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Z-Area Industrial Solid Waste Landfill Vault Cracking (U)

References:
1. Z-Area Saltstone Industrial Solid Waste Landfill Permit #025500-1603

This letter is in response to the Department's inquiry of the cracks that have been found in the Z-Area Industrial Solid Waste Landfill Vaults 1 and 4. Attachment 6 of this letter provides a history and overview of current operations of the Z-Area Industrial Solid Waste Landfill Vaults 1 and 4.

1. Timeline of vault cracking events.

   A time line and summary of the correspondences between the South Carolina Department of Health and Environmental Control (SCDHEC) and the Washington Savannah River Company (WSRC) is included in Attachment #4. As can be seen from Attachment #4 the identification, documentation, and repair of the cracks in the walls of Saltstone Vaults 1 and 4 began in 1988 and continues today. Accordingly, the presence of cracks in the Saltstone Vaults and WSRC actions to appropriately address this issue has been well documented in the past.

2. Assessment of cracks, which includes any previous soil sampling (see answer for question #5 also) and sampling of area around cracks (see answer for question #3 also). This assessment should specifically address the concern of the anonymous letter to the NRDC concerning salt solution leaking from the cracks.

   The general mechanism for water weeping from the cracks in the Saltstone Disposal Facility (SDF) vault walls stems from construction cracks and/or that of the hydrostatic head exerting a force on the vault wall from the accumulation of water in the gap that forms between the saltstone monolith and the vault wall. (See Attachment #1) The hydrostatic head exerted by the accumulated water can be up to 25-feet. The accumulated water is from rainwater intrusion (<1% as a result of leaks from roof penetrations and the roof itself) and bleed/process water (bleed/process water is the water that results from the grout curing process and flush water from cleaning the transfer lines after a grout pour from the Saltstone Production Facility (SPF) wastewater treatment process). The accumulated water is not salt solution from the SPF. It is important to note that the saltstone grout cannot flow through the cracks as it is too viscous and sets up very quickly. The Facility monitors the SDF vault walls in accordance with Facility inspection sheets (roundsheets) on a daily basis during operation and takes appropriate action if wetness is seen from a crack. In the past, radioactive contamination has been detected from the cracks and surrounding soil. The contamination levels have never exceeded any reportable quantity. The appropriate radiological controls postings are in effect to minimize exposure to the workers and protect the environment. Some visual signs of discoloration (calcine deposits and staining due to corrosion of rebar) are seen on the SDF vault walls due to normal concrete weathering.

Vault 1

Vault 1 is 100 feet wide by 600 feet long by 27 feet tall. Vault 1 is divided into two units each 100 by 300 feet, with a 3-inch separation gap between the units. Each unit is further divided into three cells of 100 by 100 feet. A rolling roof was installed on Vault 1 which covered two cells during pouring operations. The walls and slab of the vault are of reinforced concrete construction and are designed for gravity loads plus the hydrostatic pressure associated with the saltstone grout. Three of the cells (A,B,C) have been filled with grout, clean capped, and the permanent roof sealed with ethylene propylene diene monomer (EPDM) elastic sheet roofing.

In 1994 Vault 1, Cell A was filled and the portable roof was moved to cover Cells B and C. A temporary concrete cap was poured on the top of Cell A until such time that a permanent cap was to be installed. Rainwater was trapped in the space between the saltstone monolith and the vault wall during the activities to place the concrete cap on Vault 1, Cell A. The hydrostatic head of the rainwater formed a 25-foot column of water which had sufficient hydrostatic pressure to deflect the Vault 1, Cell A walls outward, which opened a space for additional rainwater infiltration at the roof and vault wall interface. Water was observed weeping through the existing cracks in Vault 1, Cell A and onto the ground. Immediate action was taken to contain the leak and decontaminate the area to background levels. A pipe and drain valve was installed in the vault wall, and the water was drained from Vault 1, Cell A into a tanker to relieve the hydrostatic pressure. The water was sampled and disposed of appropriately. A repair plan was prepared and approved by SCDHEC that required the gap between the vault roof and wall to be filled with foam sealant, installation of flashing over the edge of the vault roof and wall, and application of an EPDM membrane over the entire roof surface. The cracks in the vault wall that existed at the time of the event had been previously repaired with a sealant. Cracks that had developed as a result of the rainwater infiltration were not repaired due to the fact that the polymer sealant that was used was found not to be successful in this application. A polymer sealant was applied to the inside surfaces of the outside vault walls in later vault construction to seal any shrinkage cracks developed during the curing process. The roof repairs were successful and no further leakage from the cracks on Vault 1, Cell A have been observed to date.

Vault 1, Cells B and C were filled with saltstone grout and then capped using the same design as that of Vault 1, Cell A, which required the gap between the vault roof and wall to be filled with foam sealant, installation of flashing over the edge of the vault roof and wall, and applied an EPDM membrane over the entire roof surface. In September of 1998 during the time that the caps were being installed on Vault 1, Cells B and C, two small gaps formed between the vault roof and wall on

Vault 1, Cell B. As was seen in Vault 1, Cell A, rainwater accumulated in the space between the saltstone monolith and the vault wall. The hydrostatic head of the rainwater caused water to weep out the existing cracks. A pipe and drain valve was installed in the vault wall, and the water was drained into a container. The capping of Vault 1 was then completed.

Vault 4

Vault 4 is 200 feet wide by 600 feet long by 27 feet tall. Vault 4 is divided into two units each 200 by 300 feet, with a 3-inch separation gap between the units. Each unit is further divided into six cells of 100 by 100 feet. The walls and slab of the vault are of reinforced concrete construction and are designed for gravity loads plus the hydrostatic pressure associated with the saltstone grout. Vault 4 has a permanent concrete roof which is painted with a dura-cool coating for heat dissipation, not as a waterproof coating.

Vault 4, Cell A contains drums of waste from the Naval Fuels Facility surrounded by concrete. No saltstone was disposed of in this cell. Vault 4, Cell G is nearly full and Vault 4, Cells C and I are approximately half full of saltstone. No clean grout cap has been poured on Vault 4, Cells G, C and I.

In April of 1998, cracks formed in the gap between the vault roof and wall which allowed rainwater infiltration into Vault 4, Cell A. The hydrostatic head of the rainwater forced water to weep out the existing cracks in the Vault 4, Cell A wall. A pipe and drain valve was installed in the vault wall as was done in Vault 1 to allow the water to be drained. The water was screened for radioactivity and found not to be contaminated (< 3 dpm/ml alpha and < 16 dpm/ml beta-gamma). No contamination has ever been found in the accumulated water due to the fact that Vault 4, Cell A contains drums of waste from the Naval Fuels Facility encapsulated in clean concrete. A repair plan was prepared and approved by the SCDHEC that required the gap between the vault roof and wall to be filled with foam sealant and for flashing to be installed over the edge of the vault roof. The repair plan has been completed. A small amount of rainwater infiltration is still observed, to date, in Vault 4, Cell A, as observed by weeping from the vault wall cracks. Efforts are currently underway to continue to correct the rainwater infiltration. SCDHEC will continue to be advised of efforts to correct the rainwater infiltration into Vault 4, Cell A.

In April of 1997 weeping was detected from cracks in Vault 4, Cell G. It is believed that water had accumulated as a result of rainwater that was in the cell prior to placement of the permanent concrete roof. Surveys of the water that leaked out were found to have a detectable level of contamination. A pipe and drain valve was installed on Vault 4, Cell G to allow draining of the water to a container. The accumulated water was drained and returned to the SPF. Vault 4, Cell G has no active cracks at this time. The area adjacent to Cell G is radiologically posted as an Inactive Contamination Area (ICA) due to previous operations and detection of contamination. (ICAs are areas that are not routinely entered. The ICAs are not routinely surveyed, but are surveyed upon entry.) Plans are underway to survey inside the ICA adjacent to Vault 4, Cell G to determine current radioactive contamination and radiation levels.

Vault 4, Cells C and I have no active cracks at this time. The areas adjacent to Cells C and I is posted as an ICA due to previous operations and detection of contamination. The latest survey of Vault 4, Cell C, January 2003, showed transferable contamination of 1752 dpm/100cm^2 beta-gamma, < 20 dpm/100 cm^2 alpha and fixed contamination of 200,000 dpm beta-gamma on the Vault 4, Cell C wall inside the ICA boundary. The latest survey of Vault 4, Cell I, May 2003, showed transferable contamination of 252 dpm/100cm^2 beta-gamma, < 20 dpm/100 cm^2 alpha and fixed contamination of 25,000 dpm beta-gamma on the Vault 4, Cell I wall, inside the ICA boundary. Periodic surveys are taken around the ICAs to confirm no spread of contamination outside the posted area. Recent surveys outside the ICAs have found no spread of contamination. (See Attachment #5) Plans are underway to survey inside the ICAs adjacent to Vault 4, Cells C & I to determine current radioactive contamination and radiation levels.

3. Diagram of vaults and soil contamination areas.

A diagram of Saltstone Vaults 1 and 4 is included in Attachment #5. Attachment #5 shows the cells which are full or partially full with grout and the empty cells.

Vault 1
As is shown in Attachment #5 the areas adjacent to Vault 1, Cells A, B, and C are posted as ICAs due to past operations. Periodic surveys are taken around the ICAs to confirm that there is no spread of contamination outside the posted area. Recent surveys outside the ICAs have found no spread of contamination. Plans are underway to survey inside the ICAs adjacent to Vault 1 to determine current radioactive contamination and radiation levels.

Vault 4
The area adjacent to Vault 4, Cell G is posted as an ICA. Periodic surveys are taken around the ICA to confirm no spread of contamination outside the posted area. Recent surveys outside the ICA have found no spread of contamination. (See Attachment #5) Plans are underway to survey inside the ICA adjacent to Vault 4, Cell G to determine current radioactive contamination and radiation levels.

The areas adjacent to Cells C and I are posted as ICAs due to previous operations and detection of contamination. Recent surveys outside the ICAs have found no spread of contamination. (See Attachment #5) Plans are underway to survey inside the ICAs adjacent to Vault 4, Cells C & I to determine current radioactive contamination and radiation levels.

The Saltstone Facility is currently evaluating the requirements to remove the ICA postings from the areas adjacent to Vault 1, Cells A, B, C and Vault 4, Cells C, I, and G. Removal of the ICA postings would most likely entail some soil sampling, excavation, and removal of the soil and gravel in those areas. Extensive radioactive contamination and radiation surveys would also be required along with In-Situ Object Counting System (ISOCS) measurements.

4. Lab results of water drained from vault cells and returned to the system.

Water drained from Vault 4, Cell A is/has been found not to be contaminated (< 3 dpm/ml alpha and < 16 dpm/ml beta-gamma). No contamination has ever been found in the accumulated water due to the fact that Vault 4, Cell A contains drums of waste from the Naval Fuels Facility encapsulated in clean concrete.

Water drained from Vault 4, Cell G was returned to the SPF process without sampling.

5. Records of contaminated soil being removed from area adjacent to vaults.

   In December of 2003, the soil/gravel adjacent to Vault 1, Cells A, B, and C within the ICAs was sampled. Of the sixty-four soil samples collected and counted, eighteen indicated contamination greater than Soil Contamination Area limits of 100 pCi/g beta-gamma and 250 pCi/g alpha (or the sum of fractions greater than one requirement). Note: The Soil Contamination Area limits have been increased to 150 pCi/g beta-gamma and 1,000 pCi/g alpha. Future soil sample results will be evaluated according to this limitation.

   In August 2004 ISOCS (gamma spectroscopic) soil measurements were performed adjacent to Vault 1. Measurements were taken outside the ICAs as a follow-up to the dismantlement of the Vault 1 rolling roof. Twelve measurements were made covering 768 square meters (approx. 8,300 sq. ft.). The results detected no SRS radionuclides (i.e., all background).

   In May of 2004 contamination was found in the drainage ditch adjacent to Vault 4, Cell G. The area was roped off, posted as a Contamination Area, and sampled. For the seventy samples analyzed, the average gross alpha activity was 51.5 pCi/g and the gross beta-gamma activity was 35.8 pCi/g. The vast majority of the samples showed activity less than minimum detectable activity (MDA). The contaminated soil was removed and disposed of accordingly, up to the Vault 4, Cell G wall. An ISOCS measurement of the remediated area shows a level of Cesium-137 slightly above SRS background soils, but well below the posting levels for a Soil Contamination Area.

   The Saltstone Facility is currently evaluating the requirements to remove the ICA postings from the areas adjacent to Vault 1, Cells A, B, C and Vault 4, Cells C, I, and G. Removal of the ICA postings would most likely entail some soil sampling, excavation, and removal of the soil and gravel in those areas. Extensive radioactive contamination and radiation surveys would also be required along with ISOCS measurements.

6. Explanation concerning regrouting of cracks in the past.

   Vault 1 has a history of cracks from construction and operational events dating back to 1988. Many of the cracks, as result of the construction process, were sealed on the outside of the vault wall with a polymer sealant. The polymer sealant did not perform as expected so its use was discontinued. Future vault construction of Vaults 1 and 4 included a polymer coating on the inside of the outside walls to seal construction cracks.

7. Explanation of how new design prevents cracks in the future, including pilot testing of sheet drain system.

   In order to prevent weeping from vault cracks in the future the Vault Water Collection System has been installed in Vault 4 Cells B, D, E, F, H, J, K, and L. (See Attachments # 1, 2 and 3) This system is used for the collection and pumping of the excess liquid such as rainwater intrusion and bleed/process water from the Vault 4 cells back to the Salt Feed Tank in the SPF. A geotextile fabric membrane with an impervious backing is attached to the vault walls. Free liquid passes through the fabric where it is captured in the gap between the fabric and the backing. The water drains into a

PVC pipe system around the base perimeter of each vault cell. A drain line is connected to the PVC pipe through the Vault 4 wall which allows periodic draining of the liquid. The drain lines on each side of the vault are connected to a common header which is connected to a pump to transfer the excess water back to the Salt Feed Tank in the SPF. The interior surfaces of the outside walls are also coated with a waterproof coating up to a height of five feet, due to the fact that the vault walls are designed for gravity loads plus the hydrostatic pressure associated with the saltstone grout.

Extensive pilot testing of the Vault Water Collection System materials was conducted by the Savannah River National Laboratory to ensure that the System is adequate to remove the excess liquid from the vault cells. The test concluded that the Vault Water Collection System is adequately sized and will perform to remove excess liquid from the vault cells.

In addition to the pilot testing, during start-up testing of the Saltstone Facility, clean grout was added to one of the Vault 4 cells. The Vault Water Collection System was shown to operate as designed. Bleed and process water was collected in the pipe system around the base of the vault and pumped back to the Salt Feed Tank in the SPF.

If any additional information is required, please contact Keith Liner at (803) 208-6466.

Yours very truly,

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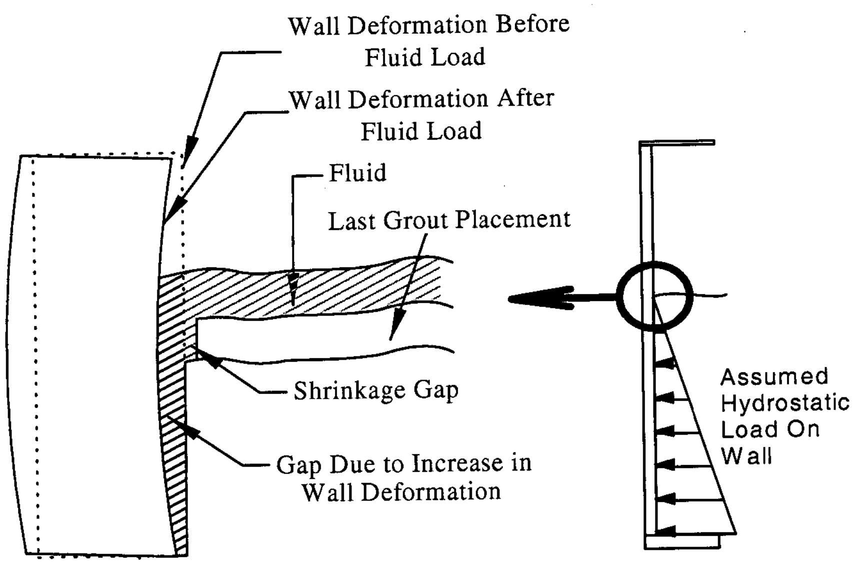
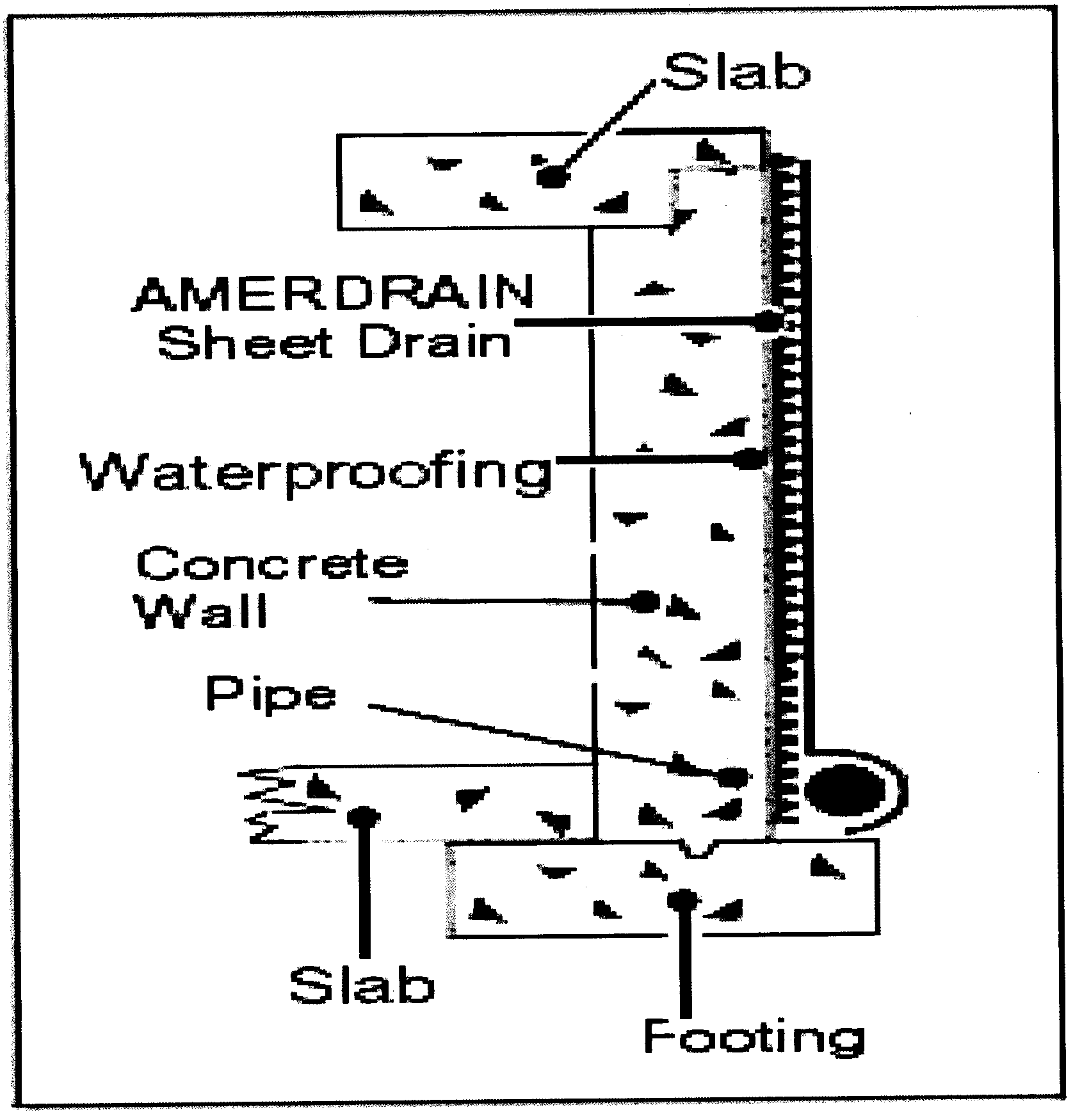
File Info:

SCDHEC, Saltstone
10666, DOE/ADM
16-1.5(a) Permanent

Attachment #1
Vault Cracking Mechanism



Attachment 2
Vault Water Collection System



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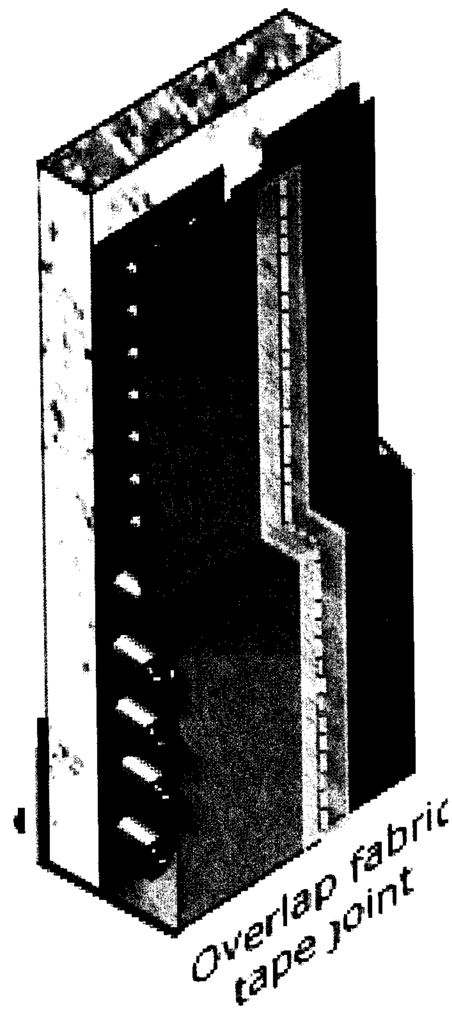
Vault Water Collection System



Attachment 4
Timeline of Vault 1 and 4 Documents Concerning Cracks

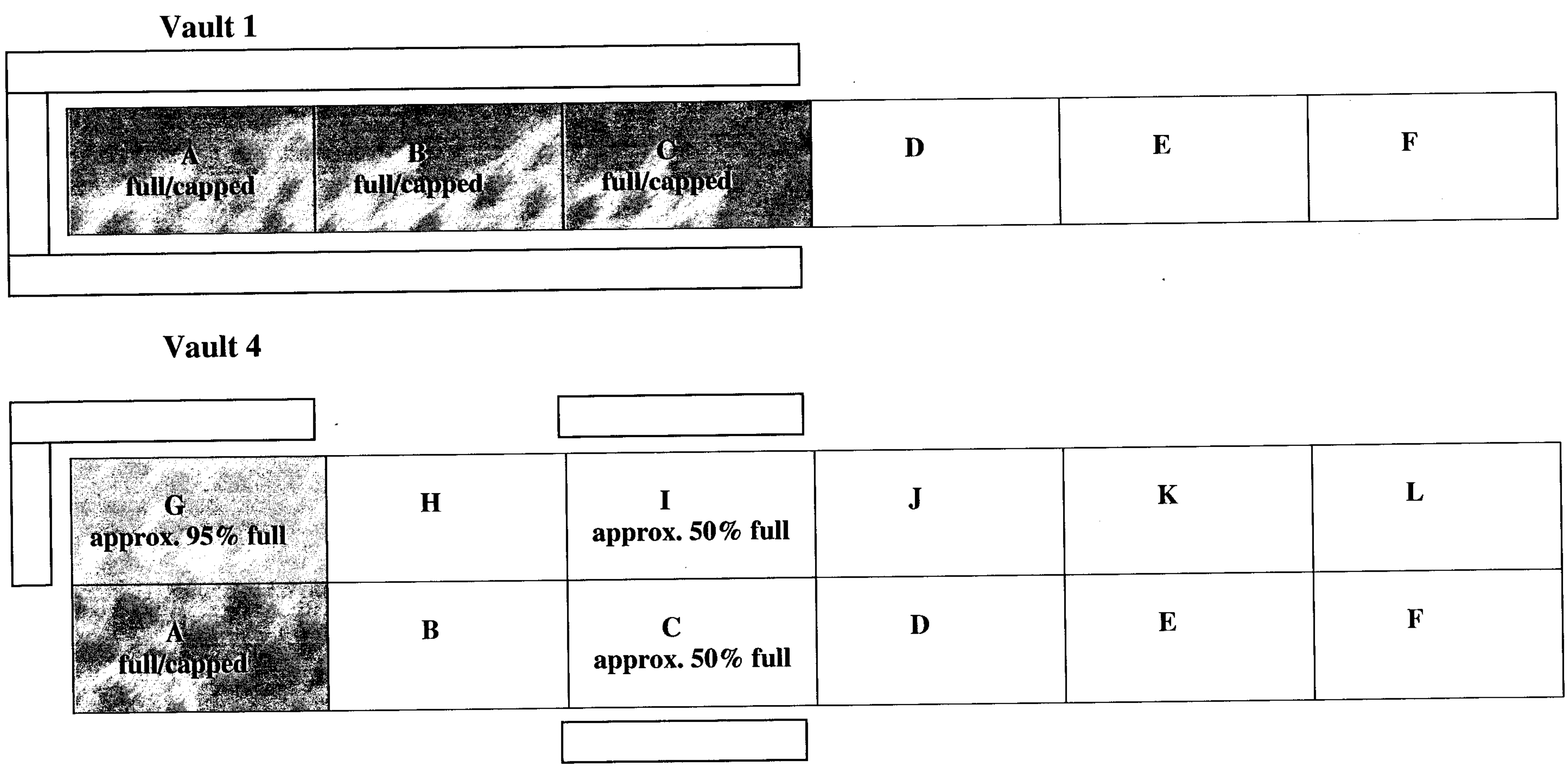
Letter Date	Document Title	Document Number	Document Summary
9/28/88	Treatment of Cracks in Savannah River Plant (SRP) Z-Area Saltstone Vault Walls	None	Initial notification of cracks in Vault. The cracks do not impact the structure integrity of the Vault. A polymer sealant will be installed on the inside surfaces of the outside walls to seal the cracks.
7/16/93	Permit Modification for the Z-Area Disposal Vaults, IWP-217	ESH-FSS-93-0486	Permit modification submitted for construction of Vault 4 which includes a permanent concrete roof and synthetic barrier. The synthetic barrier is intended to fill existing cracks and minimize new cracks in the vault.
6/30/94	Follow-up to Meeting Regarding Z-Area Disposal Vaults	ESH-FSS-94-0407	Notification of water seeping from cracks in Vault 1, Cell A after the portable roof was moved. Rainwater was trapped in space between saltstone monolith and vault wall during placement of temporary cap. The hydrostatic head of the trapped rainwater forced the rainwater out cracks in Vault 1, Cell A. Holes drilled in Vault 1, Cell A to remove water. Contaminates removed to background levels, no adverse impact to the environment.
7/26/94	Design Proposal for Sealing Gap At Z-Area Saltstone Vault One, Cell A	ESH-FSS-94-0455	Design proposal for sealing gap at roof line of Vault 1, Cell A. Includes installation of grout, caulking, an elastic membrane and flashing.

Letter Date	Document Title	Document Number	Document Summary
8/29/94	Proposed Repair Plan for the Z-Area Saltstone Vault 1, Cell A	ESH-FSS-94-0518	Repair plan for Vault 1, Cell A. Includes installation of grout, caulking, an elastic membrane and flashing.
9/9/94	Approval of Repair Plan for Z-Area Saltstone Vault One, Cell A	ESH-FSS-94-0555	SCDHEC approval of Vault 1, Cell A repair plan.
10/11/94	Information Requested by SCDHEC Regarding the Z-Area Saltstonc Facility (IWP-217)	ESH-FSS-94-0612	Submittal includes: Plan view of Vault 1, Cell A, Drawing of cracks in Vault 1, Vault survey, Sample analysis, Evaluation of saltstone dimensional changes during underwater exposure, Proposed Groundwater Monitoring Plan.
2/28/95	Submittal of Plans for Capping the Remainder of Vault 1	ESH-FSS-95-0130	Capping Plan for Vault 1, Cells B and C. Includes installation of grout, caulking, an elastic membrane and flashing.
4/27/95	Submittal of Plans for Capping the Remainder of Vault One, Z-Area Saltstone Facility (IWP-217)	ESH-FSS-95-0248	Three addition sets of Capping Plan for Vault 1, Cells B and C submitted on 2/28/95.
4/12/98	Repair Plan for Z-Area Saltstone Vault 4, Cell A	ESH-FSS-98-0095	Repair Plan for sealing gap in roofline of Vault 4, Cell A. The gap was caused by rainwater infiltration. Rainwater leaked out existing cracks in the vault walls. Vault 4, Cell A contains drums of waste from the Naval Fuels Facility surrounded by clean concrete. No contamination to the surrounding area was detected.

Letter Date	Document Title	Document Number	Document Summary
9/15/98	Repair Plan for the Z-Area Saltstone Vault 1, Cell B	ESH-FSS-98-0286	Repair Plan for Vault 1, Cell B. Rainwater infiltration from cracks in the vault roof. Rainwater was removed by drilling holes into vault wall and draining into containers. Repairs top roof were made in same manner as that of Vault 1, Cell A
1/18/99	Repairs to the Z-Area Saltstone Disposal Facility Complete	ESH-FSS-99-0013	Letter of completion of repairs to Vault 4, Cell A and Vault 1, Cell B.
4/30/03	Saltstone Vault Sheet Drain Installation	CBU-ENG-2003-00103	Letter describing the sheet drain installation into Vault 4. The sheet drain is designed to allow the bleed and process water that remains from grout pouring operations to be carried away from the vault walls into a pipe installed on the vault floor. The accumulated water is then pumped out to a carboy and returned to the system.
5/14/03	SCDHEC	None	Letter from SCDHEC acknowledging sheet drain installation.
10/26/04	Saltstone Vault Sheet Drain	CBU-ENG-2004-00258	Letter describing a change to the vault sheet drain system. The system is being enhanced to include a pump and piping necessary to pump out the accumulated water to the Saltstone Processing Facility due to increased levels of radioactivity in the bleed and process water.

Attachment 5
Vault 1 and 4 Diagram

Inactive Contamination Area



Attachment 6
Savannah River Site
Saltstone Disposal Facility
Vaults 1 and 4 Overview

LWO-CES-2006-00010
Revision 0
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Savannah River Site Saltstone Disposal Facility Vaults 1 and 4 Overview

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1.0 INTRODUCTION

The Savannah River Site Z-Area Saltstone Facility (see Attachment 6.1) processes and disposes of low-level radioactive salt solution from the Liquid Waste facilities (i.e., tank farms). The facility immobilizes low-level radioactive salt solution by mixing it with a dry material mixture of flyash, slag, and cement to produce a non-hazardous grout in the Saltstone Production Facility. Subsequently, this grout is pumped into large concrete vaults (Saltstone Disposal Facility) where it hardens to form the final saltstone wasteform.

Although the vaults are currently above-grade, after they are filled with grout they will be covered with a permanent engineered cap as part of a final closure system. The final closure system (cap, erosion control, drainage system, concrete vaults, saltstone) will minimize rainwater intrusion for thousands of years. Extensive mathematical modeling of the system shows that the use of this technology for waste disposal poses no threat to the public or environment. The modeling addresses the expected gradual degradation of the vaults and the saltstone wasteform and shows that radiological and chemical releases will not exceed regulatory limits for any exposure pathway.

2.0 HISTORY

The Saltstone Disposal Facility is composed of two above-grade vaults, Vault 1 and Vault 4, built between 1986 and 1988. Vault 1 is rectangular (600 feet x 100 feet) and contains six 100 feet x 100 feet cells. (Attachment 6.2) The walls (18 inches thick) and slab (24 inches thick) of the vault are of reinforced concrete construction and are designed for gravity loads plus the hydrostatic pressure associated with the saltstone grout. Vault 1 was designed with a rolling, sheet metal roof that covered two cells at a time.

Similarly, Vault 4 is rectangular (600 feet x 200 feet), but contains twelve 100 feet x 100 feet cells. (Attachment 6.2) Like Vault 1, the walls (18 inches thick) and slab (24 inches thick) of the vault are of reinforced concrete construction and are designed for gravity loads plus the hydrostatic pressure associated with the saltstone grout. Vault 4 has a permanent concrete roof (a minimum of 4 inches thick) which is painted with a dura-cool coating to help heat dissipation.

Saltstone operations began in 1990 with grout disposition into Vault 1. The northern three cells of Vault 1 have been filled with grout and covered with a clean grout cap. The southern three cells of Vault 1 remain empty. Three of the twelve Vault 4 cells are partially filled with saltstone grout and one cell is filled with drums of solidified non-hazardous waste with low levels of uranium which have been encased in clean concrete. Preparations are underway to resume operations and grout disposal into the remaining cells in Vault 4.

Saltstone operations have been successful in producing and disposing of saltstone grout in accordance with design requirements. However, minor cracks have been observed in some of the vault walls. Some of the cracks are attributable to vault construction in Vault 1. Another phenomenon that can initiate cracks stems from the fact that grout shrinks slightly as it solidifies.

Therefore, a tiny gap can form between the grout and the vault wall. Bleed/process water resulting from the grout curing process, flush water used to clean portions of the transfer lines after grout runs, condensation from temperature changes, along with small amounts of rainwater intrusion can then fill the gap. The water column can create enough hydrostatic pressure to cause small cracks through which the condensate and rainwater can slowly weep. (Attachment 6.3)

Vault 1 experienced cracks from construction and operational events dating back to 1988. Many of the cracks were sealed on the outside. Subsequent vault construction included a coating on the inside of the walls to seal construction cracks. The original rolling roof has been removed and the north three cells have been filled and capped in Vault 1. Condensate and rainwater that accumulated in vault cells has been drained and dispositioned. Soil in areas where leakage occurred has been isolated and partially remediated.

Vault 4 was modified with a permanent roof prior to introduction of grout to provide operational flexibility (allows more than two partially filled cells at any time) and eliminate rainwater intrusion. The roof joints, however, allowed small amounts of rainwater to enter the vault cells and condensation associated with operation continued to occur. This resulted in wall cracking similar to that experienced in Vault 1. Therefore, joint sealing and cell draining was instituted to remediate the liquid accumulation.

The eight unused cells in Vault 4 have been modified with a drainage system designed to relieve the hydrostatic pressure on the vault walls. This sheet drain system will collect any liquid that may appear between the solidified grout and the vault wall. Collected liquid will be returned through pipes to the Saltstone Production Facility and used in the production of grout.

Installation of the permanent roofs and drainage system has successfully resolved crack concerns for the cells that contain saltstone. The vaults are inspected daily and, to-date, no new cracks have appeared. These routine inspections will continue until the vaults are capped and backfilled. Rainwater intrusion and condensation are limited to the period of time when the vaults are being filled. The final closure will minimize the infiltration of water for thousands of years.

Regarding previous leakage from existing vault concrete cracks, none of the leakage from the vault walls has resulted in any reportable quantities of radioactive materials or hazardous chemicals. In addition, wells near the edge of the disposal site are used to monitor groundwater to ensure that it meets the applicable standards and no groundwater contamination resulting from these cracks has ever been detected. The past vault cracks, and the corrective actions, have been communicated to SCDHEC since their initial discovery. Finally, no issues related to past vault concrete cracks were identified by the recent Nuclear Regulatory Commission evaluation of the long term performance of the Saltstone Disposal Facility.

3.0 CURRENT OPERATIONS

The Saltstone Facility is currently in the regulatory process of a proposed permit modification to dispose of a higher activity salt solution. Operations are planned to resume in the latter part of 2006.

During operation, the interior of the vault cell being filled is monitored remotely by camera. In addition, inspections are performed daily to verify the condition of the vault exterior. This ensures that any change in the appearance of existing cracks or the development of new cracks is noted and addressed in a timely manner.

SCDHEC shall be notified should the inspections show the propagation of existing cracks, development of new cracks, or bowing of the vault walls.

4.0 CLOSURE

After an individual vault is filled with saltstone, the space between the saltstone and the roof will be filled with clean grout. Once all vaults are filled, an engineered closure cap will be constructed over all of the vaults, a drainage system will be installed, and the site will be re-vegetated. This will be followed by a 100-year period of institutional control over the closed site. This final closure system (cap, erosion control, drainage system, concrete vaults, saltstone) will minimize rainwater intrusion for thousands of years.

Extensive mathematical modeling of the system shows that the use of this technology for waste disposal poses no threat to the public or environment. The modeling addresses the expected gradual degradation of the vaults and the saltstone wasteform and shows that radiological and chemical releases will not exceed regulatory limits for any pathway.

5.0 REFERENCES

WSRC-TR-2006-0058, Saltstone Sheet Drain Performance Results, Revision 0, April 2006.

WSRC-RP-2005-4500, Results of ISOC Characterization of Z-Area Vault 4 Trench Soil and Rocks, January 2005.

WSP-SSF-2004-00025, Saltstone Low Level Waste Characterization Report, Revision 1, June 2004.

Z-Area Saltstone Industrial Solid Waste Landfill Permit #025500-1603, May 1996.

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DOE-WD-2005-001, Draft Section 3116 Determination Salt Waste Disposal Savannah River Site, U. S. Department of Energy, February 2005.

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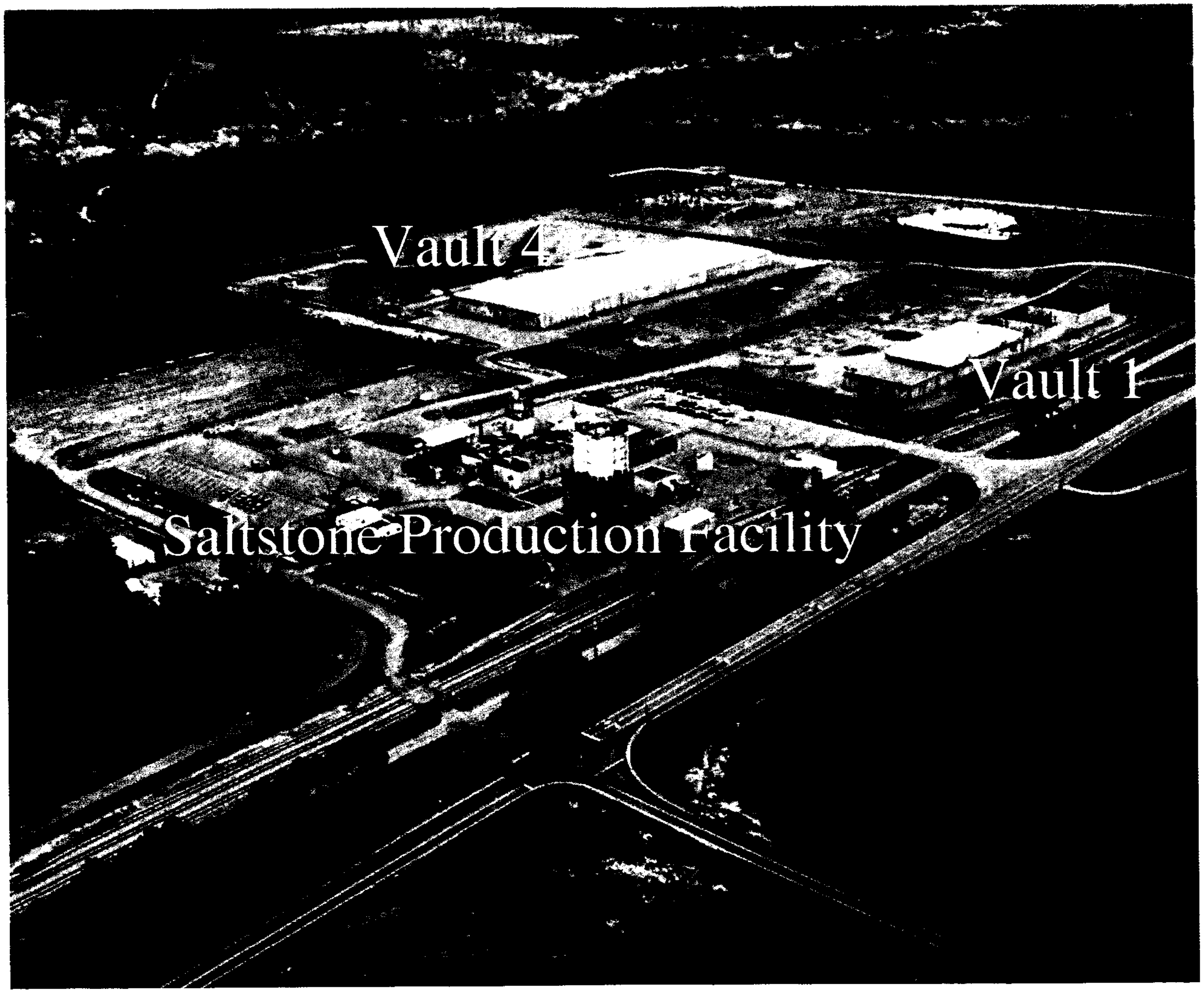
6.0 ATTACHMENTS

6.1 Saltstone Facility After Installation of Permanent Roof to Eliminate Rainwater Intrusion

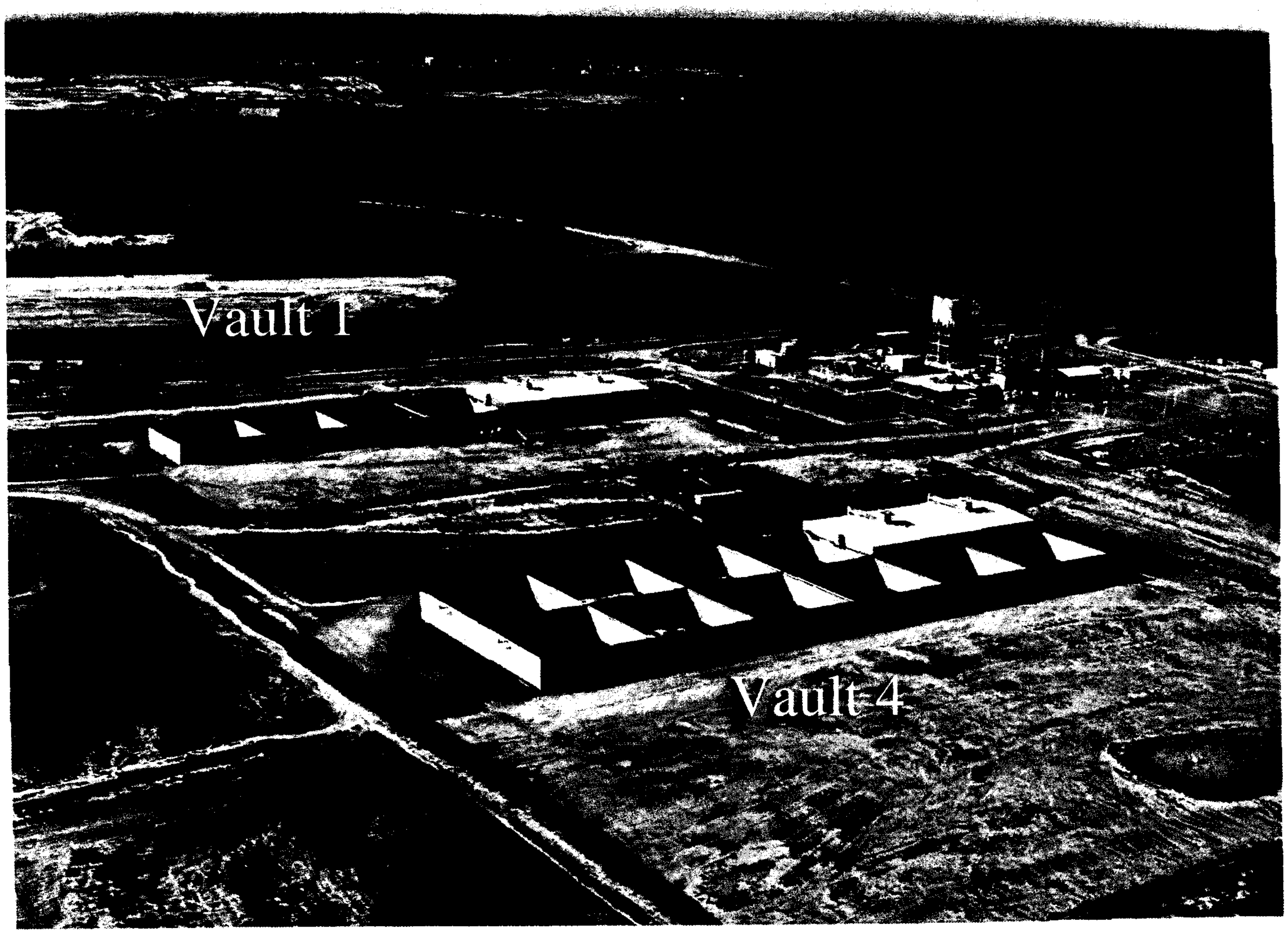
6.2 Saltstone Facility Showing Vaults 1 and 4 Cell Arrangement After Initial Construction

6.3 Vault Cracking Mechanism

Attachment 6.1
Saltstone Facility After Installation of Permanent Roof to Eliminate Rainwater Intrusion



Attachment 6.2
Saltstone Facility Showing Vaults 1 and 4 Cell Arrangement After Initial Construction



Attachment 6.3
Vault Cracking Mechanism