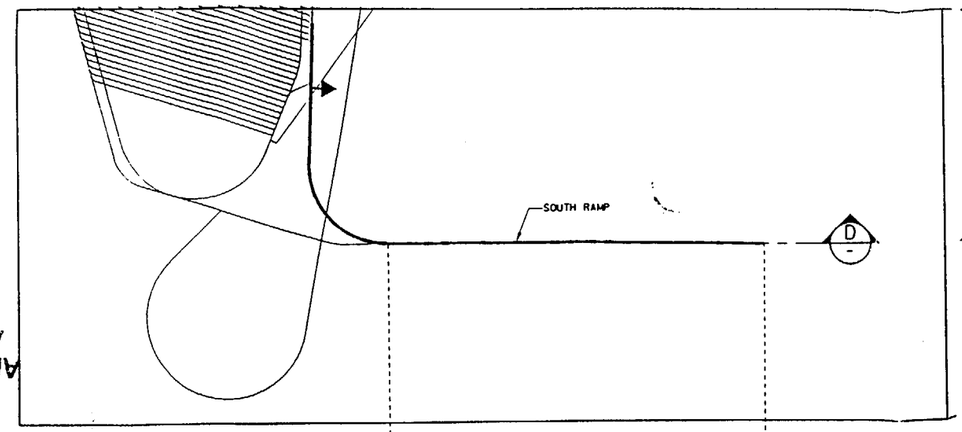
THIS DRAWING CONTAINS CONCEPTUAL INFORMATION, AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

SECTION "B" ALONG TS MAIN DRIFT (REPOS SERV MAIN) ESF/GROA INTERFACE-5 OF 7

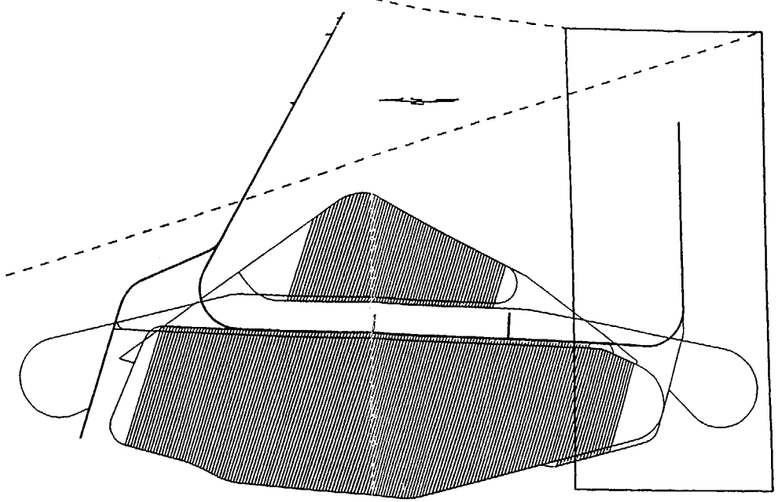
REFERENCE NUMBER
SECTION NUMBER SK-386
SCALE NOTED
FIELD SCR NUMBER
ATTACHMENT NO.
CAD FILE sacrm-sk386.dg

9511200269-11



ENLARGED PARTIAL PLAN

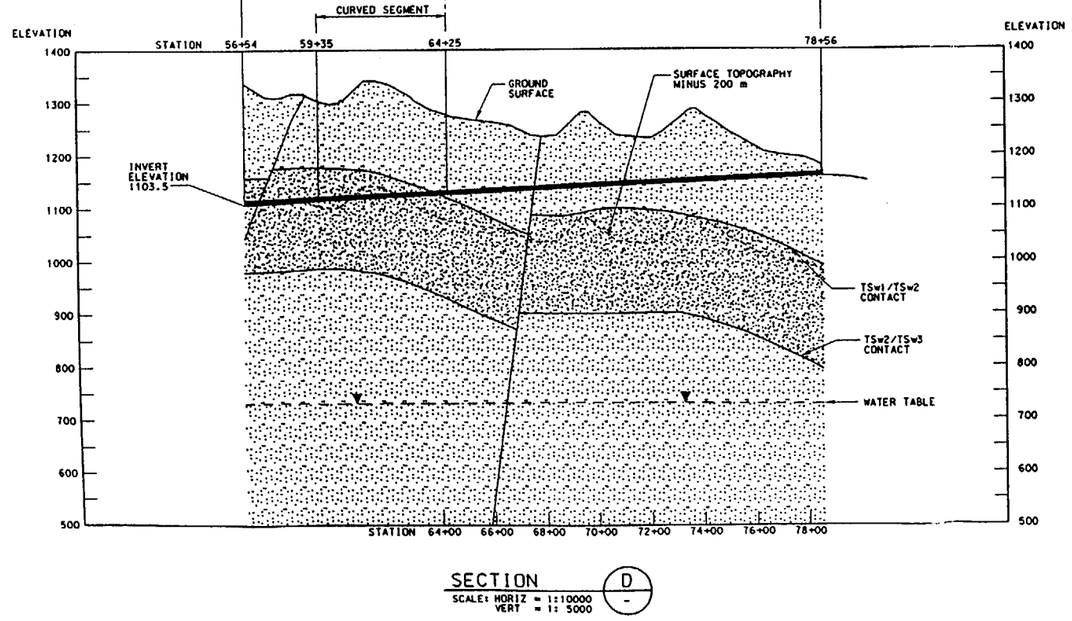
SCALE: 1:10000



ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE SK-3821)

PLAN

SCALE: 1:20000



SECTION D

SCALE: HORIZ = 1:10000
VERT = 1: 5000

Figure 7-12

NOT FOR CONSTRUCTION

THIS DRAWING CONTAINS CONCEPTUAL INFORMATION, AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

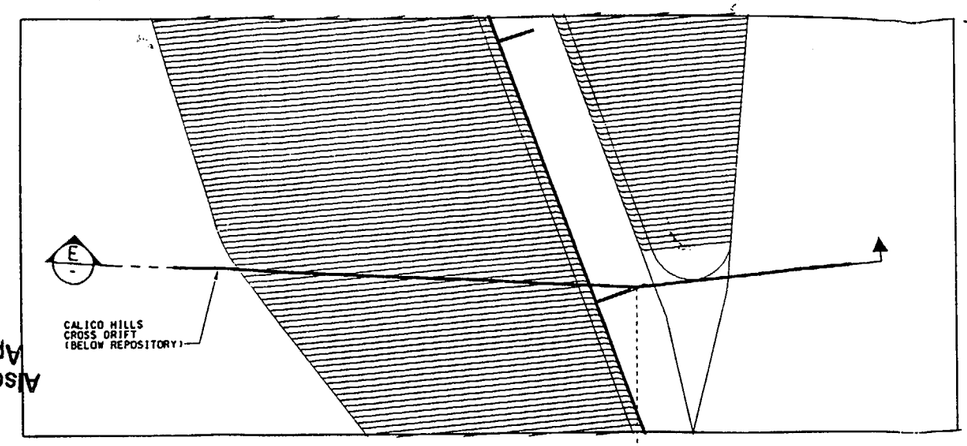
9511200269-12

Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

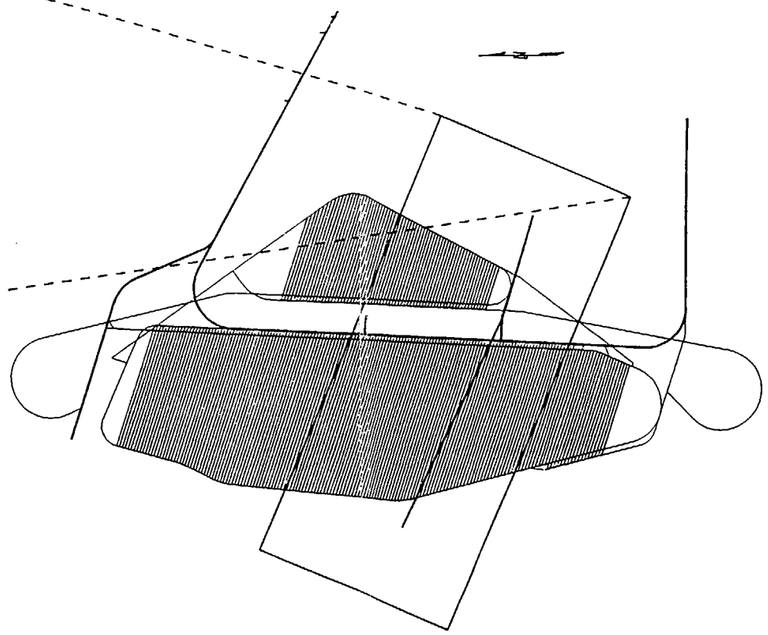
SECTION "D"
ALONG SOUTH RAMP
ESF/GROA INTERFACE-6 OF 7

REFERENCE NUMBER	SKETCH NUMBER
	SK-387
SCALE: NOTED	FOR FIELD ECR NUMBER / ATTACHMENT NO. / CAD FILE: ssrm-sk387.dg

/rep/repss/mine/lntfc/ssrm-sk387.dgn 8-SEP-1995 08:23

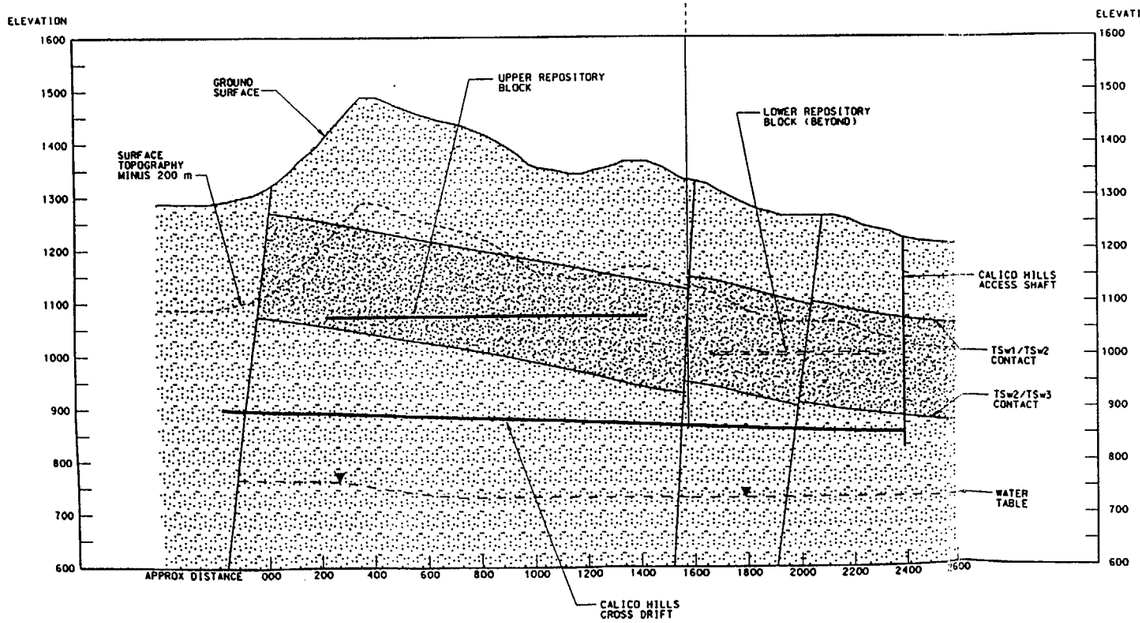


ENLARGED PARTIAL PLAN
SCALE: 1:10000



ESF/REPOSITORY
INTEGRATED CONCEPTUAL LAYOUT
(SEE SK-383)

PLAN
SCALE: 1:20000



SECTION E
SCALE: HORIZ= 1:10000
VERT = 1: 5000

DIMENSIONS, COORDINATES & STATIONS ARE ROUNDED TO NEAREST METER

GRAPHIC SCALE
0 500 m 1000 m
1 : 10000

FIGURE 7-13

NOT FOR CONSTRUCTION

THIS DRAWING CONTAINS CONCEPTUAL INFORMATION, AND IS INTENDED ONLY TO DEPICT THE PHYSICAL RELATIONSHIP OF THE ESF AND GROA LAYOUTS. NO DESIGN OR CONSTRUCTION INFORMATION SHOULD BE TAKEN FROM THIS DRAWING.

Civilian Radioactive Waste Management System
MANAGEMENT & OPERATING CONTRACTOR

SECTION "E" THROUGH CALICO HILLS SHAFT & CROSS DRIFT ESF/GROA INTERFACE-7 OF 7

REFERENCE NUMBER		DRAWING NUMBER SK-388	
SCALE NONE	FOR FIELD ECN NUMBER	ATTACHMENT NO.	CAD FILE ssrm-sk388.dg

9511200269-13

/rep/repss/mine/intfc/ssrm-sk388.dgn 6-SEP-1995 07:53

8. CONCLUSIONS

Conclusions to be drawn from this analysis include:

- The ESF and GROA have been physically integrated in that the ESF configuration fits within, and complements, the GROA layout.

- To the extent that the ESF is a part of the overall site characterization effort, it can be concluded that the requirements of 10 CFR 60.15 (c) (2), (3) and (4) are being met by the proposed ESF / GROA arrangement.

9. ATTACHMENTS

None