Copy

KERR-McGEE CHEMICAL CORPORATION

HENDERSON, NEVADA FACILITY

HAZARDOUS WASTE CLOSURE/POST-CLOSURE PLAN (SURFACE IMPOUNDMENTS)

Revision 1 - September 28, 1984

I. Background

A revised Part A "Application for a Hazardous Waste Permit" for Kerr-McGee Chemical Corporation's (KMCC) Henderson, Nevada facility was submitted on July 14, 1982, to the U. S. Environmental Protection Agency (EPA), Region IX, with a copy to the Nevada Division of Environmental Protection (NDEP).

This application identified three hazardous wastes generated at the facility, together with the TSD Hazardous Waste Management facilities. These were reported as follows:

1. Liquid waste containing chromium from manufacturing potassium perchlorate which was stored in two lined surface impoundments, designated P-1 and S-1.

2. Filter cake mud containing chromium from the sodium chlorate production process which was disposed of in a hazardous waste landfill located onsite.

3. Waste solvents stored in one 55-gallon steel drum.

In September of 1982, KMCC permanently terminated potassium perchlorate production. As described below in the closure plans for ponds S-1 and P-1, the potassium perchlorate operation was completely cleaned and the equipment transferred to other uses. All hazardous materials, including the liner, were removed from pond S-1 and placed in the onsite hazardous waste landfill prior to January 25, 1983. Neither the landfill nor pond P-1 received hazardous waste after January 25, 1983.

At this time, KMCC desires to close the two surface impoundments and the hazardous waste landfill under interim status standards. The generator identification number will be retained to allow offsite shipment of hazardous waste to permitted disposal facilities. The closure/post-closure plans for the two surface

impoundments are described below. The closure/post-closure plan for the landfill was submitted on June 13, 1984.

As a result of its review of the KMCC Plan dated April 5, 1984, NDEP advised KMCC by letter dated August 17, 1984, of certain deficiencies in the Plan and requested KMCC to make appropriate revisions to the closure portions.

This revision to the April 5 Plan addresses the concerns identified by the NDEP and, more accurately, reflects NDEP's closure requirements. The following revisions are made:

A. Procedures are described for cleaning up S-1, P-1, and all affected areas to a level below that specified for total chromium in 40 CFR, Part 261.24, which is 5 ppm.

B. KMCC will not establish background levels of chromium or use statistical comparisons, such as the students' t-test, to determine cleanup of contaminated areas.

C. Chromium in soil samples from the impoundments and affected areas will be analyzed by Desert Research Institute (DRI) in accordance with the procedures given in 40 CFR 261.

D. Procedures are given for verifying that all affected areas were properly cleaned.

E. A new section is added to the Plan that identifies the source of chromium contamination.

II. Closure/Post-Closure Plan for Surface Impoundment S-1

1. History

Pond S-1 was constructed in October of 1974. It was excavated in the native soil and the liner was installed by Hydraulic Materials, a company which specialized in installing liners for surface impoundments. The excavation was smoothed and the bottom was sealed with 20-mil PVC. The east berm was covered with 30-mil laminated-reinforced CPE, and the other three side berms were covered with 30-mil plain CPE. The sides were covered with CPE because of its greater resistance to sunlight. Pond S-1 had an approximate surface area of 47,500 $ft.^2$ and an approximate total volume of 270,000 $ft.^3$. Cleanup and closure of S-1, described below, were completed before January 25, 1983.

2. Maximum Inventory

The maximum hazardous waste inventory that could have been stored in S-1, allowing 2' freeboard, was approximately 1,700,000 gallons. The liquid waste had a total chromium concentration above 5 ppm which made it hazardous by definition. Salts, such as potassium chloride, crystallized on the bottom and sides below the water level as the solution became saturated as the result of solar evaporation. These crystals contained less than 5 ppm chromium when subjected to the "EP Toxicity" test, as shown in the attached data regarding the solid phase of pond P-1. The chromium remained mostly in the liquid phase.

3. Removal of Contents from S-1

Soon after potassium perchlorate production was terminated in 1982, S-1 was removed from service. Some liquid was allowed to solar evaporate, but no additional equipment was used to increase evaporation. The remaining free liquid was transferred by pumps and heavy-duty hose lines to pond P-1. The dewatered solids (containing about 10 percent moisture) and the bottom and side liners were removed with a clamshell and paddle scraper. These bulk materials were handled as hazardous wastes and transported to the hazardous waste landfill onsite. Also, the two feet of soil under the liner, as well as any contaminated soil resulting from closure, was removed and placed in the landfill.

By letter dated August 17, 1984, the NDEP notified KMCC that for closure of a surface impoundment all areas affected by S-1 and P-1 must be cleaned to a level below that specified for chromium in 40 CFR 261.24, which is 5 ppm. Kerr-McGee has complied with this criteria in cleaning up S-1 and/or cleaning P-1 to the same level.

In the fall of 1982, KMCC cleaned pond S-1 by removing residual solids together with the bottom and side liners using a clamshell and paddle scraper. All these materials were buried in the hazardous waste landfill onsite before January 25, 1983. Two feet of soil from beneath the liner were also removed and placed in the landfill prior to January 25, 1983.

After the above work was completed, KMCC verified that all hazardous waste constituents were removed from the S-1 pond area by the following sampling and analysis procedures:

KERR-McGEE 9/89
CLOSED SURFACE IMPOUND.
looking west

KERR McGEE 9/89
CLOSED SURFACE IMPOUNDMENTS
looking west

KERR McGEE 9/89
GW INTERCEPT SYSTEM
looking east

KERR McGEE 9/89.
HW LANDFILL - looking south

A. Six soil corings to a depth of four feet were taken from the pond site at locations shown on the S-1 sketch map, Figure 1.

B. Three soil corings to a depth of three feet were taken from outlying areas away from the pond to identify any possible contamination.

C. A composite sample of each coring made up of equal portions of each foot was prepared for analysis.

D. Four additional samples were taken in August, 1984, at four locations from the cleaned bottom of pond S-1 and analyzed by the procedures given in 40 CFR 261.24 by DRI.

E. Samples of surface and core soil previously collected in March, 1984, were preserved by DRI and reanalyzed by proper procedures of 40 CFR 261.24.

Analytical results reported by DRI on the samples are given in Table I. These show that the chromium contamination in all the samples was less than 1/100 of the cleanup level of 5 ppm.

Therefore, KMCC concludes that cleanup has been completed to a level well below the criteria established by NDEP, and there is no contamination in the bottom of pond S-1 or affected areas.

There are no plans to fill the impoundment area. After certification of proper closure, it could be used for other purposes.

4. Decommissioning and Cleanup of Manufacturing Area

When production of potasssium perchlorate was terminated, all in-process product was finished and delivered to inventory for commercial sale. All process piping, pumps, and vessels were drained, and the liquors transferred to pond P-1. The entire operation (pipes, vessels, etc.) was flushed with copious amounts of water to remove the hazardous waste component (chromium) as well as any residual salt solution that might remain. All rinsate streams were pumped to pond P-1 for storage, evaporation, and recycle.

After decontamination, as described above, most of the equipment was put in service in other

areas of the plant. Unusable piping, tanks, etc., were sold as scrap. Complete cleaning was easily determined because any liquid residue crystallized on the equipment when the water evaporated. This was avoided by thorough flushing followed by inspection of the equipment after drying.

5. Decontamination of Cleanup Equipment

The clamshell, trucks, paddle scraper, transfer pipes, etc., used in the solids removal and clean-up operation were thoroughly flushed with fresh water. The rinsate was delivered to pond P-1.

6. Decontamination of Surrounding Area

Soil around pond S-1 that was contaminated during the cleanup was removed and placed in the hazardous waste landfill. This was monitored by visual and physical inspection. There is no runoff from S-1 since the tops of the berms are about one foot above ground level. In addition, there are no stormwater ditches or drainage systems which run into S-1 that could be contaminated. As discussed in No. 3, all hazardous waste constituents were removed from the pond site.

7. Pollutant Migration

Any migration of the applicable hazardous waste constituent chromium into the underlying soil would have been detected by the soil sampling and analyses described in No. 3. Also groundwater monitoring, described below, would indicate pollutant migration.

8. Groundwater Monitoring

Closure/post-closure groundwater monitoring is not required for pond S-1 since all hazardous waste constituents have been removed. However, groundwater monitoring in the Henderson plant area is a separate program being conducted under Nevada State Groundwater Regulations. Monitoring in this program includes groundwater in the area of S-1. Data from this program demonstrate that no hazardous waste constituent (i.e., chromium) was traceable to S-1.

9. Closure/Cover Materials

As mentioned in No. 3 above, the pond S-1 site will not be filled, pending a decision to use

the area for other purposes. Cover is not required since all hazardous waste constituents have been removed.

10. Closure/Post-Closure Costs

Kerr-McGee has already expended funds in the amount of approximately $30,000 to close pond S-1. Final certification by a Professional Engineer for the two surface impoundments and landfill will cost $1,500.

11. Closure Schedule

As stated above, surface impoundment S-1 was closed prior to January 25, 1983. Sampling and analyses were conducted after the solids and liner had been removed. After approval of closure plans for pond P-1 and the landfill, all work will be completed within 180 days, and the work will be monitored by responsible K-M officials and a Registered PE. The NDEP will be properly notified and provided with a certified copy of the PE inspection report.

III. Closure/Post-Closure Plan for Surface Impoundment P-1

1. History

Pond P-1 was constructed in April of 1972 and relined in 1980. The new liner was installed by B. F. Goodrich and consisted of 30-mil Hypalon. Pond P-1 has an approximate surface area of 26,000 $ft.^2$ and approximate volume of 125,000 $ft.^3$. Pond P-1 has not received any hazardous waste since January 25, 1983.

2. Maximum Inventory

The maximum hazardous waste inventory that could have been stored in P-1, allowing 2' freeboard, is approximately 700,000 gallons. The liquid waste had a total chromium concentration above 5 ppm which made it hazardous by definition. Salts, such as potassium chloride, have crystallized on the bottom and sides below the water level as the solution became saturated as the result of solar evaporation. These crystals contain less than 5 ppm chromium when subjected to the "EP Toxicity" test, as shown in the attached data.

3. Removal of Contents from P-1

As described in the S-1 closure plan, pond P-1 received some hazardous waste from the closure

of S-1 and the decommissioning of the potassium perchlorate manufacturing process. Pond P-1 has not received any hazardous waste since January 25, 1983.

As stated above, the liquid phase of the potassium perchlorate waste contained chromium in excess of 5 ppm. All liquid has been solar evaporated or recycled back to the process to take advantage of chromium's corrosion inhibition characteristics. The pump and line used for recycle were flushed with fresh water and the rinsate placed in pond P-1 and allowed to solar evaporate. No other equipment was used to aid or promote evaporation.

To confirm the remaining solids in pond P-1 were nonhazardous, the solids were sampled and analyzed by Desert Research Institute as specified below:

A. Solid samples were taken from the bottom of the pond at locations shown on the attached map to a depth of one foot.

B. These solids were subjected to the EP Toxicity Extractions and analyzed for the "EP Toxic" metals.

The attached analyses indicate the remaining Solids in pond P-1 are not hazardous. KMCC proposes to remove these solids and liner and place in the onsite nonhazardous waste landfill. After this has been completed, KMCC proposes to demonstrate that no hazardous constituents have migrated from the P-1 pond area as described below in Section 7, "Pollutant Migration."

4. Decommissioning of Manufacturing Area

Pond P-1 received wastes from the potassium perchlorate operation as did pond S-1. The decommissioning of the potassium perchlorate production area is described in detail in Section II.4., which is part of the pond S-1 closure plan.

5. Decontamination of Surrounding Area

Since the solids remaining in pond P-1 are not hazardous, special care in decontaminating the cleanup equipment will not be necessary.

6. Decontamination of Surrounding Area

Any surrounding soil affected by the removal of the nonhazardous solids in P-1 will be removed

and placed in the nonhazardous waste landfill. This will be monitored by visual and physical inspection. Again, it should be noted that the waste remaining in P-1 is not hazardous.

7. Pollutant Migration

Any pollutant migration of chromium, the applicable hazardous waste constituent from pond P-1, during its operational life, will be determined by the following sampling and analysis procedures:

A. After the remaining nonhazardous solids and liner are removed, six soil corings to a depth of four feet will be taken from the pond site area at locations shown in attached sketch P-1, Figure 2.

B. A composite sample of each foot of core will be made and analyzed for chromium by DRI following procedures in 40 CFR 261.24.

C. Surface samples to a depth of three to four inches will be taken near each core location and separately analyzed for chromium by the same procedures.

D. Evidence of chromium concentration of 5 ppm or above will constitute reason to remove soil from the area to a depth where the chromium concentration is less than 5 ppm. All excavated soil will be transported to Beatty, Nevada for disposal at the U. S. Ecology's landfill.

E. Surface samples and core samples to a depth of four feet will be collected from adjacent potentially affected areas and analyzed for chromium migration if chromium is detected below one foot depth in the P-1 bottom. Based on the experience with pond S-1, KMCC does not anticipate any migration of chromium from P-1.

Currently, there are no plans to fill the pond area. After certification of proper closure, it potentially could be relined and used for a nonhazardous waste impoundment.

8. Groundwater Monitoring

Closure/post-closure groundwater monitoring will not be required for pond P-1 since all hazardous waste constituents will be removed. However,

groundwater monitoring in the Henderson plant area is a separate program being conducted under Nevada State Groundwater Regulations. Monitoring in this program includes groundwater in the area of P-1. Data from this program demonstrate that no hazardous waste constituent (i.e., chromium) was traceable to P-1.

9. Closure/Cover Materials

As mentioned in No. 7 above, the pond P-1 site will not be filled, pending a decision to use the area for other purposes. Cover is not required since all hazardous waste constituents have been removed.

10. Closure/Post-Closure Costs

Kerr-McGee has already expended funds in the amount of approximately $5,000 to recycle liquid from pond P-1 and conduct sampling and analyses. Future closure costs are estimated below:

Removal/Disposal of Solids	-	$10,000
Sampling and Analyses	-	2,000
Administrative	-	2,500
PE Certification	-	500*
Total		$20,000

*Based on one-third total certification - $1,500

11. Closure Schedule

After approval of the closure plan, the schedule below will be followed:

Removal/Disposal of Solids	- within	60 days
Sampling and Analyses	- within	90 days
PE Certification	- within	120 days

Closure will be monitored by responsible K-M officials and a Registered Professional Engineer. The NDEP will be properly notified and provided with a certified copy of the PE inspection report.

IV. Sources of Chromium Contamination

1. Impact of Surface Impoundments S-1 and P-1

Sampling and analysis of surface soil and corings beneath S-1 and in potentially affected areas showed no chromium migration had occurred. Cleanup of the areas of concern was completed to chromium concentration less than 1/100 of the 5 ppm upper

limit as specified in 40 CFR 261.24. This was done with minimum removal of soil from the bottom berm and adjacent areas.

The operational life of pond P-1 was essentially the same as S-1. There is no evidence of chromium contamination from P-1 unless analyses of soil from the bottom and affected areas indicate that chromium migration occurred.

2. Impact of Process Sources

KMCC has constructed 26 wells to monitor groundwater beneath its facility for chromium. The highest chromium levels were found in M-11 and M-12 that are just north and downgradient from the sodium chlorate process buildings, Units 4 and 5.

These buildings were constructed as part of the original World War II government installation. For many years, liquids from the electrolytic cells in these buildings were collected in the old concrete basements and pumped back through the process for reuse in the cells. These liquids contained sodium dichromate as a corrosion inhibitor and buffer. The concrete basements slowly deteriorated, allowing seepage and subsequent chromium contamination of the groundwater.

KMCC has done several things to prevent this seepage and reduce the groundwater contamination as follows:

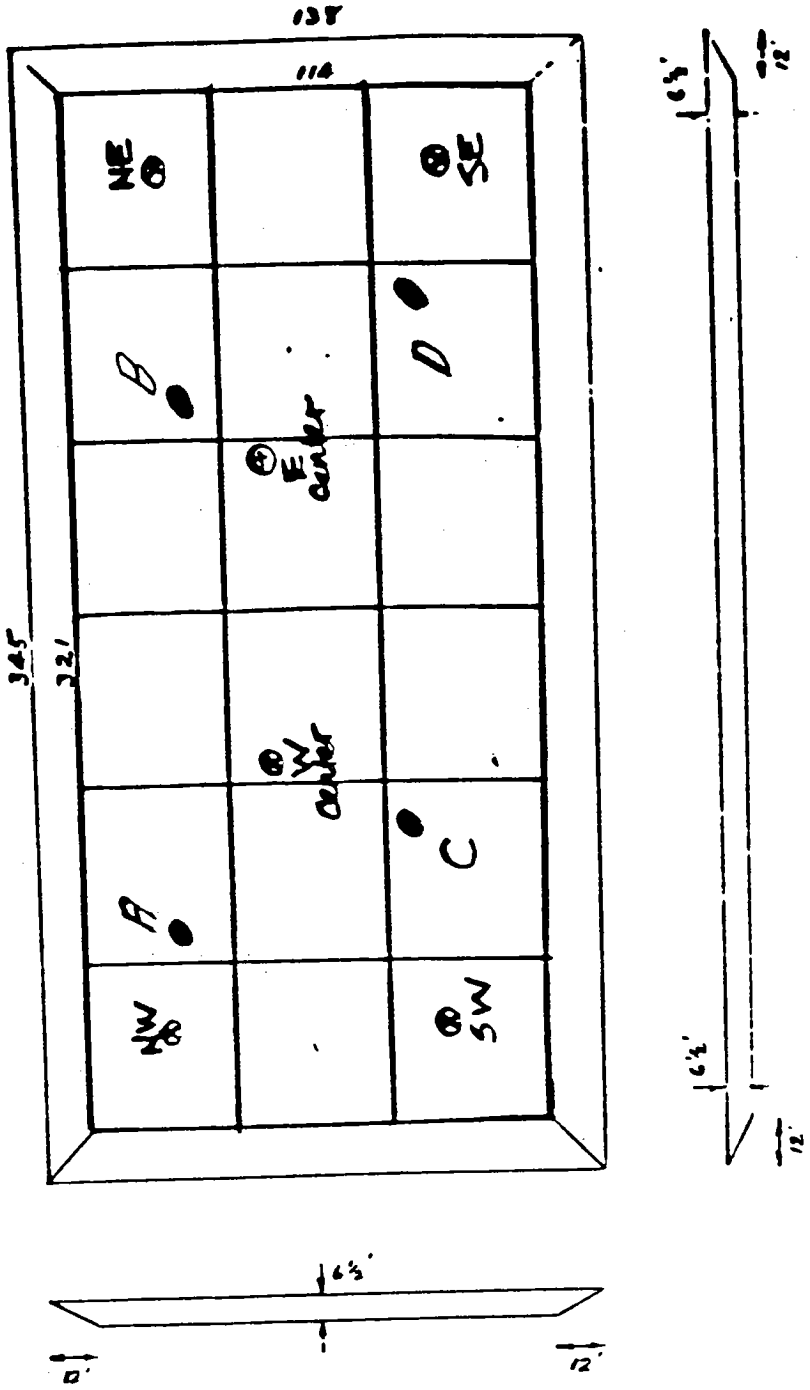
A. Installed two wells, M-11 and M-12, on the north side of Units 4 and 5, to pump contaminated water back to the process and recapture the chromium values.

B. Reduced seepage by minimizing the accumulation of liquid in the basements by regular pumping back to the process.

C. Sealing the floor and walls of the basements with a special plastic coating to further reduce seepage.

D. Committing to Clark County Health Department to replace all these cells (over 1,300 units) with new ones by August 1, 1988. The new cells will be of the most modern design and will eliminate leaks, spills, and other escape of cell liquors.

Evidence, therefore, is preponderant that the process units were the source of chromium contamination and the surface impoundments were not.



EVAPORATION POND S-1

Analyses Attached

Figure 1

Pond S-1

4CH "7 SEP 24

WATER ANALYSIS LABORATORY
DESERT RESEARCH INSTITUTE

REPORT DATE: 20-SEP-84
FILE NAME: 7714KM.TBL

LAB # / DATE	SAMPLE POINT	CR MG/L
7714	EP-TOX S1	
8-SEP-84	NW CORNER	0.05
7715	EP-TOX S2	
8-SEP-84	SW CORNER	<.02
7716	EP-TOX S3	
8-SEP-84	W CENTER	<.02
7717	EP-TOX S4	
8-SEP-84	C CENTER	0.11
7718	EP-TOX S5	
8-SEP-84	NE CORNER	0.02
7719	EP-TOX S6	
8-SEP-84	SE CORNER	<.02
7720	EP-TOX M1	
8-SEP-84	BAJADA E	<.02
7721	EP-TOX M2	
8-SEP-84	PATWAY DUNE	<.02
7722	EP TOX M4	
8-SEP-84	BLK DUNE	<.02

Table I

SLP 17 1984

WATER ANALYSIS LABORATORY
DESERT RESEARCH INSTITUTE

REPORT DATE: 13-SEP-84
FILE NAME: 8701KM.TBL

LAB # / DATE	SAMPLE POINT	CR EPTOX
8701 24-AUG-84	A-1	.03
8702 24-AUG-84	A-2	<.02
8703 24-AUG-84	A-3	.02
8704 24-AUG-84	A-4	.02
8705 24-AUG-84	A-5	<.02
8706 24-AUG-84	A-6	<.02
8707 24-AUG-84	B-1	<.02
8708 24-AUG-84	B-2	<.02
8709 24-AUG-84	B-3	<.02
8710 24-AUG-84	B-4	<.02
8711 24-AUG-84	B-5	<.02
8712 24-AUG-84	B-6	<.02
8713 24-AUG-84	C-1	<.02
8714 24-AUG-84	C-2	<.02
8715 24-AUG-84	C-3	<.02

RESULTS ON EPA-600 EXTRACTS REPORTED IN MG/L.

Table I (continued)

WATER ANALYSIS LABORATORY
DESERT RESEARCH INSTITUTE

REPORT DATE: 13-SEP-84
FILE NAME: 8701KM.TBL

LAB # / DATE	SAMPLE POINT	CR EPTOX
8716 24-AUG-84	D-4	<.02
8717 24-AUG-84	D-5	<.02
8718 24-AUG-84	D-6	<.02
8719 24-AUG-84	D-1	.02
8720 24-AUG-84	D-2	<.02
8721 24-AUG-84	D-3	<.02
8722 24-AUG-84	D-4	<.02
8723 24-AUG-84	D-5	<.02
8724 24-AUG-84	D-6	<.02

RESULTS IN [illegible] REPORTED IN MG/L.

WATER ANALYSIS LABORATORY
DESERT RESEARCH INSTITUTE

REPORT DATE: 21-MAR-84
FILE NAME: 7724KG.TBL

LAB # / DATE	SAMPLE POINT	AG MG/L	AS MG/L	BA MG/L	CD MG/L	CR MG/L	HG MG/L
7724 18-OCT-83	P-1, EP-EX SAMPLE-1	<0.1	<0.1	<0.5	<0.1	1.3	<.002
7725 18-OCT-83	P-1, EP-EX SAMPLE-2	<0.1	<0.1	<0.5	<0.1	<.2	<.002
7726 18-OCT-83	P-1, EP-EX SAMPLE-3	<0.1	<0.1	<0.5	<0.1	<.2	<.002
7727 18-OCT-83	P-1, EP-EX SAMPLE-4	<0.1	<0.1	<0.5	<0.1	0.8	<.002
7728 18-OCT-83	P-1, EP-EX SAMPLE-5	<0.1	<0.1	<0.5	0.1	0.7	<.002
7729 18-OCT-83	P-1, EP-EX SAMPLE-6	<0.1	<0.1	<0.5	<0.1	1.1	<.002

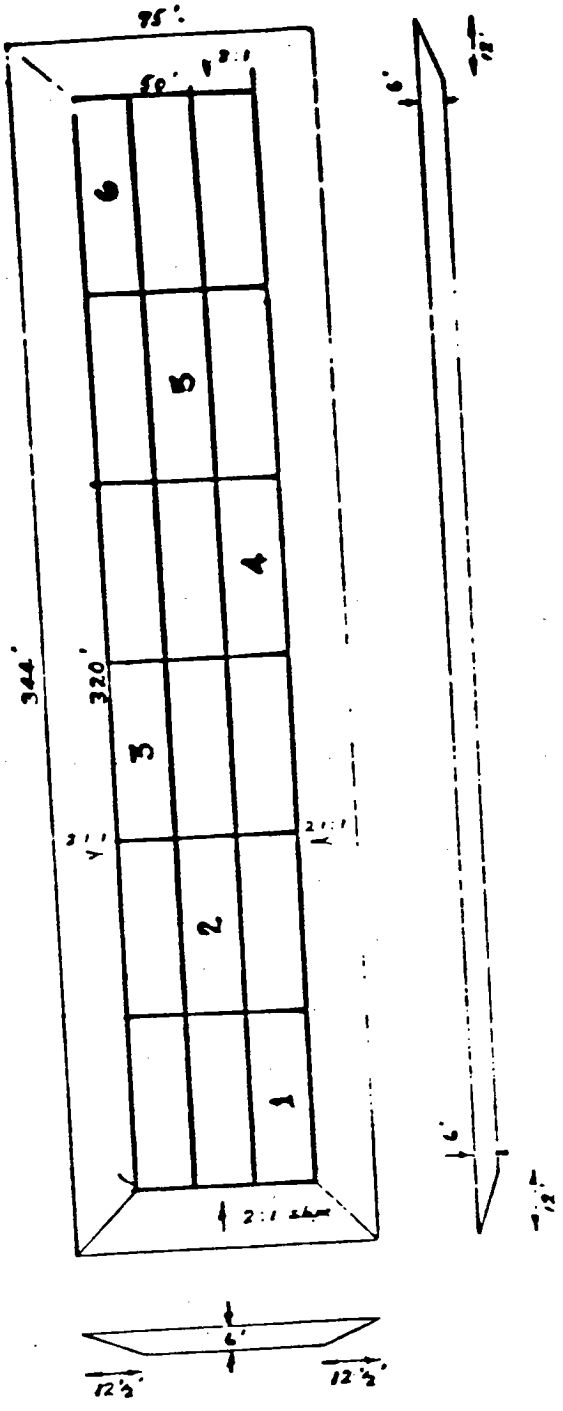
POND P-1 ANALYSIS

WATER ANALYSIS LABORATORY
DESERT RESEARCH INSTITUTE

REPORT DATE: 21-MAR-84
FILE NAME: 7724KG.TBL

LAB #	PB MG/L	SE MG/L
7724	<0.5	<0.1
7725	<0.5	<0.1
7726	<0.5	<0.1
7727	<0.5	<0.1
7728	<0.5	<0.1
7729	<0.5	<0.1

Pond P-1



Analyses Attached

POND P-1

Figure 2

Kerr-McGee Chemical Corporation
Henderson, NV
(EPA ID# NVD008290330)

Deficiencies and Required Improvements to Closure/Post-Closure Plans and Cost Estimates

This attachment identifies the deficiencies of the closure and post-closure plans and cost estimates for the hazardous waste management facility at Kerr-McGee's Henderson, Nevada plant. Attachment I indicates the revisions that Kerr-McGee must make to bring the facility into compliance with RCRA's Interim Status closure, post-closure and cost estimate standards (40 CFR 265 Subpart G and 265.142(a) and 265.144(a)).

CLOSURE PLAN

The June 9, 1983 closure plan referred only to pond P-1. No closure plan was submitted for the other pond(s) or the storage area. For the purposes of this review, EPA assumed that all ponds will contain hazardous wastes after closure.

I. MAXIMUM INVENTORY

Deficiency: The estimated inventory of hazardous waste in storage and treatment does not include all hazardous wastes at the facility at any time during the life of the facility (40 CFR 265.112(a)(2)).

Required Improvement: The closure plan must clearly indicate the maximum amount of hazardous waste that can reasonably expected to be on-site in storage and treatment at any time. In developing this estimate, consider all sources of hazardous waste at the site, including:

- o Maximum amount of hazardous material ever stored or treated in the ponds;
- o Hazardous wastes in containers;
- o Any contaminated soil from areas surrounding the ponds; from near the container storage area; locations from near the landfill that will not be covered by a cap; from near hazardous raw material storage tanks; as well as from stormwater ditches;
- o Decontamination residues from cleaning waste management system lines and pumps; the container storage area; hazardous raw material storage tanks and related containment systems and sumps; process vessels, recycling equipment and sumps that were exposed to hazardous materials; as well as equipment used in managing the waste (e.g. portable pumps; tank trucks; etc.); and
- o Any hazardous raw material inventories that will be discarded at closure.

II. PARTIAL CLOSURE

Deficiency: The closure plan does not describe in sufficient detail the steps necessary to close the facility (40 CFR 265.112(a)(1), 265.228(c) and 265.310).

Required Improvement: The closure plan must address the following issues with regard to closing the landfill:

- o Decontamination of Surrounding Area

  State how potential contamination will be assessed in areas near the landfill that will not be covered with a final cap (e.g. by visual inspection and/or sampling and analysis). Identify the parameters to be used to assess contamination; the number and general location of samples to be collected; as well as the test methods and criteria that will be used to make this determination. Describe the procedures for cleaning up any spilled hazardous material and contaminated soil near the landfill. State how decontamination of the surrounding area will be verified.

- o Containment of Wastes*

  Demonstrate that the final cover will achieve the following objectives:

  - Control of pollutant migration from the facility via ground water, surface water and air;
  - Control of surface infiltration;
  - Prevention of erosion.

  The demonstration must address the following factors:

  1. Type and amount of hazardous waste and constituents in the landfill.

  2. Mobility and rate of migration of the waste.

Note:* In addressing this requirement you may wish to refer to Closure of Hazardous Waste Surface Impoundments (SW-873) (EPA: 1980) and Evaluating Cover Systems for Solid and Hazardous Waste (SW-873)(EPA:1980).

3. Site location and topography with respect to the potential impact caused by pollutant migration (for example, proximity to population centers, ground water, surface water, drinking water sources, soil permeability, depth of water table, and geological and geochemical characteristics of surrounding soils).

4. Climate, including amount, frequency and pH of precipitation.

5. Cover material characteristics including: porosity and permeability of each layer; degree of compaction; erodability of the top layer; soil composition (e.g. texture); sources of materials; plasticity and strength of the cap for supporting loads (e.g. consistent with weight of equipment used for spreading; and loads applied to cap during post-closure use of the site).

The closure plan also must indicate the design of the cover, including the final surface contours. As a result, the closure plan must describe: types of drainage and run-on diversion structures to be used (e.g. earthen or pipe channels, berms, etc.) and their capacities; as well as the cap's slope; length of run of slope; and methods to control erosion (e.g. layer of vegetation, gravel, etc.) of the cap.

6. Construction of the final cover, including: equipment and procedures used for installing the PVC synthetic liner and for spreading, compacting and grading the cover material; precautions to prevent failure of the containment layers; inspections to ensure proper cover; and steps in the vegetation program or application of other cover material (e.g. gravel) for preventing erosion of the cap.

o Post-Closure Ground Water Monitoring

Describe Kerr-McGee's ground water monitoring program for the post-closure period and show how it will meet all the requirements of 40 CFR Part 265 Subpart F. The plan must include the continuance of this monitoring activity for 30 years. This requirement may be satisfied by submittal of an existing post-closure ground

water monitoring plan that meets the regulatory requirements. The plan must contain a description of Kerr-McGee's planned sample collection procedures (e.g. sampling equipment, locations in aquifer, etc.); sample preservation techniques; analytical procedures and chain of custody control. The plan must also indicate that ground water surface elevations will be recorded when sampling the wells.

- o Post-Closure Maintenance of Landfill Cover

  Describe the types of problems inspectors will look for during inspections of the closed landfill. Describe the types of disturbances to the cap, and drainage and diversion structures which will trigger repairs. Indicate the types and frequency of repairs which will be made to correct the effects of settling, subsidence, erosion, pooling, etc. Describe the types of preventive maintenance that will be performed and their frequencies in order to maintain the integrity of the cap and containment structures (e.g. regrading, removing woody plants, replanting and fertilizing cover vegetation, maintaining diversion and drainage structures, etc.).

- o Post-Closure Maintenance of Ground Water Monitoring Equipment

  Describe the types of problems inspectors will look for during inspections of ground water monitoring equipment as well as the types of problems that will trigger repairs or replacement of the wells, seals, pumps, caps, etc. Indicate the types of preventive maintenance that will be performed (and its frequency) to ensure that the ground water monitoring system fully conforms to the post-closure monitoring plan.

III. REMOVAL AND TREATMENT OF HAZARDOUS WASTE

Deficiency: The closure plan does not describe in sufficient detail the steps necessary to treat onsite and/or remove the hazardous wastes from the facility's ponds and container storage area at closure (40 CFR 265.112(a)).

Required Improvement: The closure plan must address the following issues.

- o Container Storage Area

  State clearly that all containers containing hazardous waste will be shipped at closure to an off-site facility with Interim Status or a RCRA permit to receive these wastes. Specify the ultimate fate (i.e. treatment or disposal) of these wastes.

- o Surface Impoundments

  Describe any procedures and equipment that will be used to promote evaporation (solar drying) of the pond contents to ensure removal of free liquids. Present calculations to show the time needed to complete evaporation of the waste. Specify the maximum evaporation rate that can be expected under ideal conditions (evaporation potential) at the site. Describe any methods (if used) to stabilize the sediment that remains after evaporation, including: type of bulking agent, amount required, and the equipment needed to stabilize the sediment. State the target residual moisture content of the waste sediment as well as the expected thickness of the sediment that will remain after evapora- tion is completed.

IV. DECONTAMINATION OF STRUCTURES AND EQUIPMENT

Deficiency: The closure plan does not describe in sufficient detail the steps necessary to decontaminate the facility (40 CFR 265.112(a)(3)).

Required Improvement: The closure plan must address the following issues.

- o Container Storage Area

  State how potential contamination in this area will be assessed (i.e. visual inspection and/or sampling and analysis). Identify the parameters to be used to assess contamination; the number

and general location of samples to be collected; as well as the test methods (if any) and criteria that will be used to make this determination. Describe the procedures for cleaning the containment area as well as removing any nearby contaminated soil. Indicate how decontamination will be verified as well as how to assess whether the decontamination solution and residues must be managed as hazardous wastes.

o Surface Impoundments

Describe the procedures for assessing whether any soil contamination has occurred outside of the areas that will be covered with a final cap. State the number and general location of samples to be collected. Identify the test methods, parameters and criteria to be used to assess contamination. Describe plans for visual inspections for seepage, spillage, etc. In addition, describe the procedures for excavating any contaminated soil and for verifying that decontamination has been effective.

Specify steps to decontaminate all lines and pumps associated with the ponds. State how decontamination will be verified and the procedure to assess whether the decontamination solution and residues must be managed as hazardous wastes.

o Other Equipment and Structures

Describe the procedures for decontaminating the following equipment and structures: hazardous raw material tanks and associated containment structures and sumps; the ditch(es) for stormwater runoff; process vessels and sumps exposed to hazardous chemicals; and equipment used for managing the hazardous wastes (e.g. portable pumps, tank trucks, shovels, etc.). Specify the procedures and criteria that will be used to verify decontamination and state how you will determine whether the decontamination rinsate must be managed as a hazardous waste.

Finally, state whether the contaminated soil, waste residues and decontamination rinsate will be disposed of onsite in the disposal surface impoundments or containerized and removed from the facility at closure. Specify that all hazardous material that is shipped off-site will be sent to a treatment or disposal facility with Interim Status or a RCRA permit to receive it.

V. CONTAINMENT OF WASTE DISPOSED ONSITE IN SURFACE IMPOUNDMENTS

Deficiency: The closure plan neither completely describes the characteristics of the disposal surface impoundment covers nor the necessary steps for installing them (40 CFR 265.228(c), 265.310 and 265.112(a)).

Required Improvement: The closure plan must be amended to include a comprehensive demonstration that the surface impoundment final covers will achieve the following objectives:

- o Control of pollutant migration from the facility via ground water, surface water or air;
- o Control of surface infiltration; and
- o Prevention of erosion.

Your demonstration must address the following factors:

1. Type and amount of hazardous waste and constituents in the surface impoundments.

2. Mobility and rate of migration of the waste.

3. Site location and topography with respect to the potential impact caused by pollutant migration (for example, proximity to population centers, ground water, surface water, drinking water sources, soil permeability, depth of water table and geological and geochemical characteristics of surrounding soils).

4. Climate, including amount, frequency and pH of precipitation;

5. Cover material characteristics including; porosity of compaction; total area to be covered; erodability of the topsoil layer; soil and clay layer compositions (e.g. texture); needed volumes of soil; sources of materials; and strength of the cap for supporting loads (e.g. consistent with weight of equipment used for spreading; and loads applied to the cap during post-closure use of the site).

The closure plan also must indicate the design of the cover, including the final surface contours. As a result, the closure plan should describe: types of drainage and runon diversion structures to be used (e.g. earthen or pipe channels, berms, etc.) and their capacities; length of run of slope; and methods to control erosion (e.g. layer of vegetation, gravel, etc.) of the cap as well as the impoundment dikes.

6. Construction of the cover, including: equipment and procedures for installing the landfill cap as well as folding the plastic membranes back over the above grade ponds without tearing or puncturing; method of containing wastes in ponds that are belowgrade; construction of run-off control structures; equipment and procedures for applying the topsoil layer including necessary compaction and grading; inspections to ensure proper cover; and steps that ensure the control of erosion of caps and dikes.

VI. CERTIFICATION OF CLOSURE

Deficiency: The closure plan should state the number and timing of the inspections by Kerr-McGee and an independent registered professional engineer to verify that facility closure has proceeded according to the closure plan (40 CFR 265.112(a)(1) and 265.115).

Required Improvement: The closure plan should indicate the timing and number of inspections by Kerr-McGee and an independent professional registered engineer to verify proper closure.

P-1 per NSR per CMC 2/25/83 telecon w/EPA Wilson

VII. CLOSURE SCHEDULE

Deficiency: The date on which final closure of the S-1 impoundment and the storage areas of the facility is not indicated in the closure plan. The plan also does not provide a schedule that allows tracking of intervening closure activities (40 CFR 265.112(a)(4)).

Required Improvement: The closure schedule contained in the plan must show the time required for intervening closure activities which will allow tracking of the progress of closure. For example, Kerr-McGee's closure schedule should include: removal of any hazardous waste inventory off-site; decontamination of facility equipment and structures; conduct of any activities to facilitate evaporation; grading of impoundment fill; preparing the soil cap; etc.

POST-CLOSURE PLAN

I. DURATION OF POST-CLOSURE CARE

Deficiency: The plan does not state that post-closure care will be provided for 30 years (40 CFR 265.117(a) and 265.118(a)).

Required Improvement: The plan must state that post-closure care will be provided for 30 years.

II. GROUND WATER MONITORING

Deficiency: The post-closure plan does not show how the planned ground water monitoring and any corrective actions will comply with Subpart F requirements (40 CFR 265.118(a)(1)).

Required Improvement: The plan must present the details of Kerr-McGee's post-closure ground water monitoring and correction program. Page 2 of Kerr-McGee's Post-Closure Plan (dated 1/21/83) refers to post-closure ground water monitoring near the landfill. However, neither this version of the plan nor the version dated 8/23/82 describes the ground water monitoring that will take place near the ponds. Moreover, it must be assumed that post-closure groundwater monitoring will be performed for 30 years.

This requirement may be addressed by reference to an existing ground water monitoring and correction plans for the facility that meet the regulatory requirements. The following items must be covered in the post-closure plan: sample collection frequency and procedures (e.g. sampling equipment, locations in aquifer, etc.); sample preservation techniques; sample shipment; analytical procedures; and chain of custody control. The plan must identify the parameters that will be tested for and indicate that ground water surface elevations will be recorded when ground water samples are collected. Finally, a complete description of planned corrective actions must be included.

III. MAINTENANCE ACTIVITIES

Deficiency: The post-closure plan does not contain a complete description of the planned maintenance activities and the frequencies at which they will be performed to ensure the integrity of the impoundment covers and other containment structures as well as the functioning of facility ground water monitoring and security equipment (40 CFR 265.118(a)(2)).

Required Improvement: The post-closure plan must address the following issues:

- o Cap, Containment and Diversion Structures

  Describe the types of problems which inspectors will look for during inspections as well as the types of disturbances to the cap, dikes and drainage and diversion structures that will trigger repairs. Indicate the types of repairs which will be made to correct the effects of settling, subsidence, erosion, pooling, dike instability, etc. Describe the types of preventive maintenance that will be performed and their frequencies in order to maintain the integrity of the cap and containment structures (e.g. regrading the cap, replacement of topsoil, removing woody plants, maintaining diversion and drainage structures, etc.).

- o Ground Water Monitoring Equipment

  Describe the types of problems which inspectors will look for during inspections of ground water monitoring and corrective action systems as well as the types of problems that will trigger repairs or replacement of the wells, seals, pumps, caps, etc. Indicate the types of preventive maintenance that will be performed (and the frequency) to ensure that the ground water monitoring and corrective action systems fully conform to the post-closure monitoring plan.

- Facility Security

  Describe what inspectors will look for during inspections of the security equipment as well as the types of problems that will trigger repair or replacement of fences, signs, etc.

  In addition, describe any provisions for the protection and maintenance of surveyed benchmarks and for restricting access to the facility during the post-closure period.

IV. POST-CLOSURE CONTACT

Deficiency: The plan does not identify a contact person or office for the facility during the post-closure period (40 CFR 265.118(a)(3)).

Required Improvement: The plan must state the name, address and phone number of the person or office to contact about the facility during the post-closure care period.

V. POST-CLOSURE GOALS

Deficiency: The plan does not describe the extent to which the post-closure activities will ensure achievement of the post-closure waste containment objectives (40 CFR 265.228(c), 265.310(b) and (c), 265.112(a)(1)).

Required Improvement: The description of the post-closure activities must show how they will achieve the following goals:

- Control of pollution migration via ground water, surface water and air;
- Control of surface water infiltration including prevention of pooling; and
- Prevention of erosion.

This discussion should include at least a narrative statement that the following factors were considered in addressing the post-closure objectives:

- o Type and amount of waste;
- o Mobility and rate of migration of the waste;
- o Site location, topography and surrounding land use;
- o Climate, including precipitation;
- o Characteristics of the cover, including material, final surface contour, thickness, porosity, permeability, slope, and vegetation;
- o Geological and soil profiles as well as surface and subsurface hydrology;
- o Type, concentration and depth of hazardous constituent migration as compared to background concentrations; and
- o Planned future use of the site.

COST ESTIMATES

I. CLOSURE COST ESTIMATES

Deficiency: The closure cost estimate does not include all relevant closure costs. In addition, the estimate should be updated to reflect inflation (40 CFR 265.142(a) and (b)).

Required Improvement: The closure cost estimate must be revised to include costs associated with the following items:

- o Labor and equipment used in evaporating the wastes from the impoundments;
- o Labor, equipment and materials used in containment of wastes in all surface impoundments that contain wastes (the current cost estimate covers only one such pond);

- o Shipping any containers of hazardous wastes offsite;
- o Labor, equipment and materials used in decontaminating facility equipment and structures;
- o Removing from the site or disposing on site of decontamination rinsate and any contaminated soil;
- o Certification by a registered professional engineer of the closure of surface impoundments and other areas at the facility (except for the landfill);
- o Ground water monitoring and corrective actions performed during the closure period.

Moreover, the closure cost estimate must be adjusted for inflation every year by using an inflation factor derived from the annual Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce in its Survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year.

In addition, the closure cost estimate should itemize the unit costs. In this way, it is ensured that all the identified cost elements are included.

II. POST-CLOSURE COST ESTIMATE

Deficiency: The post-closure cost estimate does not cover all of the costs of providing post-closure care. In addition, the estimate has not been updated for inflation (40 CFR 265.144(a) and (b)).

Required Improvement: The post-closure cost estimate should present itemized expenses. It should be reviewed to ensure that it includes the cost of labor, materials, equipment, overhead, etc. for the following items:

- o Administering the post-closure plan;
- o Sampling ground water wells monitoring the landfill as well as the ponds and analyzing samples for 30 years;
- o Performing corrective actions and related monitoring;
- o Inspecting and maintaining ground water wells for the landfill and surface impoundments (including replacement) for 30 years as well as inspecting and maintaining the corrective action system;
- o Inspecting and maintaining site security (e.g. replacing fences) for 30 years; and
- o Inspecting and maintaining landfill and surface impoundment caps and dikes as well as drainage and diversion structures for 30 years.

Finally, the post-closure cost estimate must be revised annually to reflect inflation using the same method as for updating the closure cost estiamte (per 40 CFR 265.144(b)).