KERR-McGEE CHEMICAL CORPORATION
POST OFFICE BOX 55 • HENDERSON, NEVADA 89009

October 2, 1996

Robert C. Kelso
Supervisor, Remediation Branch
Bureau of Corrective Actions
Nevada Division of Environmental Protection
333 West Nye Lane
Carson City, NV 89710

Subject: KMCC Phase II Written Response to Letter of Understanding

Dear Mr. Kelso:

Kerr-McGee Chemical Corporation (KMCC) signed a Consent Agreement with Nevada Division of Environmental Protection (NDEP) earlier in 1996, establishing the process for proceeding with Phase II of an Environmental Conditions Assessment. As required in this Agreement, a Phase II Work Plan was developed and submitted to NDEP which described field activities designed to fill in data gaps identified in the Phase I activities. Concurrent with submission of the Phase II Work Plan was submission of a Written Response which addressed those data gaps which did not require field work.

In July 1996, NDEP provided comments on both the Work Plan and Written Response for inclusion in the final version of the respective documents. Attached with this correspondence is the revised Written Response inclusive of the NDEP comments and KMCC response to the NDEP comments. Two copies have been sent to the Las Vegas NDEP location, to the attention of Brenda Pohlmann. Submission of the revised Work Plan will follow this correspondence in several weeks.

Feel free to call me at (702) 651-2234 if you have any questions. Thank you.

Sincerely,

Susan M. Crowley, CEM-1428
Staff Environmental Specialist

smc\PHIIWRCL.WPD
cc: Brenda Pohlmann (NDEP)
PRDemps
RHJones
RANapier
TWReed
JTSmith (Covington & Burling)
RSimon (ENSR)
Verrill Norwood (Pioneer)
Joel Mack (Montrose)
Susan Stewart (TIMET)
Greg Schlink (BMI)
PSCorbett
Kent Stevenson (Pioneer) - w/o attachment
Lee Erickson (Stauffer) "
Mike Reilly (Zeneca) "
Barry Sandles (Morrison & Foerster - TIMET)
David Tundermann (Parsons, Behle & Latimer - BMI)

RESPONSE TO LETTER OF UNDERSTANDING

HENDERSON SITE

July 10, 1996, NDEP General comment- Plates 1-3 show data that is approximately 3 years old. What changes have occurred in that time? Please update with current data.

Response:

KMCC performed a one-time sampling of groundwater from all monitor wells at the facility as a result of discussions held with NDEP in July 1993. These discussions related to the KMCC Environmental Conditions Assessment. This sampling was conducted in July 1993, for the for the purpose of providing information about the groundwater conditions, facility wide, at the Henderson location. The samples were analyzed for chromium, manganese, pH and specific conductivity. No other facility-wide campaign for groundwater sampling has been performed. However, KMCC routinely samples certain groundwater monitor wells and recovery wells as part of a Consent Order and other compliance requirements. A major portion of this sampling information is included in the Semi-Annual Performance Report, Chromium Mitigation Program which is submitted to the NDEP in January and July of each year. The most recent copy of this Report, July 1996, is included as Attachment 24.

1) On-Site Portions of "Trade Effluent" Settling Ponds and Associated Vitrified Clay Piping, SWMU KMCC-014:

Provide the results of soil sampling performed by DataChem (KMCC Final Phase I Report Reference K353 ("Analytical reports of soil samples taken in the vicinity of proposed SIs WC-1 and WC-2").

Provide a work plan for characterization of potential contamination in the western portion of the KMCC "Trade Effluent" pond area (that area which lies west of Ponds WC-1 and WC-2 and east of the earthen berm which defines the eastern margin of the On-site Hazardous Waste Landfill. Historical usage and waste disposal practices are to be used to establish the list of analytes to be evaluated.

Soil sampling results from DataChem are contained in Attachment 1. All EP Tox metals were "not detected" with the exception of barium which was less than or equal to 1.0 mg/L. Selected pesticides were also "not detected." The remainder of this response is addressed in the Work Plan.

July 10,1996, NDEP Comment 1. LOU Item #1 - Attachment 1 provides analytical data from DateChem for three (3) samples "in the vicinity" of WC-1 and WC-2. Please provide specific sample locations and indicate same on appropriate Figures.

Response:

Attachment 1 contains information related to three samples which were submitted to DataChem for analysis in 1987. Two of the listed samples were soil collected from the Trade Effluent pond area in the vicinity of the WC-1 (WC-East) and WC-2 (WC-West) ponds. The third sample, which accompanied the two soil samples, was collected from a waste container and was unrelated to the Trade Effluent ponds. The approximate locations of the soil samples are indicated on Plate 1.

2) Open Area Due South of "Trade Effluent Disposal Ponds":

KMCC will attempt to further delineate this poorly defined historic disposal area and to establish the nature of materials deposited therein. KMCC will incorporate characterization of this area in the work plan for #1 above ("Trade Effluent" Settling Ponds).

This item is addressed in the Work Plan.

3) Air Pollutant Emissions Associated with Industrial Processes:

Provide specific references to those passages in KMCC's Final Phase I report (and any other sources of information) which describe the nature (vapor, particulate, etc.) of historical and current air emissions at the KMCC facility. For those emissions which are determined to have been or which are presently depositional in nature, KMCC will provide information regarding patterns of dispersion and probable deposition.

The list below identifies sections of the April 1993 ECA report which were modified to include additional information on air emissions. ECA report modifications range from adding the permit number for the emission control unit to giving further details regarding the nature of the emission.

Process	Section	Page/Paragraph
Sodium Chlorate	4.1.3	4-7/3
Potassium Chlorate	4.2.3	4-14/6
Potassium Perchlorate	4.5.3	4-26/6
Ammonium Perchlorate	4.7.3 4.7.4	4-36/5 & 7 4-41/5 & 6
Manganese Dioxide	4.8.3	4-45/4 & 5
Manganese Dioxide (Leach Plant)	4.9.3	4-50/4 4-51/1
Boron Trichloride	4.11.3	4-62/1

An assessment was performed to determine the "patterns of dispersion and probable deposition" of emissions. Modeling for this assessment is documented in Attachment 2. The assessment consisted of determining the emissions and modeling the dispersion and deposition of particulate matter from the manganese dioxide process. This process was selected because it represents the majority of the emissions from the facility that are considered "depositional."

The emission estimates were developed as part of the application for the federal (Title V) operating permit and are based on source test data and EPA-approved emission factors (AP-42). The air dispersion model calculated the rate of deposition of these emissions in the areas surrounding the plant.

Deposition was calculated by the air dispersion model at "receptor" locations along the perimeter of the plant and in surrounding areas out to a distance of five kilometers (approximately 3 miles) beyond the plant boundary. The model used (i.e., version 3 of Industrial Source Complex Model--Short Term) is the air dispersion model approved by EPA for determining deposition of particulate matter. One year of actual, hourly meteorological observations (including winds, temperatures, and stability) from Las Vegas were used in the simulation for realistic treatment of transport and dispersion.

The results of the modeling are presented in Attachment 2 which contains a plot depicting isopleths of annual deposition of particulate emissions in units of grams per square meter (g/m^2). The maximum calculated deposition is 17 g/m^2 at a point on the

eastern boundary of the plant, reflecting the predominance of southwesterly winds in the Las Vegas area. At other points along the KMCC boundary, the calculated deposition is much less than this maximum value. In fact, the deposition is less than 0.05 g/m^2 at the northwest corner of the KMCC facility and is less than 1 g/m^2 along over 80 percent of the boundary. Away from the boundary, deposition falls off rapidly, decreasing by an order of magnitude within one kilometer.

July 10, 1996, Comment 2. LOU Item #3 - Please explain the comment regarding modifications to the April 1993 ECA Report. No change pages are provided with this submittal and the 1993 report appears unchanged. Also, provide additional justification/rational for the statement that manganese dioxide "...represents the majority of emissions...considered to be 'depositional.'" How does this compare to current and historical dispersion and deposition?

Response:

Subsequent to submission of the initial draft ECA Phase I Report, KMCC added the information cited in our current response to LOU Item #3 as a result of comments from the NDEP. The final draft of the ECA Phase I Report included that information. In our June 21, 1993, meeting discussing the ECA Phase I Report, NDEP requested that we identify the changes to the first draft Phase I Report. Information listed above in response to LOU Item 3 addresses that request by identifying where the changes were made. It was not necessary to submit change pages with the response to LOU Item 3 because the final draft of the Phase I Report already included this information. The changes, as indicated above, added permit numbers and other information to help further identify the nature of the emissions from the particular processes.

Except for CO, which is not a concern from a depositional standpoint, emissions of PM_{10} represent a majority of emissions from the facility. Furthermore, more than half of the PM_{10} emissions are from the manganese dioxide operation, which is adjacent to the eastern (i.e., predominantly downwind) boarder of the facility. Therefore the emissions of PM_{10} from the manganese dioxide operation, which are mostly in the form of manganese compounds, have the greatest potential to deposit on the surface at offsite locations.

We have no information on historical deposition for comparison.

4) Hardesty Chemical Company Site:

Provide analytical data obtained from sampling of the ground water monitoring wells installed on the J. B. Kelley lease site. As these wells were installed for the evaluation of potential hydrocarbon contamination from the underground storage tanks formerly located at the J. B. Kelley site, they are in the area where Hardesty is believed to have carried out its operations. NDEP may request additional sampling of these wells with an expanded list of analytes.

KMCC will provide NDEP with any additional information regarding the past operation of Hardesty Chemical Company at the KMCC facility which may be reasonably available, including facility locations, products, waste streams and waste disposal. KMCC and NDEP will then determine what additional investigatory work is necessary based upon the identified information concerning the activities of Hardesty at the KMCC site.

Information relating to the J. B. Kelley lease site is located in the response to LOU Item #63.

Additional documentation was obtained from the national archives at San Bruno, California, regarding Hardesty Chemical and other lessees operating on the site in the late 1940s. A letter dated March 11, 1948, contained a description of the portions of the BMI complex that were under lease by the following tenants: Ruth Mitchell, Nevada Clay Products Company, Allied Productions, Inc., U. S. Vanadium, Hardesty Chemical Company, and Western Electrochemical Company (WECCO).

Information on WECCO is provided in KMCC's Environmental Conditions Assessment dated April 1993. Locations of the remaining lessees are shown in Attachment 3 (based on descriptions in the 3/11/48 document).

Hardesty was having difficulty in getting into production. Around October 1947, Amecco Chemicals, Inc. undertook the total obligations of the lease and continued with modifications to the facility. In a letter dated March 6, 1948, Amecco projected sales for the following products:

Monochlorobenzene
Paradichlorobenzene
Soda Arsenite Solution
Synthetic Detergent
Chlorinated paraffin

There were no documents identified to demonstrate what quantity of these chemicals were actually produced, if any. The documentation did not discuss waste streams or disposal locations.

July 10, 1996, NDEP Comment 3. LOU Item #4 - What were the activities and/or products of the additional tenants listed in KMCC's response, i.e., Ruth Mitchell; Nevada Clay Products Company; Allied Productions, Inc.; and U.S. Vanadium? Assuming Hardesty/Amecco did operate and procure chemical products, what is the most probable method and location of waste disposal and transport? How does KMCC propose to verify that none of these residual wastes remain on site?

Response:

ERM-West conducted a review of files located in San Bruno, California, as part of BMI's requirement to identify additional information on U.S. Vanadium. The results of their investigation will be covered in the Common Areas Environmental Conditions Investigation Report. During their file review, they located additional documents (albeit limited) on Hardesty Chemical and the other companies identified above. A brief synopsis on each company is listed below.

Ruth Mitchell: Ruth Mitchell Gems processed semi-precious stones. According to a 1/28/47 inspection report on fire protection and security, the operation consisted of polishing semi-precious stones and setting finished stones with minor soldering. There is no information given on waste disposal practices. The company was no longer leasing property by December 1947.

Nevada Clay Products: According to a 1947 inspection report on fire protection and security, Nevada Clay Products was to manufacture ordinary building brick using oil fired baking ovens already in place. Subsequent documents indicate that they were having difficulty converting some of the existing equipment for use. No discussion of waste practices was identified.

Allied Productions, Inc.: Allied Productions, Inc. was a moving picture company. They had not yet taken occupancy by May 1947 and records indicate that they terminated their lease in September 1947.

Hardesty/Amecco Chemical: A review of the records indicates that Hardesty did make some production. Records indicate that the Hardesty lease was effective in September 1945. Subsequently, in September 1947, Amecco gave notification that it had purchased the entire Hardesty Chemical Company, Inc. interest in the operation at the Basic Magnesium Plant. Amecco appears to have ceased operations sometime prior to June 1949. One reference to waste handling stated that residue from the manufacturing process was pumped directly into a steel tank truck and removed to a remote location and burned. The location was not identified. In addition, schematics of the process show a waste stream going to the sewer.

Drawings of the facility show that there were two underground storage tanks located north of Unit 2, one for kerosene and one for benzene. A tank farm was also located north of Unit 2 on the north side of the tracks. None of these tanks are present today.

KMCC proposes to identify impacts, if any, from Hardesty Chemical by installing a well down gradient from the tank farm and underground storage tanks. More detail is provided on this in the work plan.

5) On-Site Portion of Beta Ditch, Including "Small Diversion Ditch" Northwest of Pond C-1:

Identify segments or tributaries of these conveyances (if any) which received waste streams from KMCC or its predecessors/tenants exclusively. Those portions of the conveyances which historically received waste streams from two or more of the BMI companies will be addressed as BMI Common Areas Issues. For those segments or tributaries identified as having been utilized by KMCC or its tenants exclusively, KMCC will prepare a work plan to characterize residual contamination by contaminants of concern which may exist therein.

This item will be addressed in the Common Areas Work Plan. Sample locations in the Common Areas Work Plan have been located either in the tributary or immediately down stream of the confluence of these tributaries. (See Figure 3-1 of the BMI Common Areas Environmental Conditions Investigation Plan.)

6) Unnamed Drainage Ditch Segment:

Based upon KMCC's assertion that this ditch is in fact the Northwest Drainage Ditch which received waste streams from more than one BMI company, this area will be addressed as a BMI Common Areas issue.

Due to the pending construction of Warm Springs Road adjacent to the Northwest Drainage Ditch, KMCC collected samples from both the ditch bottom and from the center of the proposed right of way of the new road. Also, ground water samples were collected from several existing wells in the area. Analytical results were provided to NDEP in a letter dated August 4, 1994. The City of Henderson has recently collected samples in this area; however, data has not been provided to KMCC to date.

July 10, 1996, NDEP Comment 4. LOU Item #6 - The division has received and reviewed analytical results of the City of Henderson's sampling along the proposed Warm Springs Road Extension from Gibson to Eastgate Roads. We have not seen analytical results for the remaining section from East gate to Boulder Highway. This information will be forwarded

to Kerr-McGee on receipt. Regarding KMCC's previous sampling data, please provide the locations of each sample and the rationale for excluding the 1-4 feet below ground surface sampling interval.

Response:

Information provided in Attachment 23 shows the locations of the Warm Springs Road right-of-way (ROW) sample points collected by KMCC. Eight surface soil samples (0-1' in depth) were collected; five in the proposed ROW adjacent to the Northwest Ditch and three in the ditch itself. Three additional soil samples were collected in the ditch at the 4-5' depth interval. These deeper samples were collected in an attempt to determine vertical impact, if any, from downward percolation of fluids moving through the ditch. The 4-5' sample interval was chosen in an attempt to identify the lower limits of contaminants that may have been identified in the 0-1' samples and to provide some separation from the surface sample. This separation reduced the potential for physical contamination of the sample during sample collection. Since no significant concentrations of contaminants of concern were identified in either the 0-1' samples or the 4-5' samples, it can be inferred that the 1-4' range is not significantly impacted.

7) Old P-2 Pond and Associated Conveyance Facilities:

Provide a work plan for sampling of subsurface soils in the area of the former pond to confirm that residual material concentrations are below state and federal action levels.

This item is addressed in the Work Plan.

8) P-3 Pond and Associated Conveyance Facilities:

KMCC will provide a work plan for sampling of subsurface soils in the area of the former pond to confirm that residual material concentrations are below state and federal action levels. As a necessary component of this work plan, KMCC will provide additional information on the location, regulatory/closure status, and release history of this impoundment. KMCC will also provide information on the disposition of contaminated material removed from this pond.

Sampling of this area is addressed in the Work Plan. The pond location is shown on Plate 1. While operational, this process pond was regulated under NPDES Permit #NV0000078. Upon closure of this process pond, the liner, solids and underlying soil were removed and disposed of at U. S. Ecology as chromium contaminated waste.

Monitor wells used for this pond while it was in operation were MW-50 (up gradient) and MW-76 (down gradient). Both wells show elevated conductivity and chromium levels. However, they are also in the general path of the contaminant plume emanating from Units 4 & 5 up gradient of the pond. This plume is being captured and remediated by the down gradient groundwater intercept system.

July 10, 1996, NDEP Comment 5. LOU Item #8 - This LOU item requested "additional information on the ... regulatory/closure status and release history..." of Pond P-3, which does not appear to have been discussed in the Phase I Report. Provide the specific characteristics of the waste managed therein, the sampling criteria used to determine the extent of underlying soil removal at "closure," and the location analytical results from such samples.

Response:

The materials handled in Pond P-3 were not waste but were solutions that were recycled back into the sodium chlorate process. Pond P-3 was used by the KMCC Henderson sodium chlorate production operation as a holding pond for solutions which were destined for return to the process after concentration by evaporation. The pond contained an aqueous solution of sodium chlorate with small amounts of sodium dichromate. While the pond was used, it was regulated by NDEP under the NPDES program. As the pond was closed, the liner was removed along with any soil which appeared contaminated. Sampling of underlying soils is included in the Phase II Work Plan and will be completed once the Work Plan is approved by NDEP.

9) New P-2 Pond and Associated Piping:

Provide engineering specifications of the impoundment including leak detection systems (e.g. double lined with leachate collection) and the location and configuration of monitor wells intended for this purpose. Provide information regarding the operational and regulatory status of this impoundment and release history (if applicable).

Issues exclusively concerning Total Dissolved Solids impacts to ground or surface water will continue to be addressed by NDEP's Bureau of Water Pollution control.

Engineering drawings for construction of the containment system for New P-2 are located in Plate A-001-53 (Attachment 4). The impoundment was initially constructed with two liners (30 mil unreinforced PVC and 36 mil reinforced polyester). Approximately 18 months later, an additional 60 mil high density polyethylene liner was installed. This process pond is scheduled to be taken out of service by June 1996, and replaced with a tank system located north of Unit 2.

New P-2 pond is regulated under NPDES permit #NV0000078. It has a leak detection system as shown on the above referenced plate which is monitored monthly. No leaks have been identified. Because this leak detection system was installed as part of the original construction of the impoundment, no groundwater monitor wells were installed for this unit; however, up gradient and down gradient wells are present in the area.

10) On-Site Hazardous Waste Landfill, SWMU KMCC-013:

Provide the Division with copies of correspondence relating to the closure and post-closure status of the landfill. This information should include the post-closure plan.

Attachment 5 contains the Closure/Post Closure Plan for the on-site hazardous waste landfill. Also provided in Attachment 5 are the April 16, 1985, and the January 17, 1986, letters from NDEP concerning the landfill.

11) SWMU KMCC-005:

Provide specific information (i.e. volume of material, depth of excavation, criteria used to determine extent of contamination, etc.) relating to the removal of the "old drying pad" and underlying fill material and native soils. Provide an evaluation of the feasibility of collecting confirmatory samples of soil from beneath the area of the old pad.

Alan Gaddy, former Environmental Engineer for KMCC, was present at the time that the original drying pad was removed. Attachment 6 contains a summary of his observation regarding the scope of the work completed. The current pad was built directly over the old pad and is underlain by a synthetic liner. This liner serves as secondary containment in the event that the pad should leak.

Obtaining a sample from directly beneath the pad, which would be the location of greatest potential for contamination, would require penetration of the liner thus compromising its integrity. Based on observations of Mr. Gaddy, all discolored soil plus additional soil was removed from beneath the old pad. As such, KMCC believes that confirmatory sampling is not warranted.

July 10, 1996, NDEP Comment 6. LOU Item #11 - Due to the difficulty involved in obtaining confirmatory samples from the "old drying pad" area, they are not required at the current time. The Division may require these samples, including Chromium VI, on facility decommissioning or pad removal/replacement.

Response:

Comment noted.

12) Hazardous Waste Storage Area, SWMU KMCC-006:

No further action is required at this time.

13) Pond S-1:

No further action is required at this time. A review of the RCRA permit status of this SI may be required pending the outcome of Phase II investigations.

14) Pond P-1, and Associated Conveyance Piping:

KMCC will provide Closure documentation for this impoundment. A review of the RCRA permit status of this SI may be required pending the outcome of Phase II investigations. No further action is anticipated.

Attachment 7 contains a letter from Thomas J. Fronapfel, P.E., of the NDEP, to Rolfe B. Chase, Jr., of KMCC, stating that the "impoundments have been properly closed, and that they no longer remain under the interim status standards of 40 CFR Part 265." Also included in Attachment 7 is a copy of the analytical results obtained from both P-1 and S-1 that KMCC collected as part of the clean closure demonstration. (Due to the poor quality of the original, some of the values have been penciled in next to the printed value for clarity.)

July 10, 1996, NDEP Comment 7. LOU Item # 14 - Attachment 7 has been reviewed by the Bureau of Waste Management personnel as summarized in enclosed memo from J. Dennison, dated June 13, 1996. Based on the information in Attachment 7, chromium does not appear to be a concern, however, one must question how the liquid waste stream entering the impoundment failed the EP Tox test (per the Phase I documentation), and the evaporated solids and soils managed to pass. Any additional information you might have on this occurrence would be very enlightening. Again, the issue is not chromium, but any contaminant in the disposed waste is above the state action levels.

Response:

Ponds S-1 and P-1 contained waste water from the sodium chlorate and potassium perchlorate plants respectively. The waste water from the two processes contained

concentrations of the two respective products as well as sodium dichromate. Since other metals would contaminate the electrolytic cells, considerable precautions were taken to eliminate the presence of metals in the process, other than chromium. Other metals therefore would not be present in the waste. There were no organics present in the process solutions.

As the ponds were closed, the solids, liners, and any visually stained soil were assumed to be contaminated with chromium and removed to the then-active on-site hazardous waste landfill. Attachment 7 includes information related to confirmatory sampling of the S-1 and P-1 ponds area soil after removal of the pond contents and liner. As seen in the analytical data supplied in Attachment 7, the soil in the closed pond area did not appear to have a concern related to chromium.

Together with its Phase II Report, KMCC will submit a petition for a determination that ponds S-1 and P-1 have met the regulatory standards for closure by "removal or decontamination."

15) Platinum Drying Unit, SWMU KMCC-007:

KMCC will provide either analytical data or a technically based argument supporting their contention that minor staining of the soil surrounding this unit is not a threat to either human health or the environment and is not a violation of state or federal regulations. Included in this information shall be a discussion of how KMCC has revised housekeeping practices so as to eliminate or minimize further releases of waste material from this unit.

Since the LOU was issued, KMCC has removed the platinum sludge unit. This was done to make way for construction of the new boron and boron trichloride plant which now covers the area previously occupied by the pad. In preparation for plant construction, the pad was removed and disposed of at U. S. Ecology, Beatty, Nevada. Soils under the pad were collected and analyzed for <u>total</u> chromium. Chromium concentrations were below regulatory limits (see Attachment 8).

The TCLP results of material in the platinum sludge drying area collected in January 1993 showed that all metals were below the method detectable limit with the exception of chromium which had a concentration of 1.1 mg/l (see Attachment 8). Based on these results, any material that may have escaped from the unit was below regulatory levels.

July 10, 1996, NDEP Comment 8. LOU Item #15 - Additional information is needed regarding the status and removal of the Platinum Drying Unit. Attachment 8 shows TCLP analysis data indicating analysis dates during January 1993. The chain of custody forms

appear to indicate sampling dates in April 1994. Please reconcile these dates and provide sample locations and analytical data for both test sequences. Also, the LOU response text (page 7) indicates soils were collected and analyzed from under the pad while Attachment 8 indicates samples from beside the pad. Please explain. What is the difference between "#1N" and #2S" on the chain of custody form in Attachment 8? Explain the implications on the detected chromium concentrations due to the 1:10 dilution to reduce acetate matrix interference.

Response:

The January sample was a platinum sludge sample collected and sent under its own chain of custody (COC) to Lockheed Analytical Laboratory on January 15, 1993. The sludge was analyzed by TCLP extraction to characterize the sludge material returning for reclamation of the platinum metal value. The results are listed on the Lockheed laboratory report form, included in Attachment 8.

The other two COC forms describe soil samples collected on April 7 and April 15, 1994. These soil samples were collected in preparation for removal of soil from the platinum drying pad area. This same area needed to be cleared to accommodate construction of the new boron plant. The soil samples were analyzed at KMCC's on-site laboratory for total chromium, with the results being reported on the respective chain of custody forms. Notations 1N and 2S, on the April 7, 1994, COC, refer to separate samples collected on the same day from the soil surrounding the pad. The first sample taken and analyzed was 1N. Sample 1N was collected from a east/west mid-point on the north side of the pad. After analysis of 1N a second sample, 2S, was collected to confirm the concentration was below 100 ppm chromium (20 X 5 ppm for chromium). Sample 2S was collected from the east/west mid-point south of the pad. The COC dated April 15, 1994, describes a sample taken beneath the removed pad.

The 1:10 dilution for acetate matrix interferences has no affect on the chromium analysis results.

16 & 17) Ponds AP-1 and AP-2, and Associated Transfer Lines and Ponds AP-3 and Associated Transfer Lines:

Provide a technical evaluation of the appropriateness of the placement and design criteria for wells used to monitor potential contaminant migration from these impoundments. Include a list of the analytes which are currently monitored for and the latest data. Reference to the facility wide hydrologic evaluation conducted in July of 1993 may be used to provide some or all of the requested information.

Because ammonium perchlorate is highly soluble in water, and due to the fact that the ammonium ion (NH^{4+}) may be rapidly transformed to nitrate by the action of indigenous microbes in the soil through the process of nitrification, the AP pond area should be evaluated for potential ground water impacts by nitrates.

Provide an evaluation of the potential reactivity of ammonium perchlorate in the ponds and in site soils.

Provide chromium concentration data for pond contents.

Provide a summary diagram/facility map which more accurately identifies the location of the AP impoundments and the other waste management units/areas of concern at the KMCC facility. Modification of Plate 3-2 of the KMCC final Phase I report would be acceptable for this purpose.

Issues exclusively concerning Total Dissolved Solids impacts to ground or surface water will continue to be addressed by NDEP's Bureau of Water Pollution Control.

Well Placement and Design/Pond Locations

Figure 1 in Attachment 9 shows the locations of the AP ponds. AP-2 is the only single-lined pond in this area. It is monitored as part of the facility's NPDES program via monitor wells MW-17 (up gradient), MW-89 and MW-25 (down gradient). The up gradient and down gradient placement of the wells is dictated by the prevailing north-northwest direction of groundwater flow. All of the wells are constructed with 2-inch diameter PVC and contain 15 to 20 feet of screened interval across the water table. These wells are located in appropriate positions and are screened at proper depths to effectively monitor potential impact from AP-2. Under NPDES Permit #NV0000078, wells are monitored monthly for water level, pH, specific conductivity, sodium chloride, and ammonium perchlorate. The 1996 analytical data are contained in Attachment 9.

Plate 1 in the "Plates" section is a facility-wide map displaying groundwater specific conductivity values collected in June 1993. The AP ponds area is located within a pathway of elevated groundwater conductivity values originating up gradient from the ponds. Included in Attachment 9 is a graph depicting specific conductivity trends for the wells monitoring AP-2. Very little variation in groundwater conductivity is noted between the up gradient (M-17) and down gradient (M-89) wells.

In the fall of 1995, materials were transferred from AP-2 to a new double-lined pond, AP-6. AP-2 has since been decommissioned. The liner was removed and disposed of at the Apex Industrial Waste Landfill.

The remaining ponds (AP-1, AP-3, AP-4, AP-5 and AP-6) are all double lined with a leak detection system between the liners. Because the leak detection system was installed as part of the original construction of the impoundments, no groundwater monitor wells were installed; however, up gradient and down gradient wells are present in the area. On occasion, leaks in the upper liners of some of these ponds have been detected and actions have been taken to repair these leaks.

KMCC's ultimate goal is to remove all of these impoundments via new technology. Installation of a new system that will ultimately eliminate the need for the ponds has begun.

Nitrate Sampling

Samples will be collected for nitrate analysis from three wells up and down gradient from the AP ponds. A discussion of the well locations and sampling rationale is provided in the Work Plan.

Reactivity Analysis

Low levels of ammonium perchlorate in the environment do not constitute a reactivity hazard. While no pertinent studies were found through a literature search, simple calculations show that if moderate levels (around one percent) of ammonium perchlorate in soil underwent instantaneous decomposition, the temperature increase would be negligible. This conclusion is consistent with work on the thermal destruction of ammonium perchlorate in sodium chloride that found this process step to be safe up to at least 10 percent AP in sodium chloride. A discussion of the energy release potential of AP during decomposition is provided in Attachment 9.

AP in the ponds is in water and is not reactive.

Chromium Analysis

Ponds AP-1 and AP-2 receive solutions from the sodium perchlorate and ammonium perchlorate purification steps. Liquid from these impoundments is recycled back into the process from AP-3 which serves as a pump basin. On June 1-2, 1993, KMCC collected eight solids samples each from AP-1 and AP-2. The locations were randomly selected following guidelines outlined in Chapter 9 of Test Methods for Evaluating Solid Waste; SW-846 Third Edition. Analytical results are located in Attachment 9.

Statistical guidelines outlined in SW-846 Chapter 9 were also followed to determine concentrations of chromium. Calculations show that the average concentration for

AP-1 was 3.13 mg/l with a confidence interval of +/- 0.45 mg/l. Results for AP-2 were 2.80+/-0.88 mg/l.

Liquid samples were also collected from the two ponds and analyzed for chromium. Results were both <0.12 mg/l.

July 10, 1996, NDEP Comment 9. LOU Items 16 &17 - the requested summary diagram/facility map shows all AP impoundments and waste management units/areas except the on-site Hazardous Waste Landfill. Please include the landfill location on the appropriate drawing or drawings.

Response:

The location of the closed Hazardous Waste Landfill along with associated groundwater monitor wells is shown on Plate 1.

18) Pond AP-4:

Reference Items 16 & 17 above. The issue of potential chromium contamination is not applicable to this impoundment.

See response to Items 16 and 17 above.

19) Pond AP-5:

Reference Items 16 & 17 above. The issue of potential chromium contamination is not applicable to this impoundment.

See response to Items 16 and 17 above.

20) Pond C-1 and Associated Piping, SWMU KMCC-011:

This impoundment has the potential to impact ground water with elevated levels of total dissolved solids. With the exception of manganese which has a secondary MCL of 50 ug/L, no other compounds of concern appear to have been disposed here. The potential presence of manganese in site ground water should be evaluated (reference to the KMCC hydrologic evaluation of the site performed in July of 1993 is acceptable).

Issues exclusively concerning Total Dissolved Solids impacts to ground or surface water will continue to be addressed by NDEP's Bureau of Water Pollution Control. The planned closure of this impoundment should be coordinated with the BWPC as well.

In October 1994, discharges to C-1 were stopped in order to allow pond contents to dry. Subsequently, the liner and dried pond sludge were characterized and sent to Silver State Landfill.

The location of Pond C-1 is shown on Plates 1 and 2 in the "Plates" section. The pond is down gradient from the manganese tailings pile, leach plant area, and electrolytic cells in Unit 6. While it was in operation, groundwater in four monitor wells up gradient and down gradient from Pond C-1 were monitored monthly for specific conductivity, pH, and chloride. These wells, M-19, M-22, M-35, and M-39 (shown on Plate 1) were constructed with 2-inch diameter PVC. Wells M-19, M-22, M-35 and M-39 contain 15 to 20 feet of screened intervals across the water table.

Plate 2 is an isopleth of total manganese concentration in groundwater beneath the facility. The presence of manganese in high concentrations (530 mg/l) is apparent in groundwater beneath Unit 6. This high concentration of manganese decreases dramatically down gradient in the vicinity of the impoundments (Well M-19 - 1.2 mg/l and Well M-39 - 0.05 mg/l). There does not appear to be a contribution of manganese to the groundwater due to operation of C-1.

Manganese is present naturally in the groundwater system due to the presence of eroded mafic igneous material in the alluvium. The June 1993, sampling of groundwater from monitor well M-10, up gradient from the facility, found 0.7 mg/l manganese - 14 times greater than the secondary MCL.

A review of groundwater conductivity trends at the facility (Plate 1) show that impoundment C-1 does not appear to be contributing dissolved solids to the groundwater system. Well M-39, down gradient from the impoundments, had a conductivity value of 10,900 as compared to 10,630 in the up gradient well (M-35). In addition, higher conductivity values not associated with the impoundments exist both east of the impoundments (Wells M-19 and CLD-4) and west of the impoundments (Wells M-34 and M-17).

July 10, 1996, NDEP Comment 10. LOU Item #20 - Provide additional data regarding the decommissioning of Pond C-1, e.g. sampling data showing that soil contaminated at levels of concern was removed, sampling locations, etc.

Response:

Confirmatory sampling of the Pond C-1 has not been completed. A sampling Plan for this task will be submitted to the NDEP, Water Quality Planning, as it is prepared. It is expected that NDEP Corrective Actions will have the opportunity for review of the Plan's adequacy as a part of the NDEP review process.

21) Pond Mn-1 and Associated Piping:

Reference Item 20 above. It is understood that closure of this impoundment is not anticipated by KMCC at this time.

The discussion contained in Item 20 above also applies to Pond Mn-1. This is a double lined pond and is still in service.

22) Pond WC-1 and Associated Piping, SWMU KMCC-015:

No further action is required at this time.

23) Pond WC-2 and Associated Piping:

Provide information regarding the clean up of apparently contaminated soil referred to in the KMCC Final Phase I Report.

The waste collection ponds at the north end of the KMCC facility collect water from the plant and hold it until it is transported to the on-site waste water treatment plant. The ponds will, over the seasons, develop a growth of living material, including algae, bacteria, and insect populations. To combat this and to ensure a clear transportation line, sodium hypochlorite and several other Nalco water treatment products are injected into the water as it is transported from the pond to the plant. During the initial investigation to determine the appropriate product to use, the Nalco containers were placed on the ground between the two ponds. There was a small amount of spillage from the fittings as they were installed, then later removed. As appropriate treatment chemicals and container sizes were selected, containment was installed to hold the small tanks. The treatment area now consists of a containment pad and three small 250 and 500 gallon tanks. The soil which was stained with the Nalco products was placed in the pond to get value from the remaining chemicals. These chemicals are non-hazardous.

24) Leach Beds, Associated Conveyance Facilities, and Mn Tailings Area, SWMU KMCC-009:

Provide a technically based argument (which may include existing TCLP and EP Toxicity data) to demonstrate that pre-1975 disposal of slurried and solid waste to these areas will not have the potential to impact groundwater with manganese.

Provide a technical evaluation of the appropriateness of the placement and design criteria for wells used to monitor potential contaminant migration from these waste management units. Include a list of the analytes which are currently monitored for and the latest monitoring data. Reference to the facility-wide hydrologic evaluation conducted in July of 1993 may be used to provide some or all of the requested information.

Monitor wells in the vicinity of the former leach beds show that there is no significant manganese impact to the groundwater in the vicinity of the tailings pile or former leach beds. In addition, TCLP data collected in 1990 and 1993 from the existing manganese tailings area show that the leaching potential of metals from the pile is small (see Attachment 10). While no TCLP data is available from the former leach bed tails, neither the process nor the material has changed in a manner that would affect the chemical leachability of the tails.

The current manganese tailings area is shown on Plate 2. This area is bounded up gradient by monitor Wells M-31, M-32, and M-33, and down gradient by monitor Wells M-34 and M-35. A comparison of the June 1993, groundwater manganese concentrations shows that manganese values in the groundwater are lower down gradient from the tailings area than up gradient from it.

The former manganese tailings areas are also shown on Plate 2. The highest concentration of manganese down gradient from the former tailings area west of the current tailings area is 0.9 mg/l in Well M-75. This value is slightly above that of the background Well M-10 (0.7 mg/l). The eastern portion of the former tailings area is north of Unit 6. A comparison of manganese values down gradient from the area (Well M-77) to up gradient (Well M-28) shows an increase in groundwater manganese concentrations. This increase may be due to impact from the manganese originating from beneath Unit 6.

Wells M-19, M-22, M-35, and M-39 are monitored monthly for manganese, pH, specific conductivity, and water elevation. These wells are down gradient from the current manganese tailings area and are utilized for monitoring of impoundment C-1. No specific wells are currently designated for monitoring of the tailings area. However, the above wells would identify impacts caused by the tailings if they were to occur.

July 10, 1996, NDEP Comment 11. LOU Items 24 and 34 - The LOU requests specific information regarding the potential impact of manganese on the groundwater from the

areas. Provide additional, manganese specific data or an explanation relating the non-manganese data from Attachment 10 to the potential manganese impact.

Response:

Six groundwater monitor wells are currently sampled on a monthly basis for manganese concentration. Three of these wells, M-32, M-19, and M-39 are in proximity to the Manganese Tailings Area (see Plate 2). A graphical comparison of the up gradient manganese values (well M-32) and the down gradient values (wells M-19 and M-39) is presented in Attachment 25. These data show a lack of response in down gradient wells to variations of manganese concentrations in the up gradient well. This is indicative of the pronounced insolubility of manganese in the groundwater over relatively short distances of movement.

While the TCLP data included in Attachment 10 does not include information on manganese, it does indicate that metals in the tailings have very limited potential to leach due to the nature of the material and the acidic processing that it has undergone. The tailings are generated from two points in the manganese production process: 1) the remainder from the ore that is not soluble in the leaching solution, pH of approximately 3.5, and 2) the solid precipitate from the sulfiding process which is not soluble in an acidic solution, pH of approximately 4.5. The solutions from which the tailings are generated are more acidic than the TCLP extraction solution, therefore it can be inferred that the tailings' constituents would not leach in the TCLP extraction solution.

25) Process Hardware Storage Area, SWMU KMCC-001:

No further action is required at this time.

26) Trash Storage Area:

No further action is required at this time.

27) PCB Storage Area, SWMU KMCC-003:

No further action is required at this time.

28) Hazardous Waste Storage Area, SWMU KMCC-004

Provide documentation of the remediation of hydrocarbon contaminated soil observed during Kleinfelder's site reconnaissance. This documentation should include confirmatory sampling and analysis using EPA Method 8015 modified for petroleum hydrocarbons.

The oil stains identified by Kleinfelder were associated with the used oil storage area and were non-hazardous.

As part of the project to take new P-2 pond out of service, the hazardous waste storage pad and adjoining waste oil storage pad were relocated to make way for installation of two above ground tanks. During installation of the tanks, the storage pad and surrounding soils were removed to a depth of 4 feet. Testing of the soil showed elevated levels of TPH. These soils and pad materials were disposed of at the Silver State disposal site near Apex, Nevada. A composite sample taken from several locations in the bottom of the excavation showed that TPH values were non-detect (see Attachment 11).

July 10, 1996, NDEP Comment 12. LOU Item #28 - Please provide additional detail regarding closure and hydrocarbon removal at the hazardous waste storage area, i.e., volume of material removed, location of the samples, disposal receipts, etc. Also, what were the "elevated levels of TPH" shown by soil testing and what other materials were analyzed for.

Response:

In November 1994, the hazardous waste and used oil staging area, located north of Unit 2, was demolished and a new staging area was constructed west of the administration building. Historically, the southern end of the old pad was designated for used oil staging and the northern end was designated for hazardous waste staging. Before the old staging pad was demolished, soil samples were collected around the pad perimeter along with concrete core samples of the pad itself. Analytical data from this sampling effort indicated that the soil was affected by TPH along the south and southwest perimeter of the pad. PCB concentrations in those same samples were non-detected. TPH concentrations ranged from 320 ppm to 620 ppm. This area of the pad was used for used oil staging, and the TPH affected soil was most likely due to the placement of the emptied, used oil drums on the soil next to the pad. The soil was excavated and disposed of at Environmental Technologies, Apex, Nevada. Confirmatory sampling was done as the excavation progressed. Altogether, approximately 25 yards were removed to Environmental Technologies. Manifest numbers 00910 to 00916 and 00918 were associated with the disposal. Confirmatory soil sampling was done on November 22, 1994. Included, as Attachment 18, are analytical data and manifests associated with this project.

29) Solid Waste Dumpsters, SWMU KMCC-008

No further action is required at this time.

30) Ammonium Perchlorate Area - Pad 35, SWMU KMCC-0017:

No further action is required at this time.

31) Drum Crushing and Recycling Area, SWMU KMCC-018:

Provide documentation of the remediation of minor soil staining in this area.

Provide information regarding improvements in area operating procedures for the removal of residual materials from drums prior to storage and crushing so as to minimize or eliminate spillage of waste materials to the ground.

The drum crushing station located east of the new D-1 building is used to crush drums from the AP operation. Procedures are in place to clean the residue from the drums before they are crushed. These are included as Attachment 12. Procedures also include management review of the drums prior to transporting them to the crushing area.

Unassociated staining of the soil close to the crushing area was mentioned in the KMCC Phase 1 report. The minor staining was attributed to ammonium perchlorate transportation or material handling. The minor soil staining was shoveled up and put into drums for recovery of the ammonium perchlorate value.

32) Ground Water Remediation Unit, SWMU KMCC-019:

Provide information regarding improvements in area operating procedures for the purpose of minimizing or eliminating spillage of waste materials to the ground. Document any modifications made to the remediation unit for this purpose.

In accordance with a Consent Order in 1987 between KMCC and the Nevada Division of Environmental Protection (NDEP), KMCC implemented a remediation program to remove hexavalent chromium from groundwater at the site. Over the last several years, modifications have been made to minimize spills of treated water from the remediation unit and discharge lines. These modifications focused on the groundwater treatment system and the recharge trenches.

An evaluation of the remediation program in September 1993, indicated a decrease in the permeability of the recharge trench. This was caused by periodic process upsets which allowed treated water containing soluble iron to carry over into the treatment system discharge. While the process upsets did not result in the treatment criteria being exceeded, the iron precipitated in the trench and reduced its permeability. This caused treated water to periodically rise in the recharge trench stand pipes and pool in the area.

KMCC evaluated the necessity of a polishing filter to protect the recharge system from the iron precipitate but determined that improvements to the current settling tank would be as effective. The settling improvements included modifying the coagulating polymer, altering the process to introduce a previously precipitated iron particle to act as a seed for incoming iron to precipitate on, and maintaining better pH control. These modifications appear successful at eliminating iron precipitate in the treatment discharge to the recharge trench.

The recharge trench which had become plugged by the iron precipitate was renovated in 1994. The infiltration gravel was removed and replaced with clean gravel. The removed gravel was disposed of at the Apex Industrial Waste Landfill. The renovated trench has performed well since that time.

When the remediation program was started in 1987, the volume of treated groundwater ranged from 100 to 120 gallons per minute (G.P.M.). Today, groundwater volume ranges from 35 to 50 G.P.M. This is due primarily to cessation of the use of the unlined Beta ditch which is up gradient of the groundwater recovery system.

Due to the diminished flow of groundwater, the treatment system required frequent on and off cycling. The intermittent operation caused a number of mechanical failures resulting in the treated water spilling into the containment area and surrounding soils. The treatment system was modified to allow for a more continuous operation by recycling a portion of the treated water back to the treatment process. This has significantly reduced mechanical failure rate and the subsequent spillage.

33) Sodium Perchlorate Platinum By-Product Filter, SWMU KMCC-021.

KMCC will provide a written statement describing the repair of floor cracks in this unit. Beyond this, no further action is required at this time.

The floor inside the bermed area around the filter has been coated with a Chevron industrial membrane material that provides a continuous cover over the floor. This fully covers any cracks that may be present in the underlying concrete.

34) Former Manganese Tailings Area, SWMU KMCC-022:

Reference Item 24 above.

See response to Item 24.

35) Truck Emptying/Dump Site, SWMU KMCC-025:

Provide a sampling plan for assessment/characterization of "unknown" waste materials disposed in this area.

This item is addressed in the Work Plan.

36-38) Former Satellite Accumulation Points:

No further action is required at this time.

39) Satellite Accumulation Point - AP Maintenance Shop, SWMU KMCC-29:

Provide documentation of remediation of minor spill noted in the Phase I Report. This should include information regarding the association between the spill and the 1,1,1-trichloroethane stored in this area.

Provide information regarding improvements in area operating procedures for the purpose of minimizing or eliminating spillage of waste materials.

A parts washer is used at the AP Maintenance shop to clean oily debris from parts undergoing repair. Waste from the parts washer, if containing 1,1,1 TCA, was sent to a hazardous waste disposal site for proper disposal. Non-hazardous cleaning fluids are now used for parts washing and the use of 1,1,1 TCA has been eliminated.

The small amount of soil staining near the drum of parts washer was not associated with the 1,1,1 TCA drum. It was the result of minor spillage from a used oil drum also

in the area. Visibly stained soil was picked up and placed in a drum. This drum was tested and found fit for disposal at Environmental Technologies soil/oil treatment farm. Subsequent tests indicate that some elevated TPH values are still present. Additional soil will be removed and results provided to the NDEP.

July 10, 1996, NDEP Comment 13. LOU Item #39 - Provide a schedule for the additional soil removal, analysis, and reporting. What are the elevated levels of TPH still present and the extent of the contamination? This item may be more appropriate to the Work Plan for ease of management and tracking.

Response:

Levels of TPH in the area of this item ranged from below 100 to 130 ppm. To facilitate tracking of soil removal and confirmatory sampling, this item will be addressed in the Work Plan.

40) PCB Transformer Spill:

No further action is required at this time.

41) Unit 1 Tenant Stains:

Provide documentation of remediation of hydrocarbon impacted soil in this area.

Visibly stained soil immediately to the north of Unit 1 was removed and disposed of at Environmental Technologies soil farm near Apex, Nevada. Confirmatory sampling indicates some areas of elevated TPH are still present. These areas will be cleaned again and results provided to the NDEP.

July 10, 1996, NDEP Comment 14. LOU Item #41 - See NDEP Comment above for LOU #39.

Response:

Levels of TPH in the area of this item ranged from below 100 to 150 ppm. To facilitate tracking of soil removal and confirmatory sampling, this item will be addressed in the Work Plan.

42) Unit 2 Salt Redler:

No further action is required at this time.

43) Unit 4 and 5 Basements:

Provide a discussion concerning the feasibility of characterization and removal and/or stabilization of residual chromium contamination in the unsaturated zone beneath these units.

Provide, as a stand alone document, a full re-evaluation of the effectiveness of the chromium recovery system. Included should be such items as aquifer properties and characteristics, ground water flow patterns, capture and reinjection zones, influent concentration trends, etc. A discussion of the transport and fate of chromium within the shallow aquifer and within the vadose zone beneath Units 4 and 5 should also be included in this document.

Recovery System Reevaluation

A report titled Groundwater Interception System Evaluation Report, Henderson, Nevada Facility prepared by the Kerr-McGee Hydrology Department was submitted to NDEP on September 15, 1993. The report concluded that four additional intercept wells were needed to improve the recovery performance of the system. These wells were installed and put into service in July 1994.

In addition (as discussed in Item 32 above), studies of the infiltration beds showed that they had plugged off due to iron oxide precipitation in the voids. The entire trench system was excavated and renovated in October 1994. The treatment system itself has been upgraded to reduce the build up of iron in the system and prevent future plugging of the infiltration galleries.

Based on the latest monitoring results, the system is effectively capturing and treating the groundwater chromium plume. Analytical results are reported semi-annually to the NDEP.

Removal or In-situ Stabilization of Chrome in Contaminated Soil

Unit 5 houses the sodium perchlorate production process and part of the manganese dioxide process. Any characterization or stabilization/removal of soils from beneath this unit would require the shutdown of these two processes for an extended period of time.

Unit 4, while currently inactive, is being held in reserve for possible use at a future date. Removal of soil from beneath this building would require destruction of the building if significant quantities had to be removed. Traditional stabilization technologies reviewed such as injection or mixing of reducing agents would ultimately

add additional TDS to the groundwater. Other technologies reviewed have not been proven on a field scale to date.

As mentioned above, the groundwater remediation system down gradient of these units is effectively capturing and treating the chromium.

July 10, 1996, NDEP Comment 15. LOU Item #43 - The Division will review and evaluate the referenced document (Groundwater Interception System Evaluation Report, Henderson, Nevada Facility) Prepared by the Kerr-McGee Hydrology Department in response to the "stand alone document" request of LOU #43. Additional KMCC effort may be required based on the results of this review, including further characterization of contamination in the vadose zone beneath Units 4 and 5.

Response:

The following information is provided to assist NDEP in its evaluation of the ongoing Chromium Remediation effort at the KMCC Henderson facility.

<u>Removal of Chromium Contaminated Soil</u>

Units 4 and 5 dimensions are approximately 200 by 250 feet each, with the water table roughly 35 feet below the units' basements. There is an estimated 65,000 cubic yards of unconsolidated alluvium below each unit. Some or all of this soil may be affected with Cr^{+6} and would potentially require the extraction of large quantities of soil.

Removal of contaminated soil from underneath the buildings is not possible without destruction of the buildings. Currently, the eastern half of Unit 5 houses the sodium perchlorate production cells. Destruction of Unit 5 would require shutdown of the current sodium perchlorate process and would significantly impact the production of sodium chlorate and ammonium perchlorate as well. The western half of the building contains manganese dioxide production cells, installed in 1994 as part of the manganese reconfiguration project. Removal of the soil from beneath the Unit 5 would require the destruction of the building and concurrent shutdown of the affected manganese dioxide process as well. Unit 4 is currently inactive but is being held in reserve for future expansion opportunities. As with Unit 5, removal of soil would require destruction of the building and not allow for its future reuse.

KMCC believes that continued operation of the groundwater intercept and treatment system is adequately addressing chromium affected groundwater at the site. The pump and treat remediation alternative was selected in 1987 to address groundwater chromium contamination because this appeared the best alternative

for capturing the hazardous chromium. It is important to remember that soil removal would address only the affected soil and would not address the groundwater which had flowed away from the impacted area.

44) Unit 6 Basement:

Provide a technically based discussion of the potential impacts to groundwater from manganese bearing solutions and from residual high/low pH contamination in the vadose zone which may have resulted from leakage of the basement of this unit. A discussion is required of the engineering features, leak detection system(s), and periodic maintenance of the basement liner and any other appropriate method of addressing the issue of potential on-going releases. Groundwater monitoring data should be used to document impacts (or lack thereof) from residual contamination beneath the unit.

In response to an Administrative Order issued 8-16-86, the basement liner is inspected and repaired on a regular basis. A recent history of these repairs is included as Attachment 13. Repairs were made not only to any holes that were discovered in the liner, but to indentations as well. As a result, the majority of the "holes repaired" noted on the summary sheet were not actual penetrations of the liner. It should also be noted that there is typically no standing water on the liner. Any drips onto the liner are directed to a sump and recovered.

Well M-29 is located in the basement of the Unit 6 building. Groundwater manganese, specific conductivity, and pH values were collected and recorded for this well as part of the facility-wide sampling program in June 1993. Well M-29 contained the highest manganese concentration (530 mg/L) noted during the sampling program. This information is shown on Plate 2. This well also contained the lowest pH recorded for groundwater beneath the facility. This value (6.39) is depicted on Plate 3.

The elevated manganese and relatively low pH beneath Unit 6 are due to past, historic leaks of manganese sulfate solution from the electrolytic cells housed in the building. The groundwater pH trend emanating from Unit 6 shows a rapid neutralization down gradient from the building (see Plate 3). Likewise, manganese concentrations are also reduced markedly in a down gradient direction. Manganese is most soluble as a sulfate, but is relatively insoluble as an oxide or hydroxide. The manganese sulfate reacts with calcium in the vadose zone to produce calcium sulfate (gypsum) which precipitates. The residual manganese is apparently oxidized, drops out of solution, and is immobilized down gradient from the building. This rapid diminution of manganese in the groundwater down gradient from Unit 6 is readily apparent in the trends presented on Plate 2.

45) Diesel Storage Tank:

Within 180 days of receipt of this letter of understanding, KMCC will provide the Division with a work plan designed to address visible and potential hydrocarbon contamination of soil and/or groundwater in this area. If KMCC decides to renovate the tank, integrity testing (including some form of non-destructive testing of the tank bottom) will be performed. If KMCC decides to discontinue tank use, the tank will be removed and the area assessed for contamination.

KMCC has removed the above-ground diesel storage tank. Following discussion with NDEP, the diesel tank area assessment plan will be included in the Phase II Work Plan and will be implemented when approved by NDEP as part of the Phase II investigation.

46) Former Old Main Cooling Tower and Recirculation Lines:

No further action is required at this time.

47) Leach Plant Area Manganese Ore Piles:

Provide data/documentation from industrial hygiene studies to on-site workers and off-site residents from exposure to manganese ore and/or manganese compounds.

Dust samples are collected periodically in the manganese leach plant as part of the facility's industrial hygiene program. From these surveys, eight-hour time weighted averages for dust exposure are developed. In 1995, the average exposures were:

Operator A	**1.74 mg/M^3 total dust**
Maintenance Technician	**0.058 mg/M^3 total dust**

Operator A is directly involved in turning the roaster piles and has the greatest potential for exposure to dust. The Maintenance Technician results are more typical of dust exposures in the general area of the leach plant.

No such testing has been conducted off-site.

July 10, 1996, NDEP Comment 16. LOU Item #43 - Has KMCC evaluated the effects of manganese exposure to off-site residents at other facilities? If so, what results were obtained, what conclusions were drawn, and what changes/modifications to processes, etc., were made in response to these results and conclusions? What industrial hygiene studies

are available and/or have been reviewed by KMCC concerning manganese effects on the local resident population?

Response:

Although LOU Item 43 is indicated in the NDEP comment, for consistency, this item has been included in LOU Item 47 response.

KMCC has not evaluated the effects of manganese exposure to off-site residents at other facilities. KMCC is unaware of studies of manganese effects on the local resident population.

48) Leach Plant Anolyte Tanks:

Provide a technical evaluation of the appropriateness of the placement and design criteria for wells used to monitor potential manganese and pH contaminant migration from this area. Include a list of the analytes which are currently monitored for and the latest data. Reference to the facility wide hydrologic evaluation conducted in July of 1993 may be used to provide some or all of the requested information.

The manganese leach plant area containing the various tanks and lines is shown on Plates 1, 2 and 3. The leach plant area is bounded on the down gradient portion by monitor wells M-31, M-32, and M-33, and up gradient by Wells M-11, M-28, and M-29. Each well is screened across the water table for effective water level measurement and monitoring purposes. All the wells except M-11 are constructed with 2-inch PVC. Well M-11 is 5-inch diameter steel. The screened interval in the wells ranges from 10 to 20 feet in length. The up gradient and down gradient placement of the wells is based on the prevailing north-northwest direction of groundwater flow.

Although the well network is not currently sampled as part of a required monitoring program, certain parameters are collected on a monthly basis from the wells. Up gradient wells M-11 and M-28, and down gradient wells M-31 and M-32, are monitored for water level, pH, and specific conductivity. Well M-32 is also monitored for manganese. The 1996 analytical data are contained in Attachment 14.

Plate 2 shows the manganese concentrations in groundwater sampled from these wells in the June 1993 sampling event. Well M-29, up gradient from the leach plant area and underneath Unit 6, contained a manganese concentration of 530 mg/L. This elevated manganese value, which trends down gradient to the north-northwest toward the leach plant area and Well M-32, is related to historic releases from Unit 6. Well M-32, directly down gradient from the leach plant area, contained a manganese concentration of 9.4 mg/L. The reduced concentration of manganese down gradient from the leach

plant area indicates that the leach plant apparently has not contributed manganese to the groundwater. Based on the 1996 analytical data for M-32, manganese concentrations have declined since the 1993 sampling.

Plate 3 displays the groundwater pH trends at the facility based on the June 1993 sampling event. These data for the up gradient and down gradient wells are presented in graphical form in Attachment 14. A review of these data indicate that no identifiable impact to the groundwater system from leach plant activity is apparent.

49) Leach Plant Area Sulfuric Acid Storage Tank:

Reference Item 48 above.

See response to Item 48.

50) Leach Plant Area Leach Tanks:

Reference Item 48 above.

See response to Item 48.

51) Leach Plant Area Transfer Lines:

Reference Item 48 above.

See response to Item 48.

52) AP Plant Area Screening Building, Dryer Building and Associated Sump:

Provide documentation of remediation of "minor white staining" from ammonium perchlorate wash downs and modifications to area procedures to mitigate or eliminate further releases of waste materials.

Modifications to this area include installation of secondary containment around the sump, and a collection ditch completely around the building. This prevents the release

of material from the building to the surrounding soil. The minor white staining was cleaned up and the material recycled for recovery of the AP value.

53) AP Plant Area Tank Farm:

Provide documentation of remediation of small visible staining and repair or replacement of the concrete pad.

Provide a discussion of procedural changes intended to mitigate or eliminate further releases of waste materials.

The AP Plant tank farm area has been renovated by replacing old concrete around the tanks and installing curbs to prevent spills from reaching the soil. Any spilled or leaking material is captured by a sump and returned to the process to recover ammonium perchlorate value. These renovations have eliminated releases of ammonium perchlorate to soil surrounding the tank farm.

The small stained areas were picked up and recycled for recovery of AP values.

54) AP Plant Area Change House/Laboratory Septic Tank:

Provide a work plan for assessment/characterization of potential contamination related to waste chemical disposal via the laboratory septic system.

This item is addressed in the Work Plan.

55) Area Affected by July 1990 Fire:

Provide documentation of the remediation of the impacted area including specific data (e.g. waste volume, etc.) regarding material disposal at U.S. Ecology.

In July 1990, a fire occurred on AP storage pad 24. The fire was extinguished with water. The ammonium perchlorate not destroyed in the fire was reclaimed in the AP plant. The nature of ammonium perchlorate decomposition leaves negligible residue as all the decomposition products are gases: NOx, Cl_2, HCl and O_2. The drums involved in the fire were washed at the tank farm to recover the ammonium perchlorate value, then crushed. The burned asphalt and soil surrounding the area, consisting of about 30 yd^3, was removed and sent to US Ecology.

56) AP Plant Area Old Building D-1 -- Washdown:

Provide a technically based discussion concerning the environmental fate of ammonium perchlorate in site soils (see also the requirements of Item #52 above).

A literature search of available information on the environmental fate of ammonium perchlorate (AP) in soils turned up very little information. One report titled Biodegradation of Rocket Propellant Waste, Ammonium Perchlorate, by Dr. Syed M. Z. Naqvi and Dr. Abdul Latif was issued on June 23, 1975, under a NASA contract (NASA-CR-142965).

A second report (NASA-CR-148323) under the same title by the same authors was issued on July 3, 1976. The former report discusses the impact of AP on various plants and micro-organisms and presents initial data on a long-term impact of AP in soils. The later report also discusses results of additional tests to determine the effects of AP on selected plants and micro-organisms. It also provides results of tests on the long-term impacts of AP on soil chemistry started in the first report.

The soil tests were run for 22 months. General conclusions regarding the impact of AP on soil chemistry are:

1) **No statistically significant difference was obtained in chloride contents of soil which was analyzed after 12, 16, and 22 months of initial treatment.**

2) **No change in the nitrogen contents of soil occurred anytime after the initial treatment with AP.**

3) **There was no significant difference in pH levels after 22 months.**

4) **Soil chemistry is not affected by the treatment of ammonium perchlorate.**

Other conclusions related to plant germination and growth show that at the 55 g AP/m^2 concentration in soil level (which was the highest concentration tested) shows some toxicity to selected plant species. However, micro-organisms were unaffected.

July 10, 1996, NDEP Comment 17. LOU Item 56 - Additional clarification of the response is required. For example, does "initial treatment" refer to application of AP to the soil or application of a methodology to remove/reduce it? If the latter, it appears to have been a failure. Also, since the referenced reports (please provide the division with copies) are over

20 years old and the literature search was brief, is anyone actively investigating AP environmental impacts at the current time. I understand that an AP working group, composed of producers and users is also concerned about this issue. Is any information available from this group?

Response:

The two referenced reports are included as Attachment 19. The term "initial treatment" referred to the initial application of AP to the soil and not a methodology for removing AP from the soil. The library search for information regarding the environmental fate of AP covered a large number of sources. These sources indicate that there is little information on the environmental fate of AP in soil. This fact is confirmed by discussion with members of the AP working group. They have provided a few additional references that we are currently attempting to obtain. Briefly, what information is available indicates that the perchlorate ion is inert and generally does not react with other compounds in the soil or groundwater. However, there are some instances where degradation of AP in the soil appears to have occurred but the mechanism for the degradation is not well understood.

57 & 58) AP Plant Area New Building D-1 -- Washdown and AP Plant Transfer Lines to Sodium Chlorate Process:

No further action is required at this time.

59) Storm Sewer System:

Provide documentation of system flow/integrity investigations as part of a technical evaluation concerning the potential for soil and/or groundwater contamination resulting from waste disposal and storm water discharges through the storm sewer system.

Provide a technical evaluation of the appropriateness of the placement and design criteria for wells used to monitor potential contaminant migration from the storm sewer system. Include a list of the analytes which are currently monitored for and the latest data. Reference to the facility wide hydrologic evaluation conducted in July of 1993 may be used to provide some or all of the requested information.

Attachment 15 contains a "Declaration of Observation" from Alan Gaddy regarding his observations of flows in the storm sewer system.

A general configuration of the storm sewer system and the acid drain system is shown on Plates 1 and 3. Neither drain system has a specific monitor well network designated for monitoring potential impact to the groundwater; however, numerous monitor wells are located throughout the facility in up gradient and down gradient positions to segments of the drain systems. Based on the configurations of groundwater pH and specific conductivity trends at the facility, there are no apparent point sources of impact directly attributable to the drain systems. The low pH and high specific conductivity values noted on Plates 1 and 3 are related to past leaks and spills into the subsurface from operations within the Unit buildings 4, 5, and 6 and not from the storm sewer or acid drain systems. The existing placement of monitor wells at the facility should be sufficient to detect any point source impact emanating from the drain systems.

July 10, 1996, NDEP Comment 18. LOU Item #59 - The LOU requests a list of analytes "...currently monitored for and the latest data." Please provide this information along with the locations at which any samples were taken. This response also only addresses groundwater contamination. What soil sampling has been conducted around the storm sewer system to ensure that no leakage has occurred. Mr. Gaddy's letter makes reference to small flows in the system from up gradient source water leaks. If water can get into the system, contamination has the potential to get out.

Response:

The KMCC Henderson facility is a "zero discharge" facility, meaning all process solutions are controlled in vessels and/or lined impoundments. The storm drain system at the KMCC facility receives only storm water and non-contact cooling water/water leaks. Any water flows are sampled and analyzed according to the following schedule:

NPDES Discharge Analytes (Per Event)

Analyte	*Stormwater*	*Non-contact water*
pH	*X*	*X*
Temperature	*X*	*X*
Total Dissolved Solids	*X*	*X*
Total Suspended Solids	*X*	
Chemical Oxygen Demand	*X*	

Oil and Grease	*X*
Nitrate	*X*
Nitrite	*X*
Ammonia	*X*
Total Phosphorus	*X*

The most recent set of analytical data, the KMCC Henderson Discharge Monitoring report (DMR), is included as Attachment 20.

Because the storm drain system is subsurface (ranging from 25 to 45 foot below surface grade), soil sampling around the drain has not been done. There has been no evidence of any leakage from the storm drain system which would have required an excavation of this magnitude. As explained above, the network of groundwater wells throughout the facility should be sufficient to detect point source impact emanating from the drain system.

Mr. Gaddy's reference to water leaks getting into the storm drain system are from surface flows on the streets but have at times been attributed to water line leaks in the basements of the electrical subs which are then pumped to the storm drain system. Access of these flows into the storm drain system are by the surface street drains and/or lines which are piped directly to the storm drain system. There has not been a recorded case of water flows being introduced into the storm drain system from infiltration of the flows through the clay/brick piping or manhole system.

60) Acid Drain System:

Provide a technically based evaluation of the potential for soil and/or groundwater contamination resulting from historic waste disposal through the acid drain system.

Provide a technical evaluation of the appropriateness of the placement and design criteria for wells used to monitor potential contaminant migration from the acid system. Include a list of the analytes which are currently monitored for and the latest data. Reference to the facility-wide hydrologic evaluation conducted in July of 1993 may be used to provide some or all of the requested information.

See response to Item 59. All acid drains in operating portions of this plant have been plugged and are no longer in use. The existing placement of monitor wells at the

facility should be sufficient to detect any point source impact emanating from the drain systems.

July 10, 1996, NDEP Comment 19. LOU Item #60 - What is the status of the acid drains in the non-operating portion of the plant? What material/contaminants can get into these drains and can be distributed throughout the system? What techniques have been employed to verify the integrity of this system? What soil sampling has been conducted around the acid drain system to ensure that no leakage has occurred. What does KMCC plan to do with the unplugged portion?

Response:

Acid drains in the non-operating portion of the facility are those in the Units 1 and 2. These Units do not have ongoing operations in them and are being demolished. While the drains in Units 1 and 2 are not plugged with concrete, as those in the operating areas, they do not have the potential to receive any process flows or waste. They are remote in reference to any operating portion of the plant. In addition, the areas of Units 1 and 2 which contain the access to the acid drains have been backfilled with concrete debris and soil. The large steel building structure of Units 1 and 2 are being demolished and the area is expected to be graded and remain unused.

Because the acid drain system has been plugged in the operating portion of the plant, there has been no attempt at invasion of the drain system for the purposes of determining the system's integrity. In addition, because the acid drain system is subsurface (ranging from 25 to 45 foot below surface grade), soil sampling around the drain has not been done. There has been no evidence of any leakage from the acid drain system which would have required an excavation of this magnitude. As explained above, the network of groundwater wells throughout the facility should be sufficient to detect point source impact emanating from the acid drain system.

61) Old Sodium Chlorate Plant Decommissioning:

No further action is required at this time.

62) State Industries, Inc. Site, Including Impoundments and Catch Basin:

Provide a work plan for the complete assessment/characterization of the State Industries surface impoundments. Analytes should be selected based upon known or suspected waste streams disposed to these ponds and should include TCLP metals, volatile organic compounds (if applicable), TPH (if applicable), and pH.

KMCC has been working with State Industries to determine the appropriate action on the surface impoundments. Samples were collected from the east impoundment in March 1994. Additional samples were collected on January 3-4, 1996, which included both the east impoundment and the west impoundments. Samples were collected by Western Technologies, Inc. (WTI). Results are presented in a report prepared by WTI (see Attachment 16). These results indicate that metal and other compound concentrations are low.

July 10, 1996, NDEP Comment 20. LOU Item 62 - Attachment 16 (Subsurface Soil Evaluation, Former Evaporation Pond Sites, Former State Industries Facility) will require additional evaluation by the division to determine if additional information is required. Areas of potential concern include closure requirements/documentation for the former evaporation ponds, regulatory status, and other historical uses. There also appear to be several factual inconsistencies between Attachment 16 and the KMCC Phase I Report, including differences with respect to the type of pond liner and the physical size of the ponds. These inconsistencies must be resolved to the satisfaction of the Division.

Response:

KMCC is attempting to resolve the inconsistencies related to the State Industries ponds, operated on property leased from KMCC. A letter requiring a response from State Industries in this matter has been sent to State Industries requesting resolution of these issues.

63) J. B. Kelley, Inc. Trucking Site:

Provide closure and/or remediation documentation for the underground storage tanks formerly located at this site. Include data from the groundwater monitor wells installed by KMCC to evaluate potential hydrocarbon contamination.

Provide an assessment plan to characterize areas potentially impacted by truck washing rinsate and liquids and sludge present in the concrete vaults at this site.

An investigation plan for the concrete vaults is presented in the Work Plan.

J. B. Kelley, Inc. previously leased a portion of Kerr-McGee Chemical Corporation (KMCC) property to the north of the Unit 1 and 2 buildings. Kelley conducted trucking-related activities on the property from September 1986 to June 1991 which included truck washing, fueling, oil changes, and minor repair work. Trucks were fueled on-site from a 10,000 gallon underground diesel storage tank. Waste oil was stored temporarily in a 600 gallon underground tank.

In June 1991, all on-site fueling operations were discontinued and the diesel and waste oil tanks were removed. The tank closure activities were performed for J. B. Kelley by an environmental contractor. At the time of removal, both tanks were found to have released hydrocarbons to the subsurface. Hydrocarbon-impacted soils surrounding the tanks were subsequently excavated, and Clark County approved the closure.

On May 4-6, 1993, KMCC performed a soil and groundwater assessment of the J. B. Kelley site to evaluate groundwater quality conditions. The work performed included a comprehensive soil boring program, monitor well installation, and monitor well sampling.

Two soil borings were drilled at the locations shown on Figure 2. Soil boring M-92 is located up gradient to the south from the underground storage tank excavations. Soil boring M-93 is located approximately 100 feet down gradient from the diesel tank excavation. Soils were logged according to the Unified Soil Classification System. Soil lithology, photoionization detector (PID) response, depth to groundwater, and the presence or absence of hydrocarbon odor were noted. The soil boring information is presented on soil boring log forms in Attachment 17.

Groundwater monitor wells were installed in each of the soil borings. These wells were constructed of 2-inch diameter Schedule 40 PVC. All casing and screen joints were flush-threaded and assembled without the use of cementing compounds. Ten foot screened sections with 0.010 inch slot size were installed in each well. Number 16 grade silica sand was utilized for filter pack around the well screens. This filter pack material extends at least two feet above each screen and is topped by a minimum of two feet of hydrated bentonite pellets.

A cement-bentonite grout was emplaced above the bentonite pellet seal. Well M-92 was completed with a 3 foot by 3 foot concrete pad and steel casing protector. Well M-93 was completed as a flush-mount well. Following well completion, the wells were developed by bailing to remove fines from the natural formation. All information relating to well construction and development is presented in Attachment 17.

Groundwater samples were collected from each of the wells following development. The samples were shipped on ice by overnight delivery to Alpha Analytical, Inc. in Sparks, Nevada. Each well sample was analyzed for Total Petroleum Hydrocarbons (TPH) and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX).

The results of the groundwater analysis, presented in Attachment 17, show that neither TPH nor BTEX were detected in the monitor wells. These results indicate that there is no hydrocarbon impact to the groundwater from past activities at the J. B. Kelley

site. Since the underground tanks and hydrocarbon-impacted soil have been removed, no further potential for hydrocarbon contamination exists at the site.

July 10 ,1996, NDEP Comment 21. LOU Item #63 - Please provide a copy of the final report and the closure letter from Clark County regarding the June 1991 tank removal at the J.B. Kelley Site. Completion of the two borings (MW-92 and MW-93) indicates an intent to continue sampling for some period of time into the future. Attachment 17 only includes analytical data from the initial sampling round. What additional data is available? Please provide a copy to the Division.

Response:

The final closure report and the closure letter from Clark County regarding the June 1991 tank removal at the JB Kelley Site are included as Attachment 21. Following closure of the J.B. Kelley tank, KMCC installed two wells, M-92 up gradient and M-93 down gradient from the tank area. It was KMCC's intent to confirm that there had been no down gradient groundwater impact from this tank. The analytical information related to the construction and sampling of these wells is supplied in Attachment 17. The installed monitoring wells confirmed that there had been no impact.

Special Note :

July 10, 1996, NDEP Comment 22. LOU Items 64 through 67 - Page 26 is missing from this document. Please provide this page and the responses referenced to the LOU's.

Response:

Page 26 was inadvertently left out when the May 1996 draft of this report was compiled. The information from Page 26 of the May 1996 draft is included now and contains information related to LOU Items 64 through 67.

In addition, correspondence related to the KOCH lease (a letter from KOCH and two reports prepared by Western Technologies, Inc. dated April 25, 1996, and April 26 , 1996) is included in Attachment 22. KMCC received these reports after we had submitted the May 1996 draft response to the LOU. The reports relate to LOU Item 64 and contain the results of subsurface soil investigations and soil removal activities conducted at the former Koch facility. The results of the investigation indicate that all hydrocarbon levels are below NDEP action levels for hydrocarbon contaminated soils.

64) Koch Materials Company Site:

Provide documentation of KMCC's efforts, in conjunction with those of Koch Materials, Co., to remediate hydrocarbon contamination and to develop operating procedures and/or containment structures to prevent further releases of petroleum hydrocarbons and other wastes.

Koch's lease of this location terminated as of January 31, 1995. Koch has ceased operations and removed many of the fixtures and equipment from the leased premises. Only the concrete lab building, metal storage building and truck scale remain. Koch has removed visibly stained soils from areas they operated in during the lease. They have also collected confirmatory samples for TPH analysis which are currently undergoing analysis.

65) Nevada Precast Concrete Products, Green Ventures International, Buckles Construction Company, and Ebony Construction Sites:

Determine whether soil staining identified in this area is coincident with the staining referred to in Item 41 above. If the staining is not coincident with this item, provide documentation of KMCC's efforts to work with these tenants for the purpose of remediating hydrocarbon contamination and developing operating procedures and/or containment structures to prevent further releases of hydrocarbon compounds and other waste materials.

This item refers to soil staining identified north of Unit 1. See response to Item 41.

66) Above-Ground Diesel Storage Tank Leased by Flintkote Co.

No further action is required at this time.

67) Delbert Madsen and Estate of Delbert Madsen Site:

Provide documentation of KMCC's efforts to work with the tenant to further assess and characterize contamination which may be present at this location.

Mr. Vohs' lease terminated in 1995. KMCC has hauled the remaining trash and debris from the site to the Silver State Landfill at Apex. The area is now vacant and free of trash and debris.

68) Southern Nevada Auto Parts Site:

Provide documentation of KMCC's efforts to work with the tenant to further assess and characterize contamination which may be present at this location.

In mid-January 1993, KMCC requested information from Nevada Recycling Corporation, the current lessee, regarding actions being taken to address observations made the Phase I ECA report. They responded by stating that they have made efforts to employ practices and make improvements that prevent contamination of the property. These include: pouring many yards of cement so that the processing of cars is handled on concrete, draining fluids from the cars on the concrete processing pads before cars are placed in the yard for customer access, and eliminating the crushing of cars on the property.

KMCC representatives conducted a site visit on September 22, 1993, to follow up on progress made to date. The management has made efforts to ensure that automotive fluids do not impact soil on the premises. Collected fluids were contained in tanks for use on site or sent off to be recycled. As cars are removed from the site for ultimate disposal, the area is cleaned of debris. Other visits have also been conducted to observe practices at the site.

KMCC has notified Nevada Recycling of lease termination, effective December, 1996, at which time all cars and equipment will be removed.

July 10, 1996, NDEP Comment 23. LOU Item # 68 - KMCC's response indicates other "visits" to the Nevada Recycling Corporation site since September 1993. What was the outcome of these visits? Provide copies of any reports and subsequent correspondence. How does KMCC intend to verify site cleanliness after lease termination? Include this as a discussion item in the Work Plan.

Response: ***Since September 1993, KMCC has visited the Nevada Recycling Corporation's site to review the property, lease conditions and negotiate terms of the lease. No reports were issued as a result of the visits except for a lease extension with a requirement to limit the encroachment of Nevada Recycling on to property that they were not leasing. KMCC has not provided a copy of the lease extension correspondence because it has no relevance to the ECA Phase II process. It is likely that the lease with this tenant will be renewed on one year intervals. Because this property may be occupied for a number on years into the future, it does not lend itself to inclusion in the Phase II Work Plan. KMCC proposes that as the property is vacated it be evaluated for cleanliness by developing a sampling plan at that time.***

69) Dillon Potter Site:

No further action is required at this time.

List of Attachments

Attachment 1	LOU Item 1	Soil Sample Results from DataChem
Attachment 2	LOU Item 3	Particulate Dispersion Modeling
Attachment 3	LOU Item 4	Hardesty Chemical
Attachment 4	LOU Item 9	New P-2 Construction Drawing
Attachment 5	LOU Item 10	Hazardous Waste Landfill Documentation
Attachment 6	LOU Item 11	Old Drying Pad Cleanup Observations
Attachment 7	LOU Item 14	Pond P-1 Closure Documentation
Attachment 8	LOU Item 15	Platinum Drying Unit Documentation
Attachment 9	LOU Items 16 & 17	AP-1, 2, & 3 Documentation
Attachment 10	LOU Item 24	Leach Bed Data
Attachment 11	LOU Item 28	Hazardous Waste Storage Area Soil Documentation
Attachment 12	LOU Item 31	Drum Crushing Procedures
Attachment 13	LOU Item 44	Unit 6 Repair Records
Attachment 14	LOU Item 48	Leach Plant Analyte Tanks
Attachment 15	LOU Item 59	Storm Sewer System Declaration of Observation
Attachment 16	LOU Item 62	State Industries Data
Attachment 17	LOU Item 63	J. B. Kelly Documentation
Attachment 18	LOU Item 28	Hazardous Waste Staging Area Soil Documentation
Attachment 19	LOU Item 56	AP Plant Area Old D-1 Building
Attachment 20	LOU Item 59	Storm Sewer System
Attachment 21	LOU Item 63	J.B. Kelley Inc Trucking Site
Attachment 22	LOU Item 68	Tenent Information
Attachment 23	LOU Item 6	Northwest Drainage Ditch Information
Attachment 24	General	Groundwater Remediation Evaluation
Attachment 25	LOU Item 24	Groundwater Information Relating to Mn Tailings Area

Plates

ATTACHMENT 18

LOU ITEM 28

HAZARDOUS WASTE STAGING AREA

SOIL DOCUMENTATION

NEVADA ENVIRONMENTAL LABORATORY

CLIENT: Kerr- McGee Chemical Corporation
8000 W. Lake Mead Drive
Henderson, Nevada 89015

ATTN: Mark J. Porterfield

PROJECT: P-2 Tank
PROJECT #: 94-600

RECEIVED: 10/20/94
REPORTED: 10/25/94

METHOD: **EPA 8015 MOD. FOR TPH (FULL RANGE)**

SAMPLE MATRIX: **SOIL**

Client ID/ Date, Time	NEL ID	Extracted/ Analyzed	Concentration (mg/kg)	Detection Limit (mg/kg)
Sample #1 10/20/94 08:00	L9410119-01	10/24/94 10/24/94	**390***	10
Sample #2 10/20/94 08:00	L9410119-02	10/24/94 10/24/94	**540***	10
Sample #3 10/20/94 08:00	L9410119-03	10/24/94 10/24/94	**620***	10
Method Blank	L941024-SBLK	10/24/94	ND	10

ND - Not Detected.
* TPH components are in the range of Diesel (C_9 - C_{24}) and Oil (C_{18} - C_{34}).
QC Data (Total for Gasoline and Diesel Ranges): L941017-SMS: 75% Recovery

Scott Jelinek
Chemist

10/25/94
Date

NEVADA ENVIRONMENTAL LABORATORY

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-800-368-5221

CLIENT: Kerr- McGee Chemical Corporation
8000 W. Lake Mead Drive
Henderson, Nevada 89015

Soil Samples for P-2 tank excavation

PROJECT: P-2 Tank
PO #: 94-600

ATTN: Mark J. Porterfield

RECEIVED: 10/20/94
REPORTED: 10/25/94

METHOD: **PCBs by EPA METHOD 8080**

SAMPLE MATRIX: **SOIL**

Client ID	NEL ID	Date Analyzed	Concentration (mg/kg)	Detection Limit (mg/kg)	Aroclor
Sample #1	L9410119-01	10/22/94	ND	1.0	NA
Sample #2	L9410119-02	10/22/94	ND	1.0	NA
Sample #3	L9410119-03	10/22/94	ND	1.0	NA
Method Blank	L941021-PCBLK	10/22/94	ND	1.0	NA

ND - Not Detected
NA - Not Applicable
QC Data (PCB 1260 Aroclor): L941019-PCBLC: 103% Recovery.

Scott Jelinek for
Scott Jelinek
Chemist

10/25/94
Date

NEVADA ENVIRONMENTAL LABORATORY

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-800-368-5221

CLIENT: Kerr-McGee Chemical Corporation
8000 W. Lake Mead Drive
Henderson, Nevada 89015
ATTN: Mark J. Porterfield

Excavation
P-2 Tanks
(Final)

PROJECT: U-2 Storage Area
PROJECT #: 94-670

RECEIVED: 11/22/94
REPORTED: 11/28/94

METHOD: **EPA 8015 MOD. FOR TPH (FULL RANGE)**

SAMPLE MATRIX: **SOIL**

Client ID/ Date, Time	NEL ID	Extracted/ Analyzed	Concentration (mg/kg)	Detection Limit (mg/kg)
U2-7 11/22/94 10:00	L9411136-06	11/23/94 11/23/94	ND	10
Method Blank	L941123-SBLK	11/23/94	ND	10

ND - Not Detected.
QC Data (Total for Gasoline and Diesel Ranges): L941123-SMS: 85% Recovery

Scott Jelinek
Chemist

11/28/94
Date

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No. 20.9.18 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORP
8000 W. LAKE MEAD DR. HENDERSON, NV 89015
4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: Environmental Technologies | 6. US EPA ID Number | A. Transporter's Phone 702/734-5401

7. Transporter 2 Company Name | 8. US EPA ID Number | B. Transporter's Phone

9. Designated Facility Name and Site Address
Industrial Solid Waste LANDFILL
APEX Waste Management Center
APEX, NV
10. US EPA ID Number | C. Facility's Phone 702/644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED concrete Industrial Waste NON-HAZARDOUS, NOT REGULATED	1	DT	20	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM # 000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
Emergency Contact 702/ 734-5400

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Printed/Typed Name: Mark Porterfield | Signature: Mark A. Porterfield | Month 11 Day 08 Year 94

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Mike Weddle | Signature: Mike Weddle | Month 11 Day 08 Year 94

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month . Day . Year .

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Bill Acker | Signature: Bill Acker | Month 11 Day 08 Year 94

GENERATOR | TRANSPORTER | FACILITY

ORIGINAL - RETURN TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N.V.D.0.0.8.2.9.0.3.3.0 | Manifest Document No. 809.116 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORP.
8000 W. LAKE MEAD DR. HENDERSON, NV 89015

4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C & P | 6. US EPA ID Number | A. Transporter's Phone 595-2832

7. Transporter 2 Company Name | 8. US EPA ID Number | 8. Transporter's Phone

9. Designated Facility Name and Site Address
Industrial Solid Waste Landfill
APEX WASTE MANAGEMENT CENTER
APEX, NV

10. US EPA ID Number | C. Facility's Phone 702/644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS, NOT REGULATED	001	DT	20	Y
b.				
c.				
d. WASTE STREAM # 000543				

D. Additional Descriptions for Materials Listed Above
EMERGENCY CONTACT
702/734-5400

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Mark J. Porterfield | Signature: Mark J Porterfield | Month 10 | Day 24 | Year 94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: JOE OPELSHOW | Signature: Joe Opelshow | Month 10 | Day 24 | Year 94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month | Day | Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: BILL SCOTT | Signature: Bill Scott | Month 10 | Day 24 | Year 94

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL - RETURN TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N.V.D.0.0.8.2.9.0.3.3.0 | Manifest Document No. 00915 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORP.
8000 W. LAKE MEAD DR. HENDERSON, NV 89015

4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C-P Enterprize | 6. US EPA ID Number | A. Transporter's Phone: 595-2832

7. Transporter 2 Company Name | 8. US EPA ID Number | 8. Transporter's Phone

9. Designated Facility Name and Site Address
Industrial Solid Waste Landfill
APEX WASTE MANAGEMENT CENTER
APEX, NV

10. US EPA ID Number | C. Facility's Phone: 702/644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS NOT REGULATED	001	DT	00020	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM # 000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT (702) 734-5400

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
MARK J. PORTERFIELD	Mark J. Porterfield	10	21	94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Sherman C Roper	Sherman C Roper	10	21	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
Bill Bozot	Bill Bozot	10	21	94

GENERATOR | TRANSPORTER | FACILITY

ORIGINAL - RETURN TO GENERATOR

S77157

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N.V.D.0.0.6.2.9.0.3.3.0 | Manifest Document No. 6094 | 2. Page 1 of

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORP.
8000 W. LAKE MEAD DR. HENDERSON, NV 89015
4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C&P ENTERPRISES | 6. US EPA ID Number | A. Transporter's Phone: 595-7832

7. Transporter 2 Company Name | 8. US EPA ID Number | B. Transporter's Phone

9. Designated Facility Name and Site Address
Industrial solid Waste Landfill
APEX WASTE MANAGEMENT CENTER
APEX NV
10. US EPA ID Number | C. Facility's Phone: 702/644-4210

GENERATOR

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS, NOT REGULATED	001	DT	00020	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM # 000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT (702) 734-5400

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Printed/Typed Name: Mark J. Porterfield | Signature: Mark J. Porterfield | Month 10 | Day 21 | Year 94

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: JOE OPERANDO | Signature | Month 10 | Day 21 | Year 94

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month | Day | Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: BILL BECOT | Signature: Bill Becot | Month 10 | Day 21 | Year 94

ORIGINAL - RETURN TO GENERATOR

39413P

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N. V. D. 0. 0. 8. 2. 9. 0. 3. 3. 0 | Manifest Document No. 00.9.1.3 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORPORATION
8000 W. LAKE MEAD DRIVE, HENDERSON, NV 89015
4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C+P ENTERPRISES | 6. US EPA ID Number | A. Transporter's Phone: 595-2832

7. Transporter 2 Company Name | 8. US EPA ID Number | 8. Transporter's Phone

9. Designated Facility Name and Site Address
INDUSTRIAL SOLID WASTE LANDFILL
APEX WASTE MANAGEMENT CENTER
APEX, NV
10. US EPA ID Number | C. Facility's Phone: 702-644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS, NOT REGULATED	0.0.1	DT	00020	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM #000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT (702) 734-5400

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Mark Porterfield	Mark Porterfield	10	20	94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
JOE OPENSHAW	Joe Openshaw	10	20	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
BARRY A MARTIN	Barry A Martin	10	20	94

GENERATOR — TRANSPORTER — FACILITY

ORIGINAL – RETURN TO GENERATOR

39664P

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N.V.D.0.0.8.2.9.0.3.3.0 | Manifest Document No. 0.0.9.1.2 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORPORATION
8000 W. LAKE MEAD DRIVE, HENDERSON, NV 89015

4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C-P Enterprizes | 6. US EPA ID Number | A. Transporter's Phone: 595-2832

7. Transporter 2 Company Name | 8. US EPA ID Number | B. Transporter's Phone

9. Designated Facility Name and Site Address
INDUSTRIAL SOLID WASTE LANDFILL
APEX WASTE MANAGEMENT CENTER
APEX, NV
| 10. US EPA ID Number | C. Facility's Phone: 702-644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS, NOT REGULATED	0.0.1	D.T	0.0.0.20	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM #000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT (702) 734-5400

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Mark Porterfield	Mark J. Porterfield	10	20	94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Sherman C Roper	Sherman C Roper	10	20	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
BARRY A MARTIN	Barry A Martin	10	20	94

GENERATOR | TRANSPORTER | FACILITY

ORIGINAL - RETURN TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N.V.D.0.0.8.2.9.0.3.3.0 | Manifest Document No. 00971 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORPORATION
8000 W. LAKE MEAD DRIVE, HENDERSON, NV 89015

4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C-P Enterprises | 6. US EPA ID Number | A. Transporter's Phone: 595-2832

7. Transporter 2 Company Name | 8. US EPA ID Number | B. Transporter's Phone

9. Designated Facility Name and Site Address
INDUSTRIAL SOLID WASTE LANDFILL
APEX WASTE MANAGEMENT CENTER
APEX, NV
| 10. US EPA ID Number | C. Facility's Phone: 702-644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS, NOT REGULATED	001	DT	020	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM #000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT (702) 734-5400

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Printed/Typed Name: Mark J. Porterfield | Signature | Month 10 Day 20 Year 94

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Sherman C Roper | Signature | Month 10 Day 20 Year 94

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month . Day . Year .

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Bill Boyt | Signature | Month 10 Day 20 Year 94

GENERATOR — TRANSPORTER — FACILITY

ORIGINAL – RETURN TO GENERATOR

39715P

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. N.V.D.0.0.8.2.9.0.3.3.0 | Manifest Document No. 00910 | 2. Page 1 of 1

3. Generator's Name and Mailing Address
KERR-McGEE CHEMICAL CORPORATION
8000 W. LAKE MEAD DRIVE, HENDERSON, NV 89015
4. Generator's Phone (702) 651-2200

5. Transporter 1 Company Name: C & P ENTERPRISES | 6. US EPA ID Number | A. Transporter's Phone: 595 2832

7. Transporter 2 Company Name | 8. US EPA ID Number | 8. Transporter's Phone

9. Designated Facility Name and Site Address
INDUSTRIAL SOLID WASTE LANDFILL
APEX WASTE MANAGEMENT CENTER
APEX, NV
10. US EPA ID Number | C. Facility's Phone: 702-644-4210

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. CONTAMINATED CONCRETE INDUSTRIAL WASTE NON-HAZARDOUS, NOT REGULATED	001	DT	00020	Y
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
WASTE STREAM #000543

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT (702) 734-5400

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Printed/Typed Name: Mark J. Porterfield | Signature | Month 10 Day 20 Year 94

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: JOE OPENSHAW | Signature | Month 10 Day 20 Year 94

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month . Day . Year .

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: BILL BEZOT | Signature | Month 10 Day 20 Year 94

GENERATOR
TRANSPORTER
FACILITY

ORIGINAL – RETURN TO GENERATOR

ATTACHMENT 19

LOU ITEM 56

AP PLANT AREA

OLD D-1 BUILDING

FINAL REPORT

NASA Grant NSG 6005

"Biodegradation of Rocket Propellent Waste, Ammonium Perchlorate"

Initiation date: June 1, 1974

Principal Investigator: Dr. Syed M.Z. Naqvi

Co-investigator: Dr. Abdul Latif

Left a couple years ago.

Research Assistants:

Mr. Stanley Harvey (June 1, 1974 to August 31, 1974

Mr. Daniel Malone (September 1, 1974 to May 15, 197

Technical Advisor: Mr. William Wolverton 601/688-2211
NASA N.S.T.L.
Bay St. Louis, Mississippi
Anne Johnson x3747
2 left 21 year ago

Participating Institution:

601/877-6436 6235
Department of Biology 877-6100
Alcorn State University
Lorman, Mississippi

Dr Willie Humphrey 601/877-6236
Abraham Dunbar 6235

June 23, 1975

N75-24959

(NASA-CR-142965) BIODEGRADATION OF ROCKET PROPELLENT WASTE, AMMONIUM PERCHLORATE Final Report (Alcorn State Univ., Lorman, Miss.) 34 p HC $3.75 CSCL 21I

Unclas G3/28 25997

A. Total Nitrogen
B. Chlorides (NaCl equivalent)

VI Microbial growth
A. Nitrogen fixing bacteria, Azotobacter chroococcum
B. Chlamydomonas sp.

VII Total biomass
A. Treated plots
B. Control plots

DUE DATE

10/10/93			
			Printed in USA

Table 1---Percent germination and seedling height of soybean and wheat.

NH_4ClO_4 Conc. in water(ppm)	Ave. seedling height (mm)	% Germination
	SOYBEAN	
0.0	37.0	81.2
0.1	29.0	70.0
1.0	28.0	63.0
10.0	21.0	60.0
100.0	13.0	48.0
1000.0	8.0	30.0
	WHEAT	
0.0	30.8	77.8
0.1	37.4	70.9
1.0	36.7	61.8
10.0	34.7	56.3
100.0	22.9	55.8
1000.0	17.1	54.9

In corn, significant reduction in seedling height was noticed. Ammonium perchlorate in aqueous form was less in toxicity than salt form, when applied in the same conc.(Tabl No conclusive reason can be given for this difference. Possibly, this compound dissociates in water and does not interfere as much in plant's physiology. The pH of soil did not vary greatly in 4 weeks, which is evident from Table 3.

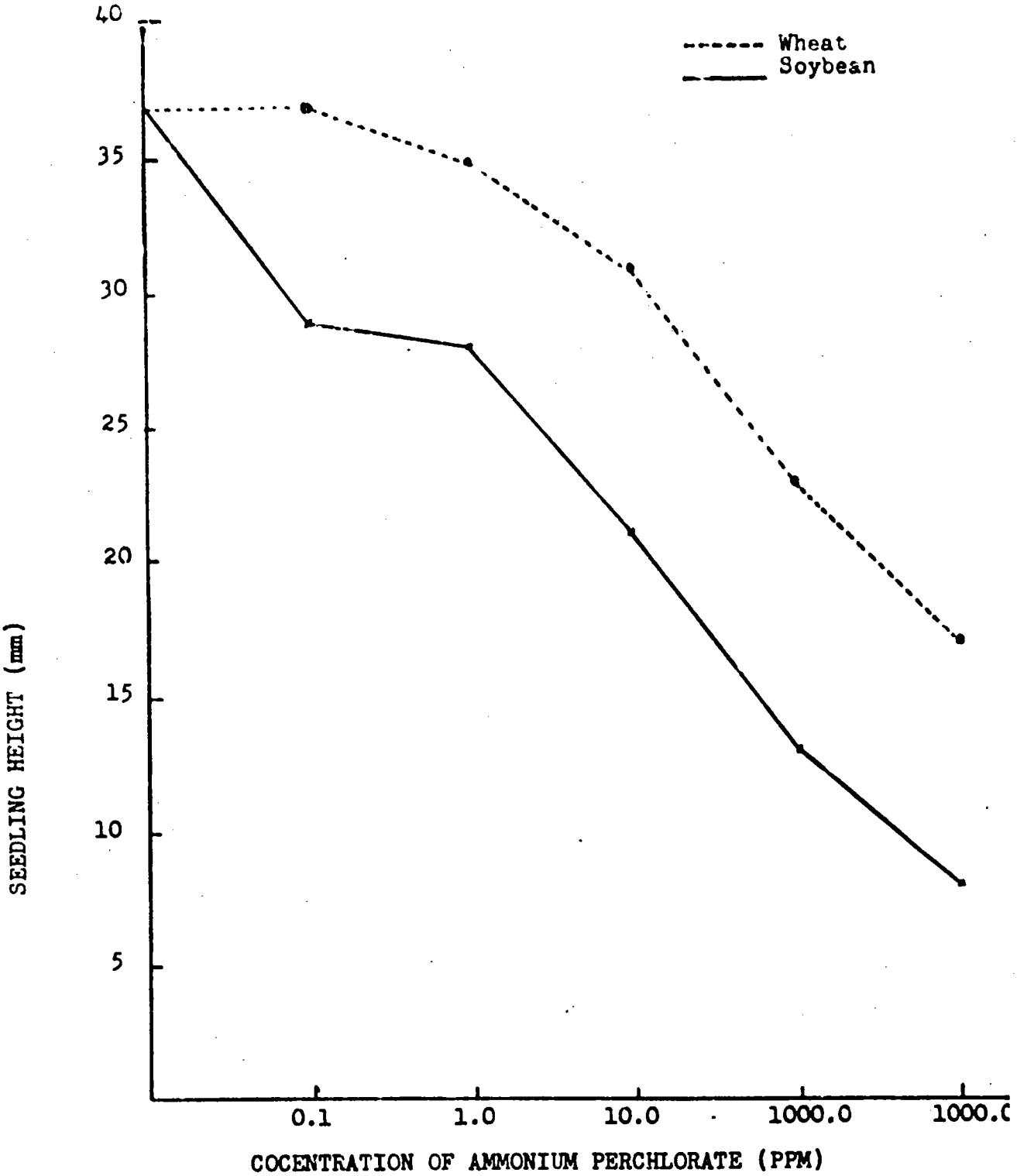

Figure 2---Seedling height of wheat and soybean treated with varicus concentrations of ammonium perchlorate.

Table 3---Soil pH recorded at monthly intervals.

NH_4ClO_4 Conc. (Aqueous Form) ppm.	Week I	Week II	Week III	Week IV
0.0	6.70	6.70	6.70	6.75
1.0	6.70	6.65	6.60	6.60
10.0	6.70	6.65	6.65	6.65
100.0	6.65	6.60	6.60	6.60
1000.0	6.00	6.00	6.00	6.00

PHOTOSYNTHESIS

Elodea twigs were acclimatized in the laboratory for 1 week before testing their photosynthetic activity. The plants were treated by placing them in wide-mouth gallon jars for 72 hours to insure proper exposure of ammonium perchlorate. Initial oxygen concentration of test solutions was recorded, and twigs were placed in the B.O.D. bottles for 6 hours. The bottles were kept in a water bath to maintain similar temperature and light conditions. Six B.O.D. bottles for each test solution were used, and each such test was repeated 5 times. Oxygen production by Elodea was computed on the dry weight basis, expressed as O_2 ppm/hr/gm. Elodea twigs at the completion of the test were dried in a thermostatic electric oven at 60°C for 48 hours and weighed on a Mettler balance. The temperature around the B.O.D. bottles did not change more than 3°C during the experiments.

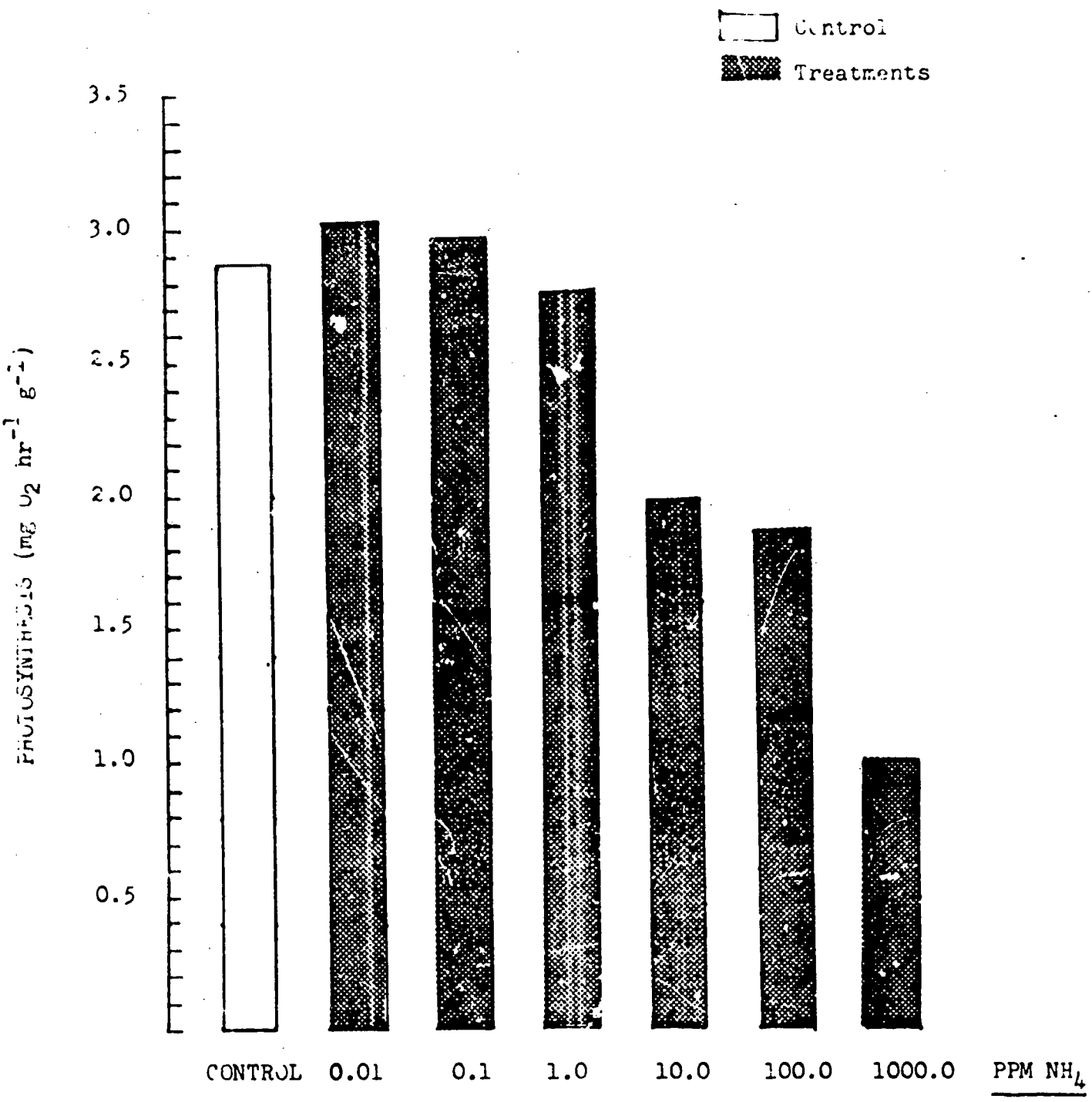

Figure 3---Effect of ammonium perchlorate on photosynthesis of Elodea.

However, oxygen production decreased in 10 ppm ammonium perchlorate solution (1.93 ppm/hr). In all the 3 kinds of plants tested, increase in photosynthetic activity was noticed, if the amount of ammonium perchlorate did not increase above 1.0 ppm. Unless further studies on biochemical effects of this compound on plant's photosynthetic mechanism are carried out, no satisfactory reason for this increase can be given.

RESPIRATION

Respiration of aquatic microorganisms was measured, basically by using the same technique. Natural pond water was collected during the month of December, when the least phytoplankton is expected. The water was filtered through cotton to remove floating objects, and acclimatized in the laboratory for 72 hours. Ammonium perchlorate was mixed directly with the pond water to make test solutions of 0.01, 0.1, 1.0, 10.0, and 100.0 ppm concentrations. The B.O.D. bottles were placed in completely dark place to prevent photosynthesis by phytoplankton presence. The average oxygen consumption per hour by the control microorganisms was 0.0055 ppm. No significant change (statistically) was present in treated microorganism's respiration. Oxygen consumption was measured after 108 hours. Five B.O.D. bottles for each concentration were used, and 3 replications were made.

Milligram carbon= (B-V)NE, where:

V = Volume (ml) of acid to titrate alkali in solution to the end point.

B = Volume (ml) of acid to titrate alkali in carbon-dioxide collector of control, to the end point.

N = Normality of acid.

E = Equivalent weight of carbon in the reaction.

Results

The control soil microorganisms produced 0.84 mg C, compared to the treated soil: 0.84, 0.87, 0.96, 1.08, and 1.14 mg C, in the ascending order of ammonium perchlorate concentration (Fig. 5). It is evident that the respiration increased consistently with ammonium perchlorate concentration. This does not necessarily imply that the presence of this chemical had an adverse affect on microbial growth. Similar increase in respiration has previously been recorded for certain invertebrates (De la cruz and Naqvi, 1973) exposed to Mirex insecticide. This was interpreted by the authors as due to natural response of an animal to the toxic stress. Naqvi and de la Cruz (1972) report similar stimulation of respiration rate of certain freshwater invertebrates exposed for 24 hours to 1 ppm Mirex. To ascertian the effect of ammonium perchlorate of bacterial growth, separate tests were conducted, which are reported in the following section of this report.

MICROBIAL GROWTH

In order to assess the effect of ammonium perchlorate on microbial growth, aquatic microorganisms were grown on nutrient medium. Inoculation was made by 1 ml of pond water, pre-exposed to a certain concentration of this compound. Individual colonies of microorganisms were counted for each treatment level (Conc. of NH_4ClO_4). There was a great variation in the number of colonies, which did not follow any specific trend. Therefore, these tests were discarded.

Pure culture of Azotobacter chroococcum was inoculated to liquid nutrient medium. This medium was autoclaved before inoculation and was mixed with known amount of 0.1% stock solution following the serial dilution technique, so as to obtain the desired concentrations of ammonium perchlorate. The inoculated medium was kept at 24°C, and bacterial growth was measured every 24 hrs on Spectrophotometer 21 (Log absorbance 600 nm) upto 144 hrs. During the first 72 hrs the growth was measured for ammonium perchlorate concentrations ranging from 1.0 ppb to 500.0 ppm, however, in the next 72 hours the growth was recorded for 1.0 ppb to 500.0 ppb (Fig. 6).

Results

In general, bacterial growth increased upto 120 hrs(Table 4) in cultures containing 1 and 50 ppb ammonium perchlorate, in comparison to the control. However, the growth was

Table 4---Growth of Azotobacter chroococcum measured by Spectronic 20, for a period of 144 hrs.

Conc. NH_4ClO_4 (ppb)	Hrs. Incubation	% Transmittance (600 nm)	Optical Density
0.0 (Control)	24	72.5	0.1397
"	48	40.0	0.3980
"	72	26.0	0.5850
"	96	18.0	0.7450
"	120	23.0	0.6380
"	144	11.5	0.9390
1.0 ppb	24	78.0	0.1078
"	48	38.0	0.4200
"	72	26.0	0.5850
"	96	13.0	0.8860
"	120	09.5	1.0220
"	144	16.0	0.7960
50.0 ppb	24	76.0	0.1192
"	48	31.5	0.5020
"	72	24.5	0.6110
"	96	10.0	1.0000
"	120	11.0	0.9590
"	144	14.5	0.8380
250.0 ppb	24	80.5	0.0942
"	48	36.5	0.4380
"	72	22.5	0.6480
"	96	12.5	0.9030
"	120	14.5	0.8380
"	144	14.0	0.8540

suppressed after 120 hrs. This may be due to delayed mortality effect of this compound. This cannot be ascertained unless further data are obtained. Growth was curtailed in 50,000 ppb (=50 ppm) and greater concentrations, even at 24 hrs incubation. Increase in growth upto 120 hrs (1 ppb to 500.0 ppb) is yet to be explained, and no conclusion can be made at present.

It is suggested that this work shall be continued with certain modifications: (i) Ammonium perchlorate will be mixed with the autoclaved culture, instead of prior to incubation (ii) Growth will be measured for a period of 3 weeks instead of 1 week (iii) Pure cultures of other bacteria will be tested (iv) Concentration of ammonium perchlorate higher than 50 ppm shall not be included.

Chlamydomonas spp. Pure culture of this organism was obtained from a biological supply house. Laboratory stock of Chlamydomonas was maintained in Knop's solution. All precautions were taken to avoid contamination in the stock solution. Separately, ammonium perchlorate was added to freshly prepared Knop's solution, and desired concentrations were thus prepared. Pure culture of Chlamydomonas was then inoculated to test solutions which were contained in 250 ml conical flasks. The organisms were allowed to grow 72 hrs before the first growth was measured by Spectronic 20. The inoculated media were kept in subdued light, near a window.

Table 5--- 96 hr growth of Chlamydomonas spp in various concentrations of ammonium perchlorate.

Conc. of NH_4ClO_4 (ppb)	Treatment Time (hrs)	Ave. O.D.* at 600 nm	Ave. growth Range
0.0	0.0	0.07	
0.0	24.0	0.11	
0.0	48.0	0.18	0.18
0.0	72.0	0.21	
0.0	96.0	0.25	
1.0 ppb	0.0	0.05	
" "	24.0	0.10	
" "	48.0	0.15	0.21
" "	72.0	0.20	
" "	96.0	0.26	
10.0 "	0.0	0.08	
" "	24.0	0.13	
" "	48.0	0.21	0.20
" "	72.0	0.25	
" "	96.0	0.28	
100.0	0.0	0.11	
" "	24.0	0.15	0.11
" "	48.0	0.22	
" "	72.0	0.24	
" "	96.0	0.22	
1.0 ppm	0.0	0.11	
" "	24.0	0.15	
" "	48.0	0.20	0.14
" "	72.0	0.25	
" "	96.0	0.25	
10.0 "	0.0	0.09	
" "	24.0	0.12	
" "	48.0	0.16	0.15
" "	72.0	0.21	
" "	96.0	0.25	
100.0	0.0	0.09	
" "	24.0	0.16	
" "	48.0	0.16	0.12
" "	72.0	0.20	
" "	96.0	0.21	

* Average reading taken from 6 replicates.

1 B	5 C	9 A	13 D	17 D	21 B	25 A	29 C
2 D	6 A	10 A	14 C	18 A	22 C	26 B	30 D
3 C	7 B	11 D	15 B	19 B	23 A	27 B	31 C
4 D	8 C	12 B	16 A	20 A	24 D	28 D	32 C
33 D	37 C	41 D	45 D	49 D	53 D	57 B	61 C
34 C	38 B	42 A	46 A	50 C	54 C	58 C	62 B
35 B	39 D	43 B	47 D	51 A	55 A	59 A	63 D
36 B	40 C	44 C	48 A	52 A	56 B	60 B	64 B

Fig. 7 LAY OUT OF EXPERIMENTAL PLOTS AT NASA TEST SITE

A: 55 g ammonium perchlorate/ square meter
B: 5.5 g " " " " "
C: 0.0 g Control plots
D: 0.55 g ammonium perchlorate/ square meter

Table 6---Total Nitrogen (%) and Cnloride (NaCl equivalent) levels of soil samples taken at 3 intervals.

Amt. NH_4ClO_4 (Gm/meter^2)	ONE MONTH		TWO MONTHS		FOUR MONTHS	
	Nitrogen (%)	Chlorides (ppm)	Nitogen (%)	Chlorides (ppm)	Nitrogen (%)	Chlorides (ppm)
0.00	0.049	0.25	0.060	0.58	0.060	0.20
0.00	0.049	0.21	0.046	0.29	0.073	0.33
0.00	0.049	0.17	0.049	0.45	0.073	0.10
0.55	0.063	0.41	0.067	0.33	0.083	0.43
0.55	0.056	0.33	0.070	0.29	0.068	0.36
0.55	0.056	0.17	0.049	0.83	0.070	0.16
5.50	0.063	0.33	0.053	0.66	0.030	0.10
5.50	0.049	0.17	0.056	0.58	0.060	0.16
5.50	0.053	0.12	0.042	0.41	0.075	0.30
55.0	0.046	0.25	0.063	1.10	0.100	0.16
55.0	0.049	0.66	0.070	2.10	0.065	0.33
55.0	0.063	1.60	----- *	1.90	0.068	0.36

*None detected (This method)

Table 7---Analyses of variance for chloride contents of soil taken at different intervals.

Source of variation	Degrees of freedom	Sum of squares	Mean square	F value
		ONE MONTH SAMPLES		
Treatments	3	3.2748	1.0916	10.8833**
Error	8	0.8027	0.1003	
Total	11	4.0775		
Table value	F 0.95(3,8) - 4.07	F 0.99(3,8) - 7.59		
		TWO MONTHS SAMPLES		
Treatments	3	1.1204	0.373	6.2063*
Error	8	0.4812	0.0601	
Total	11	1.6016		
Table value	F 0.95 (3,8) - 4.07	F 0.99 (3,8) - 7.59		
		FOUR MONTHS SAMPLES		
Treatments	3	0.0216	0.0072	0.09
Error	8	0.6086	0.0761	
Total	11	0.6302		
Table value	F 0.95 (3,8) - 4.07	F 0.99 (3,8) - 7.59		

Table 8---Average total nitrogen (%) of samples taken at different intervals of time.

Conc. NH_4ClO_4 gm/meter square	ONE MONTH	TWO MONTHS	FOUR MONTHS
Control	0.049	0.052	0.069
0.55	0.058	0.062	0.074
5.50	0.055	0.050	0.055
55.0	0.052	0.066	0.078

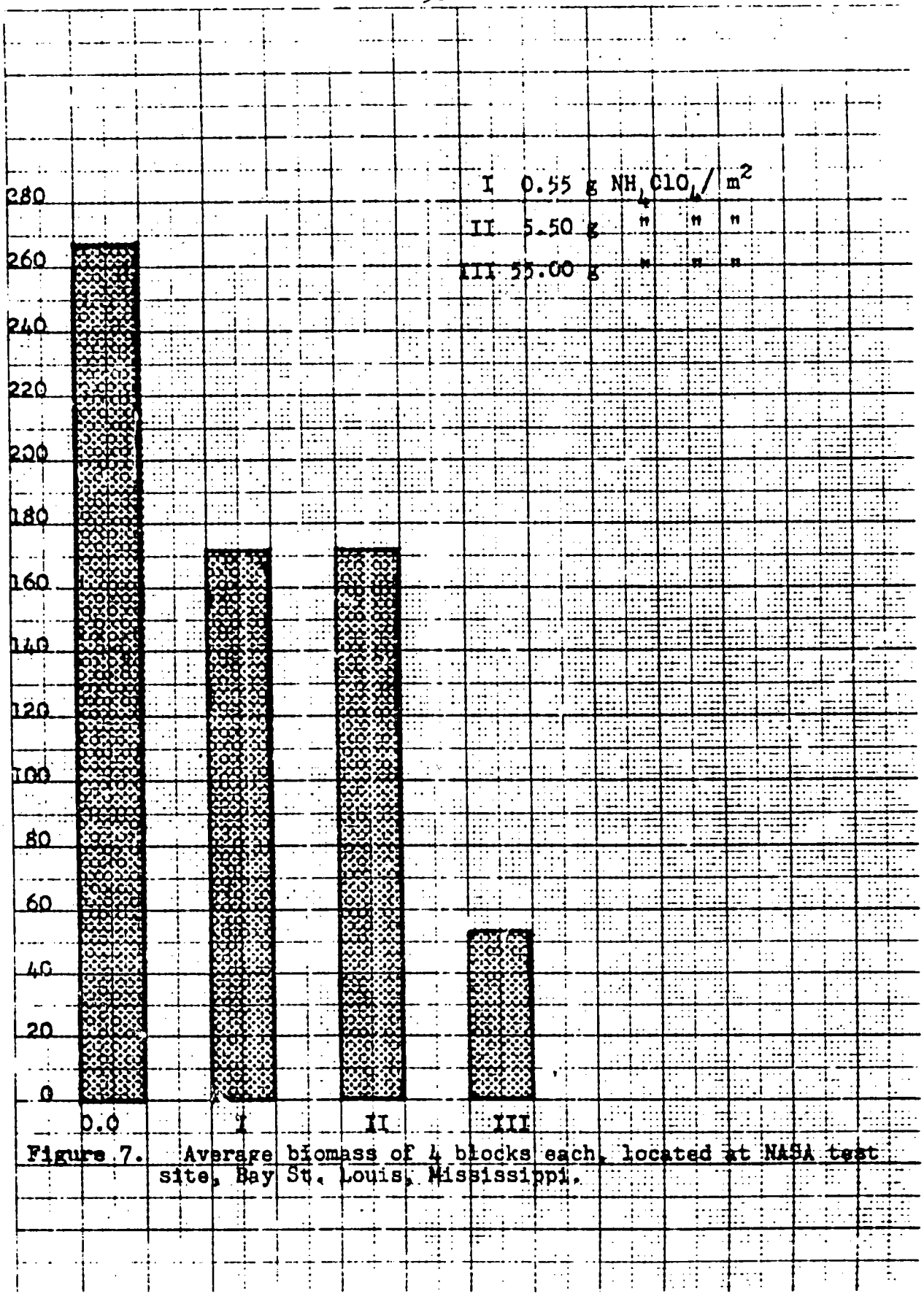

Figure 7. Average biomass of 4 blocks each, located at NASA test site, Bay St. Louis, Mississippi.

6. Studies on bio-gas production by methanogenic bacteria are in progress. Efforts are being made to see if ammonium-perchlorate affects anaerobic digestion of sludge or the growth of methanogenic bacteria.

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De La Cruz, A.A. and S.M.Z. Naqvi. Mirex incorporation in the environment: uptake in aquatic organisms and effects on the rates of photosynthesis and respiration. Arch. Enivron. Contam & Toxicol. 1(3): 255-264 (1973).

Naqvi, S.M.Z., and A. A. De La Cruz. Mirex incorporation in the environment: Toxicity in Selected Freshwater Organisms. Bull. Environ. Contam. & Toxicol. 10(5): 305-308 (1973).

N.B.

Half-yearly report of Grant NSG-8005 was sent to the following persons:

1. Mr. William Wolverton, N.S.T.L. NASA Test Facility, Bay St. Louis, Mississippi.
2. Mr. Marion Kent, Assistant Director, University Affairs, George C. Marshall Space Flight Center, Huntsville, Alabama.
3. Mr. Thomas A. Bryant, ONR Representive, Office of Naval Research University of Huntsville Alabama Research Institute, Huntsville, Alabama.

ated response may be of primary importance in acquired immunity to *T. cruzi* infections in mammalian hosts. Histopathological studies suggest that host immune cells may be able to recognize parasitized cells as a pre-condition to some inflammatory reactions. The present study examines the ability of spleen cells from infected and immunized mice to selectively detect and destroy *T. cruzi* infected mouse embryo fibroblasts. Using a macrocytotoxicity assay involving the ^{51}Cr-release technique, preliminary evidence indicates that immune spleen cells can not detect or destroy stage 1 infected fibroblasts when total *in vitro* infection involves 15% or less of the target cells. Experiments to determine the capacity of immune cells to detect and destroy later stage infections with greater percentages of infected fibroblasts are in progress and will be discussed.

(55)
Life History of the Saltmarsh Gerardia, *Agalinis maritima* (Scrophulariaceae)

LYTTON J. MUSSELMAN AND STEVEN D. RICH
Old Dominion University

Agalinis maritima (Raf.) Raf. is an annual succulent root parasite of salt marshes of the eastern United States. We have recorded the following hosts for *A. maritima* at sites in North Carolina and Virginia: *Distichlis spicata, Spartina alterniflora, Salicornia virginica, Iva frutescens,* and *Borrichia frutescens.* No host preference was noted. The wide range of hosts is similar to that observed in other species of the genus as is the development, general morphology, and anatomy of the haustoria. Reciprocal crosses between *Agalinis maritima* and *A. purpurea,* a species of roadsides, weedy fields and ditch banks, produced a high percentage of seed set. No hybrids between the two species were noted in nature, however. The characters commonly used to separate these species — succulence, pedicel length, calyx lobe morphology — are discussed in light of the present study. Stratification of seeds of *A. maritima* at 5C for 40 days ensures a high germination rate. The role of salinity in the seed germination and seedling survival of *A. maritima* are also discussed.

(226)
Multiple Regression Analysis of a Disjunct Stand of *Quercus prinus* (Fagaceae) in Southern Illinois

MONA M. MYATT
Southern Illinois University

The relationship between vegetation and soil-site characteristics was studied for the largest disjunct stand of chestnut oak (*Quercus prinus*), located in Union County, Illinois. Multiple regression analysis of selected species was performed using relative density, relative dominance, or importance value (I.V. = 200) as the dependent variable. Soil-site characteristics including slope position, percentage slope, and aspect with percentage organic matter, soil reaction, texture, and soil color for the A and B horizons were used as the independent variables for the full model. Highly correlated variables and those variables which were not significant were eliminated from the individual regression models. In general, those variables associated with site moisture relationships were found to be most important in the majority of regression equations.

(217)
Effect of Ammonium Perchlorate on Germination, Growth (Soybean, Corn) and Photosynthesis (*Elodea*)

SYED M. Z. NAQVI AND ABDUL LATIF
Alcorn State University

Kentucky Wonder soybean seeds (N = 1000) were treated for 168 hours in 0.1, 1.0, 10.0, 1000.0 ppm aqueous ammonium perchlorate solution. Percent germination and seedling height was reduced significantly in treated seeds. Corn seeds (N = 640) were treated with the same concentrations of ammonium perchlorate. Plant height and soil pH were measured weekly for 1 month. There was a significant reduction of height in treated plants, but the pH did not change. Toxicity of ammonium perchlorate salt homogenized with soil (10.0 to 1000.0 ppm conc.) was much greater; it reduced plant height drastically.

Photosynthetic activity of *Elodea* was measured by an electrode type oxygen-meter. The plants were exposed to 0.01, 0.1, 1.0, and 10.0 ppm ammonium perchlorate solution for 48 hours before measuring oxygen. Control plants produced 2.54 ppm O_2/hr/gm. Photosynthesis increased in plants treated with 0.01 ppm ammonium perchlorate, which measured 3.05 ppm O_2/hr/gm. Photosynthesis decreased consistently in higher concentrations of ammonium perchlorate. Photosynthesis of natural phytoplankton increased slightly only in 0.01 ppm ammonium perchlorate, but was unaffected by higher concentrations (up to 10.0 ppm).

(267)
A Comparison of the Tardigrade Fauna (Phylum: Tardigrada) from Three Phorophytes on Roan Mountain, Tennessee

DIANE R. NELSON
East Tennessee State University

Tardigrades were collected from epiphytic mosses on beeches (*Fagus grandifolia*), buckeyes (*Aesculus octandra*), and sugar maples (*Acer saccharum*) at 4000 feet on the north slope of Roan Mountain, Carter County, Tennessee. Fifteen species of tardigrades were identified, eleven of which were present on all three phorophytes. Significant differences in the frequency data were noted. Buckeyes and sugar maples were most similar and buckeyes and beeches least similar, in regard to their tardigrade fauna.

(51)
Problems in the Southeastern *Stachys* (Lamiaceae)

JOHN B. NELSON AND JOHN E. FAIREY, III
Clemson University

A morphological and taxonomic investigation of the Southeastern species of *Stachys* (Dicotyledonae, Lamiales, Lamiaceae) involving extensive study of herbarium specimens, personal collections, and field observations reveals that considerable confusion exists in the placement of the various taxa. Three main geographic regions occur which represent species complexes. In the Gulf Coast, *S. agraria* C. & S. occurs from Louisiana to the Florida panhandle. Along the Atlantic Coastal Plain, *S. hyssopifolia* Michx. forms a rather variable group of up to three varieties. *S. tenuifolia* Willd. forms a very large complex, with up to five varieties in question. *S. tenuifolia,*

Vol 22 (2) April 1975

(NASA-CR-148323) BIODEGRADATION OF ROCKET PROPELLANT WASTE, AMMONIUM PERCHLORATE Final Report (Alcorn State Univ., Lorman, Miss.) 40 p HC $4.00 CSCL 06C

N76-27816

Unclas
G3/51 44625

FINAL REPORT

NASA Grant NSG 8005

"Biodegradation of rocket propellent waste, ammonium perchlorate"

Initiation date: June 1, 1974

Annual report for the period June 1, 1974 to May 31, 1975 was submitted to NASA on June 23, 1975.

PRINCIPAL INVESTIGATOR — DR. SYED M.Z. NAQVI

CO-INVESTIGATOR — DR. ABDUL LATIF

TECHNICAL ADVISOR — MR. WILLIAM WOLVERTON
NASA N.S.T.L.
Bay St. Louis, Mississippi

RESEARCH ASSISTANT — Mr. Daniel Malone - Undergraduate
(September 1, 1975 to May 31, 1976)

PARTICIPATING INSTITUTION — Alcorn State University
Department of Biological Sciences
Lorman, Mississippi 39096

SUBMISSION DATE OF THIS REPORT — July 3, 1976

During the year 1974-'75, we made an effort to study the short term effects of ammonium perchlorate on selected organisms. A long-term experiment was set up at the NASA National Space & Technological Laboratories, Bay St. Louis, Mississippi. This was designed to assess the changes incurred by ammonium perchlorate in nitrogen and chloride contents of soil within a period of 3 years. Another facet of our work slightly diverged from ammonium perchlorate biodegradation. An attempt was made to produce methane gas from anaerobic fermentation of aquatic weed, Alternanthera philoxeroides (Mart.) Griesb. This report consists of the following:

I. SHORT-TERM EFFECTS OF AMMONIUM PERCHLORATE

A. Percent germination and growth of wheat.

B. Percent germination and growth of cotton.

C. Percent germination and growth of rye grass.

D. Total biomass determination of rye grass.

E. Growth of Chlamydomonas sp. upto 1164 hours.

F. Growth of Escherichia freundii upto 192 hours.

G. Growth of Bacillus proteus upto 192 hours.

H. Growth of Azotobacter chroococcum upto 192 hours.

II. LONG-TERM EFFECTS OF AMMONIUM PERCHLORATE

Nitrogen and chlorine determinations of soil upto a period of 3 years.

pH determinations of soil samples upto 2 years.

III. BIOGAS PRODUCTION FROM ALLIGATOR WEED Alternanthera philoxeroides.

The fact that no research work is documented on effects of ammonium perchlorate, literature review did not yield any useful information. Work reported in this paper can virtually be considered as pioneer investigations on ammonium perchlorate bigodegradation and its short and long-term effects. Detailed data are represented by tables and graphs. Record of raw data are maintained in a bound note-book. Short description of the methodology used is also made. Results and conclusions are given for each sub-title. Manuscripts are under preparation which will be sent for publication in THE JOURNAL OF BACTERIOLOGY and CROP SCIENCE. A summary of our work will be sent for THE SPACE AND TECHNOLOGICAL REPORTS, in near future.

A. Percent germination and growth of wheat, Triticum vulgare

Seed germination and growth of wheat were tested by placing 20 seeds in sterilized petri-dish containing Kimpax (sterilized, non-nutritive absorbing material). The seeds were surface-sterilized by immersing them in 0.2% sodium hypochlorite solution for 10 minutes and by several subsequent washing in distilled water. All seeds were equally spaced in the petri-dish. A series of 50 such petri-dishes were divided into 6 groups (5 treatments and a control). Germination and growth of each group was recorded. Total of 966 seeds were thus tested.

Since ammonium perchlorate is highly soluble in water, stock solution was prepared in concentration of 1 percent. Further dilutions were made by serial dilution method. Germination of all seeds was done at room temperature. Percent mortality (or ungerminated seeds), and growth of seedlings was recorded after 120 hours. Data are presented in Tables 1 and 2 and Figures 1 and 2. Average height of seedling and the standard deviation were calculated on a computer. Similar methods were adopted for cotton and rye-grass with minor modifications which will be described with each context. All precautions were taken to provide identical conditions for treated and control seedlings.

Table 1---Average height (cm) and standard deviation of wheat seedlings measured after 120 hours.

Conc. of NH_4ClO_4 in test solutions	Petri dish No.	Ave. Ht. of seedlings in each petri-dish	Ave. Ht. of plants in all petri-dishes of each treatment	SD
Control	I	9.9		3.75
"	II	9.26		2.72
"	III	8.60		2.45
"	IV	9.82		3.87
"	V	8.41	9.2	2.32
1 ppb	VI	7.84		2.92
"	VII	9.85		3.69
"	VIII	11.53		4.18
"	IX	8.45		3.15
"	X	10.90		3.64
"	XI	9.13		4.54
"	XII	10.0		3.79
"	XIII	7.54	9.40	3.28
500 ppb	XIV	10.49		3.08
"	XV	9.15		3.48
"	XVI	10.70		3.90
"	XVII	8.72		2.33
"	XVIII	9.68		2.19
"	XIX	10.59		3.58
"	XX	10.20		3.38

Table 1--- Contd.

500 ppb	XXI	8.58	9.76	3.69
1ppm	XXII	9.79		3.21
"	XXIII	10.66		4.74
"	XXIV	9.45		2.23
"	XXV	9.10		4.404
"	XXVI	10.4		2.32
"	XXVII	9.99		1.30
"	XXVIII	8.39		3.37
"	XXIX	9.05	9.60	3.91
10 ppm	XXX	7.62		2.59
"	XXXI	8.14		3.12
"	XXXII	7.99		2.90
"	XXXIII	5.91		1.58
"	XXXIV	5.69		2.53
"	XXXV	7.94		3.48
"	XXXVI	6.82		2.74
"	XXXVII	7.55	7.21	3.28
500 ppm	XXXVIII	4.84		0.812
"	XXXIX	5.75		2.01
"	XL	5.43		0.88
"	XLI	5.59		1.71
"	XLII	5.50		1.69
"	XLIII	5.23		0.86
"	XLIV	5.36		1.00
"	XLV	5.72	6.41	2.18

Table 2--- Percentage of ungerminated wheat seeds grown in treated and untreated soil.

Conc. of NH_4ClO_4 in soil	Total No. of seeds tested	Percentage of ungerminated seeds
Control	160	42.0
1ppb	160	45.6
500 ppb	160	46.2
1ppm	160	40.0
10 ppm	160	38.1
500 ppm	160	37.5

Conclusions (Tables 1, 2; Figures 1, 2)

Interesting results were obtained which are presented in Tables 1 and 2 and Figures 1 and 2. In comparison to control, average seedling growth increased in 1 ppb, 500 ppb and 1 ppm , but it decreased significantly in 10 and 500 ppm treatments. However, contrary to expected results, germination success was greatest in highest treatment (500 ppm) and lowest in 500 ppb treatment. It could be explanied by the fact that the lowest number of seeds germinated in 500 ppb treatment provided more space and nutrients for the later growth of seedlings which resulted in highest average growth. On the other hand, in 500 ppm treatment, the growth of seedlings was inhibited by ammonium perchlorate but maximum number of seeds were able to germinate. Therefore, this compound seems to have its affect in later growth of wheat.

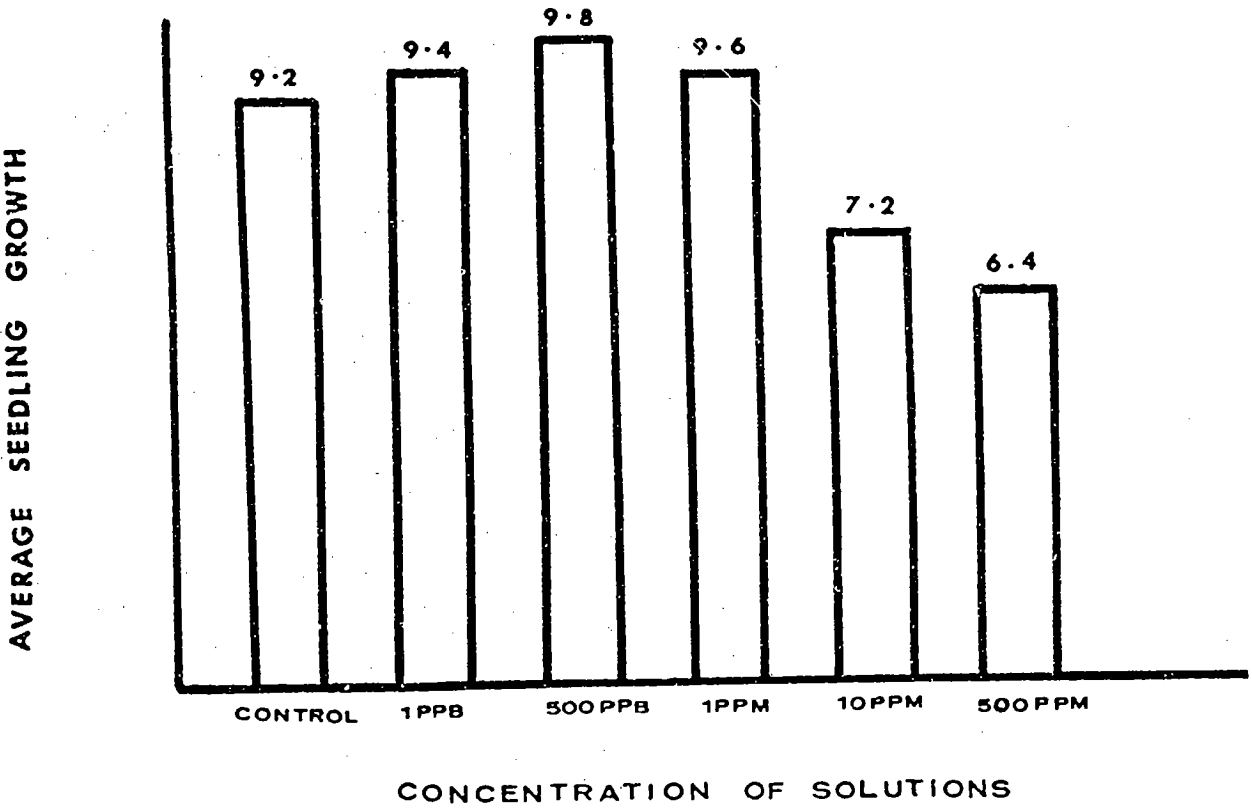


Fig. 1. Average seedling growth of wheat, Triticum vulgare (measured in cm) in various concentrations of ammonium perchlorate.

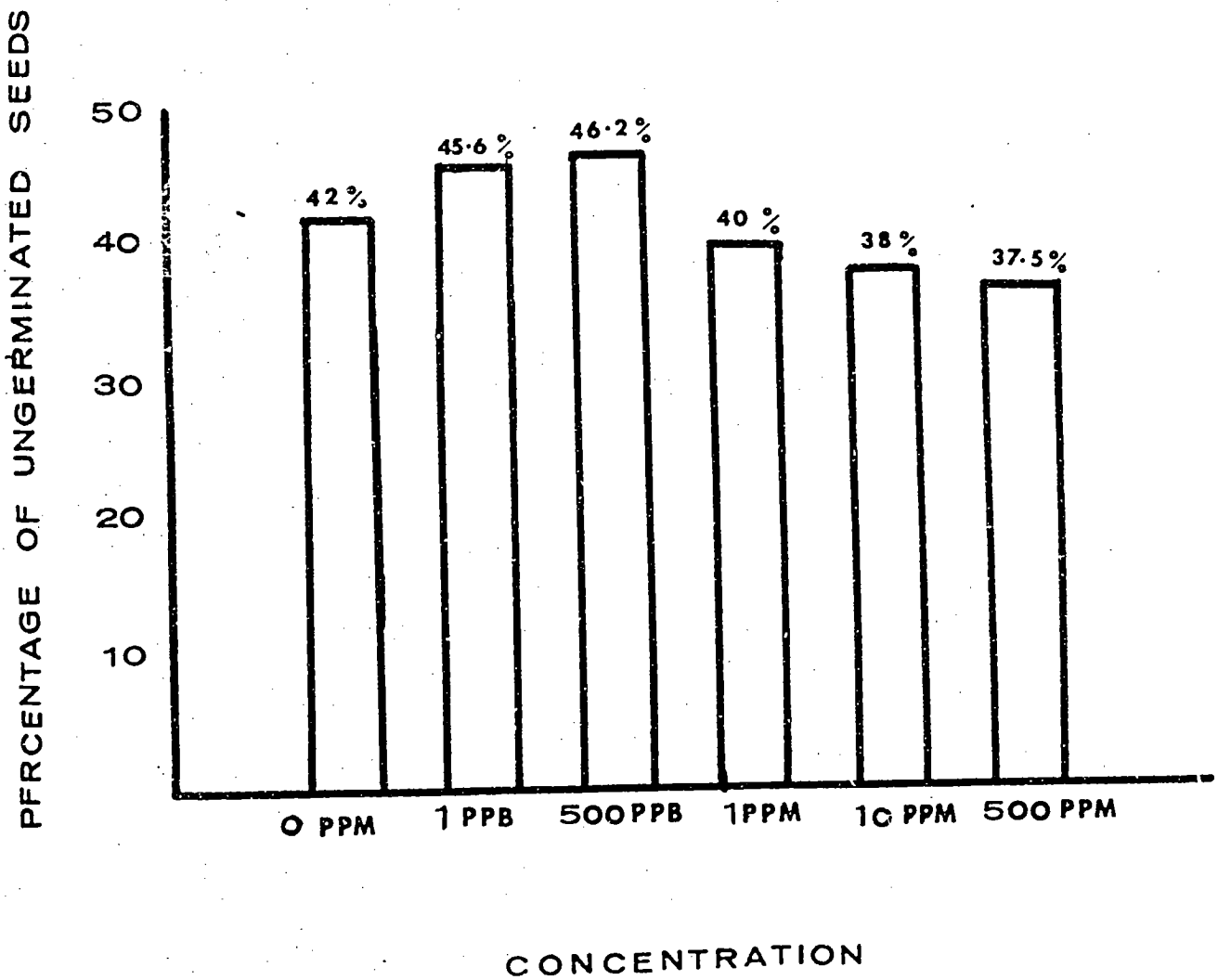


Fig. 2. Percentage of ungerminated seeds of wheat, Triticum vulgare, in various concentrations of ammonium perchlorate.

Cotton: The following table (Table No. 3) represents the percentage of seeds which were unable to germinate. In 55.0 gram treated soil the highest number of seeds were prevented to germinate due to the toxicity of ammonium perchlorate. The percentage of ungerminated seeds in 0.55 g treated soil was unexpectedly lower than control. Soil for germination was brought from field-plots, where initial treatment was made on June 24, 1974, @ 0.55, 5.5 and 55.0 grams of ammonium perchlorate homogeneously mixed with surface soil of 1^2 meter plots. Experimental and control plots were designated on the basis of Randomized Complete Block Design.

Table 3--- Percentage of non-germinated cotton seeds grown in ammonium perchlorate treated and control soil.

Conc. of ammonium perchlorate in soil (Grams/Meter^2)	No. of seeds tested	% of un-germinated seeds
Control	60	25.0
0.55	50	10.0
5.50	50	25.0
55.0	50	56.7

Conclusion: Even after approximately after 2 years of initial treatment, soil has retained its toxicity in those plots which were treated with 55.0 g of this compound. However, there seems to be insignificant difference between the

control and 0.55 and 5.50 gram treatments.

Rye-grass: The soil for germination of rye-grass was also obtained from the experimental plots which were established almost 2 years ago at NSTL, Bay St. Louis, Mississippi. To determine the effect of ammonium perchlorate, growth of seedlings was recorded upto 28 days. At the end of this period, all plants were dried at 80 C for 24 hours and weighed on a Mettler balance. Percentage of un-germinated seeds was also recorded.

Table 4---Percentage of un-germinated rye-grass seeds and total biomass of seedlings determined after 28 days.

Conc. of NH_4ClO_4 in soil/sq.meter	% of un-germinated seeds	No. of seeds tested	Biomass * dry weight in grams
Control	47.0	200	0.324
0.55	41.0	100	0.210
5.50	51.2	100	0.130
55.0	73.0	100	0.040

* Based on total dry weight of 16 individual plants after 6 weeks growth-period.

Conclusion: Basically similar results were obtained for germination of rye-grass. Highest number of seeds germinated in 0.55 treatment and the lowest in 55.0 g treated soil. However, there is a consistent decrease in biomass in direct proportion to increasing concentration of ammonium perchlorate. (Fig. 3, 4).

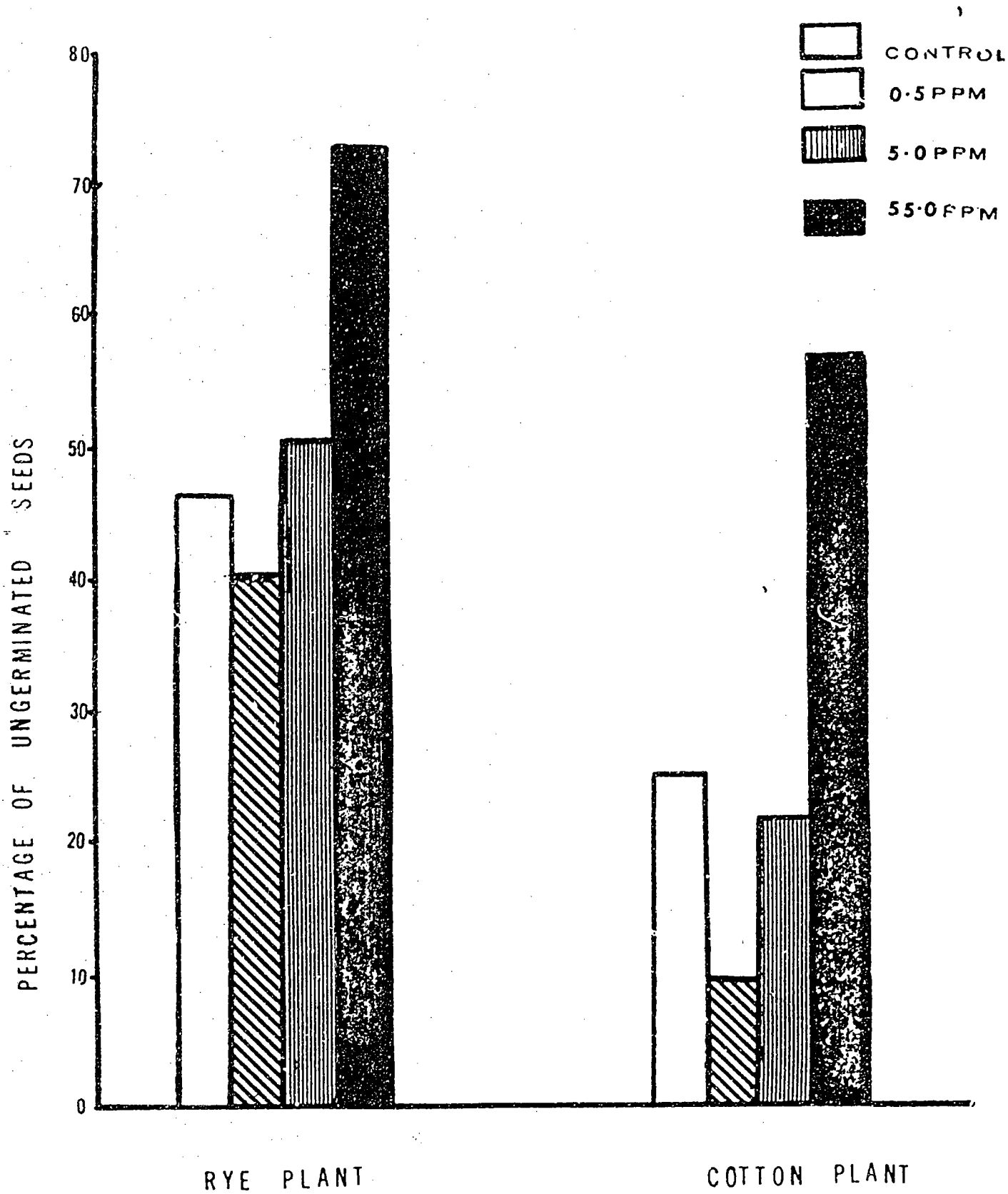


Fig. 3. Percentage of ungerminated seeds of rye-grass and cotton treated with various concentrations of ammonium perchlorate.

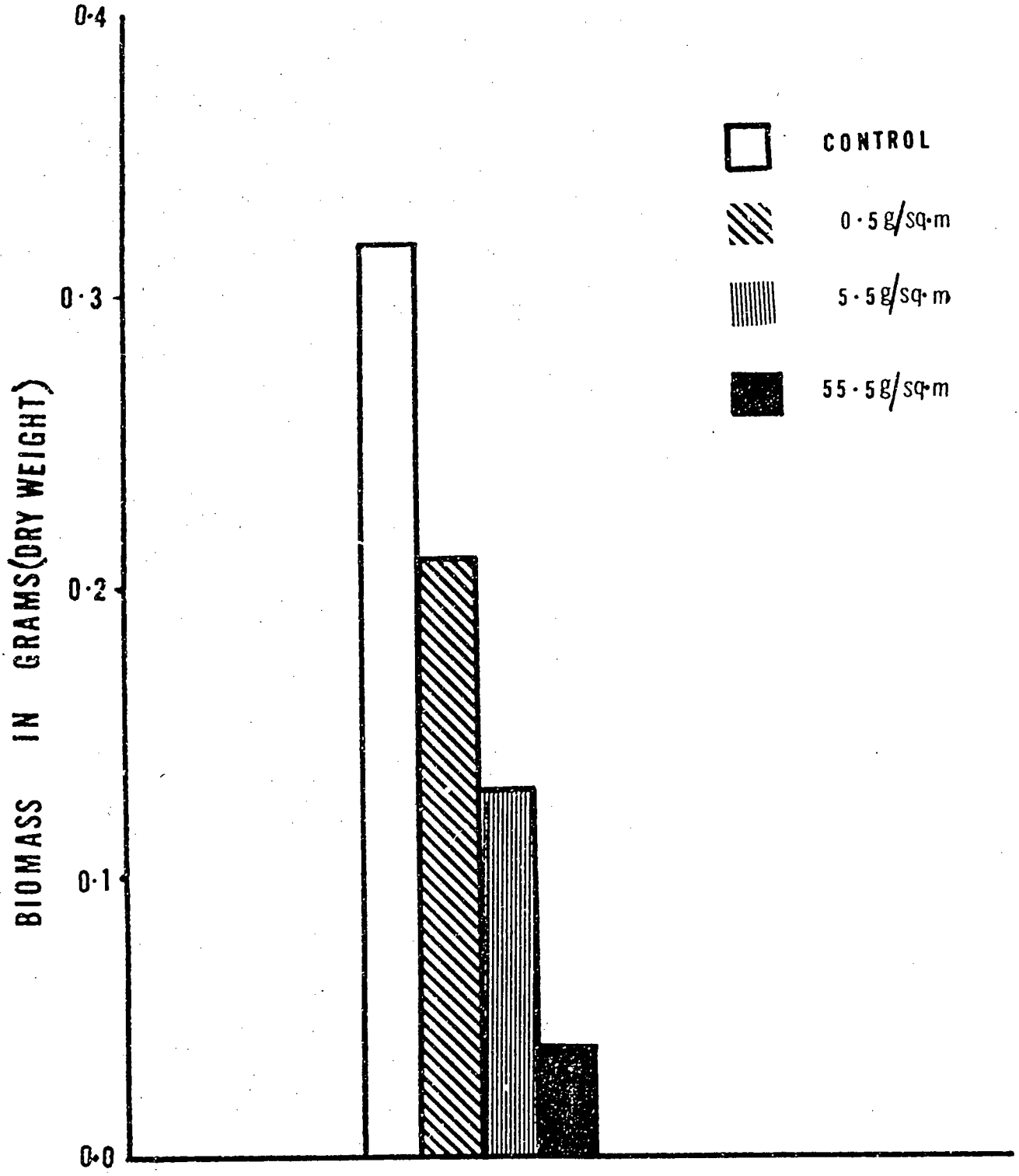


Fig. 4. Total biomass (dry) of rye-grass grown in various concentrations of ammonium perchlorate.

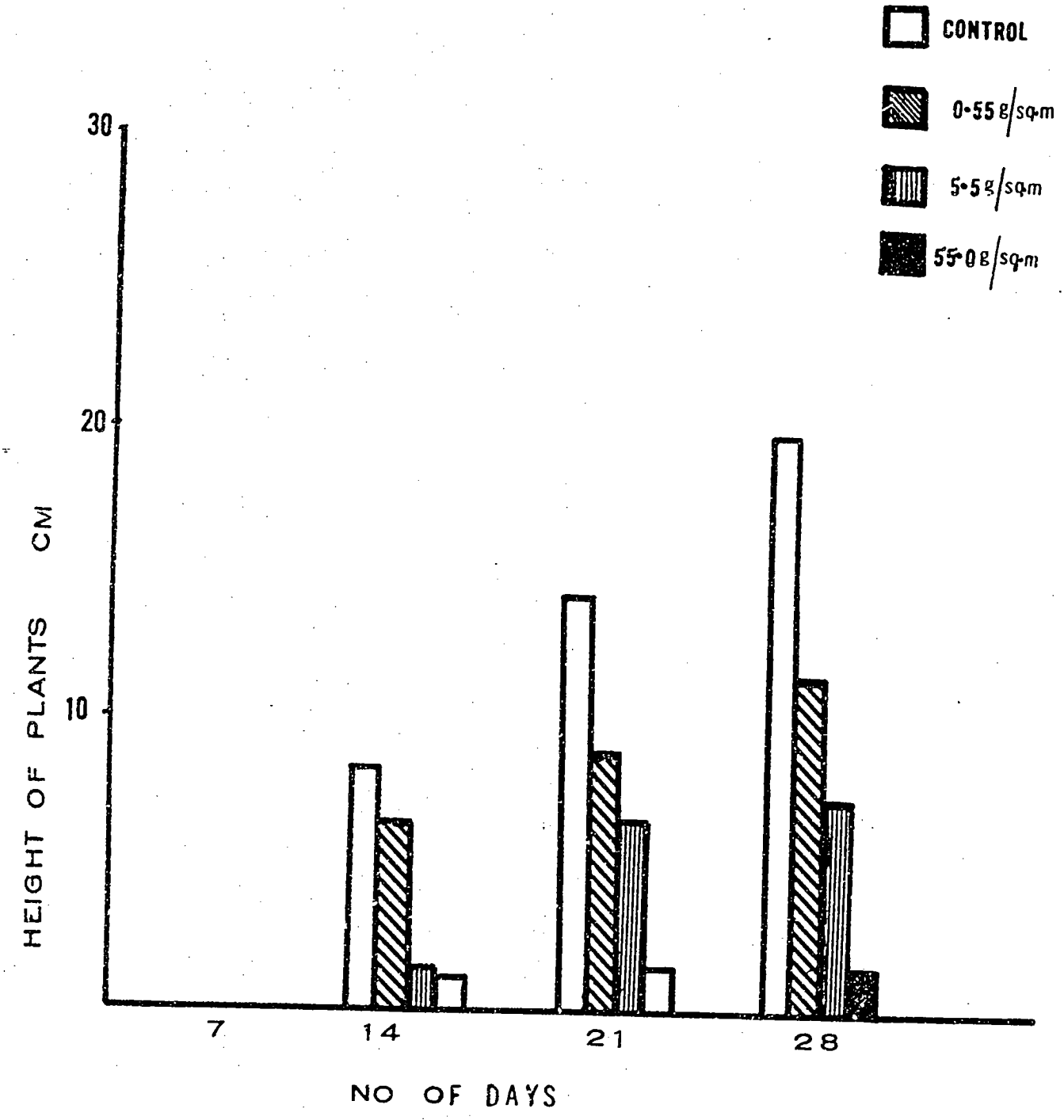


Fig. 5. Growth-rate of rye seedlings treated with various concentrations of ammonium perchlorate.

Table 5---Growth rate of rye-grass measured in centimeters upto a period of 28 days.

NH_4ClO_4 Conc. in soil	Seedling Ht. (Cm.) 14 days	Seedling Ht. (Cm.) 21 days	Seedling Ht. (Cm.) 28 days
Control	8.4	14.2	19.8
0.55	6.4	9.0	11.6
5.50	1.2	6.6	7.4
55.0	1.0	1.5	1.7

Conclusion: Data are fairly apparent in depicting the effect of ammonium perchlorate. There is a marked decrease in the highest concentration of this compound, exhibiting its toxicity retention after two years. (Fig. 5).

Growth of Chlamydomonas

Pure culture of Chlamydomonas was purchased from Turtox Co. Further culture was maintained in Knop's solution at room temperature. The constituents of the medium were mixed together according to Turtox Service Leaflet No. 6 (6-2). Test solution was prepared by diluting 1% stock solution of ammonium perchlorate. No problems were encountered in dissoloving this compound in distilled water since it is highly soluble in it. The cultures were grown in a dust-free atmosphere and the growth of Chlamydomonas was measured on a Bausch & Lomb Spectronic-20 Meter, at 600 nm.

We have reported the results of 96 hour growth in the final report of 1975; where the growth rate of this alga was greater in 1.0 and 10.0 ppb ammonium per-chlorate treatments than the control. We are reporting here, growth of this organism extending to 1164 hours, measured at several intervals. The concentration of ammonium perchlorate in growth medium was 1.0, 10.0, and 100.0 ppb and ppm. This provided a wide range of testing from a very low to a very high level. Although the raw data are maintained for all the above concentrations, 10.0 ppb and ppm have been omitted from Table 6 and Figures 6,7, for the sake of clarity.

Table 6---Growth of Chlamydomonas spp. measured upto 1164 hours in various concentrations of ammonium perchlorate at 600 nm.

Conc. of NH_4ClO_4	Treatment time (Hrs.)	O.D. X 100
Control	0.0	3.94
	143.0	4.43
	192.0	4.91
	236.0	6.39
	336.0	13.08
	357.0	4.58
	405.0	4.58
	432.0	12.50
	454.0	5.93
	831.0	6.58
	1128.0	4.58
	1164.0	4.26
1ppb	0.0	4.91
	143.0	5.24
	192.0	4.58
	236.0	6.57
	336.0	14.47
	357.0	5.38
	405.0	4.12
	432.0	12.69
	454.0	5.23
	831.0	6.58
	1128.0	4.12
	1164.0	4.76
10 ppb	0.0	3.15
	143.0	3.15
	192.0	3.62
	236.0	5.88
	336.0	14.87
	357.0	4.74
	405.0	2.69
	432.0	8.09
	454.0	3.62
	831.0	4.26
	1128.0	2.69
	1164.0	4.10

On April 16, 1996 and April 17, 1996, the stockpiled soils were loaded and transported to the Las Vegas Paving facility in Las Vegas, Nevada for thermal destruction/treatment. According to weigh scale tickets, there were 511.12 tons of hydrocarbon impacted soil disposed at the Las Vegas Paving facility. A letter of acceptance from the disposal facility is provided in Appendix C. On April 17, 1996, the two excavated areas on the property (by the DGO tank and at sample KM-9) were backfilled with a Type II imported fill material to surrounding grade.

This concludes our services on this project. If you have any questions or require additional information, please contact me at (702) 798-8050.

Sincerely,
WESTERN TECHNOLOGIES, INC.

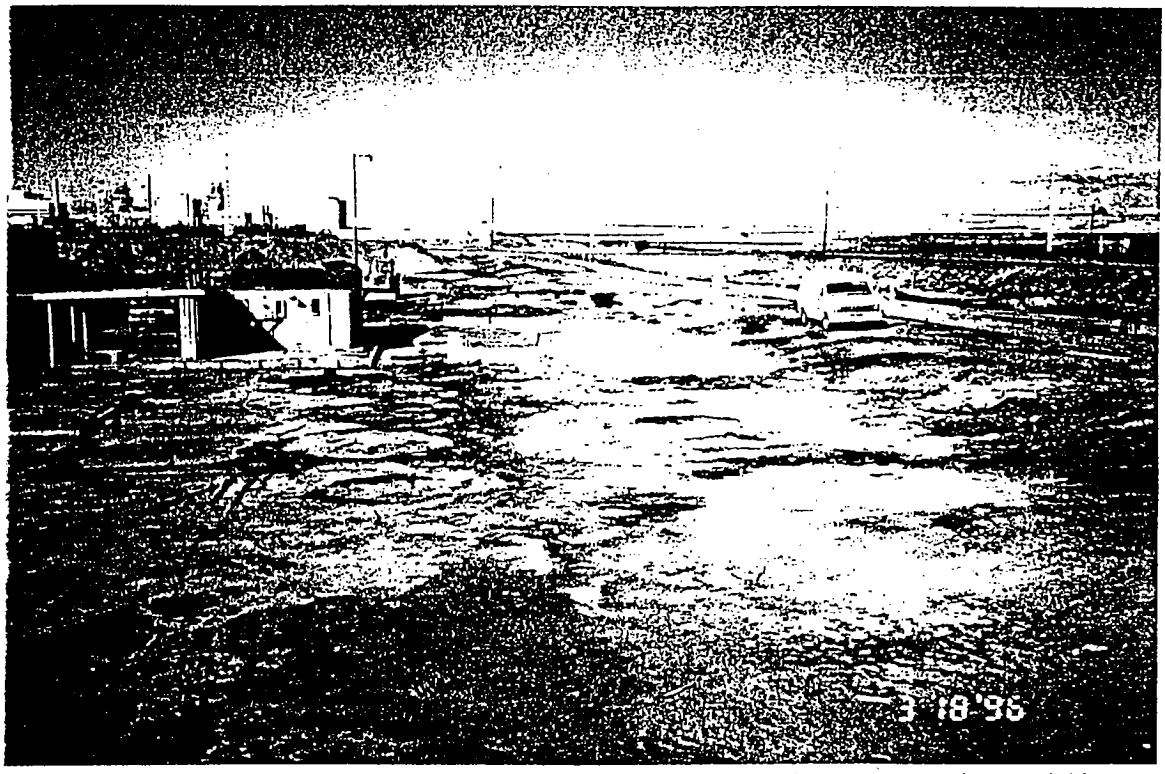
Timothy P. Aten, C.E.M.
Senior Project Manager

cc: Mr. Kevin Koerner, Koch Materials

attachment:

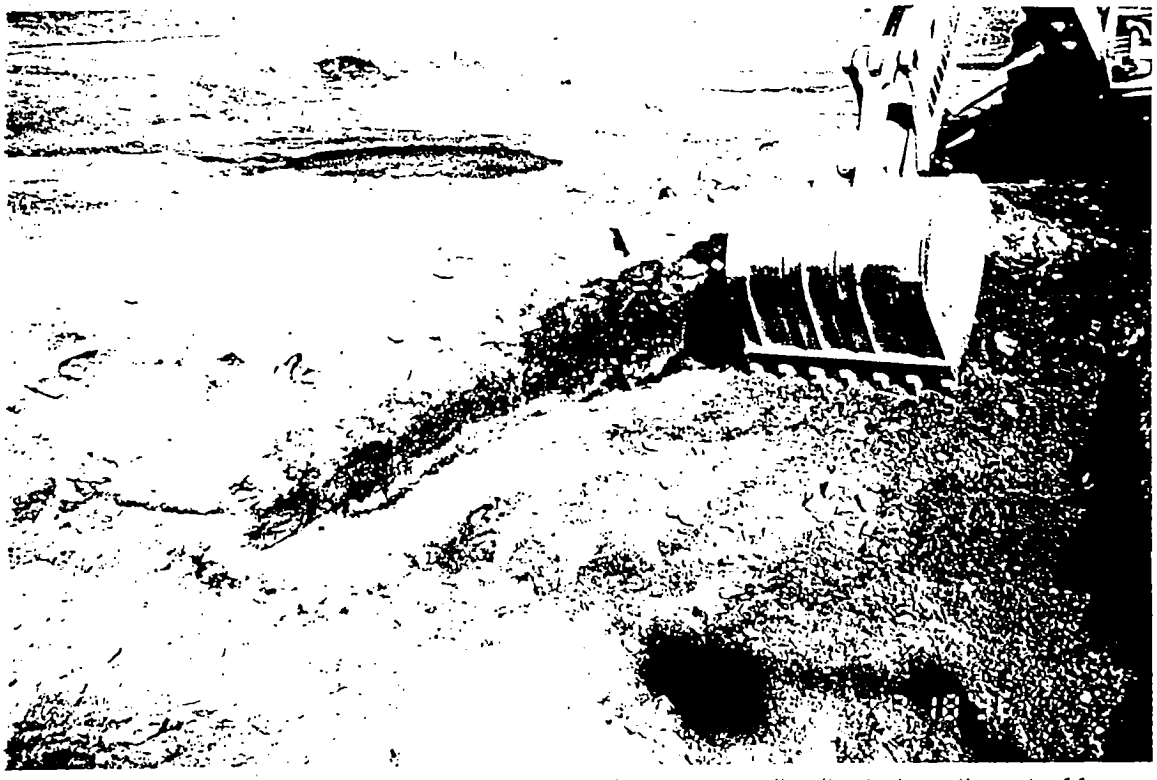
	Appendix A	Project Photographs
	Appendix B	Soil Stockpile Analytical Results
	Appendix C	Acceptance Letter
	Appendix D	Post-excavation Analytical Results

APPENDIX A

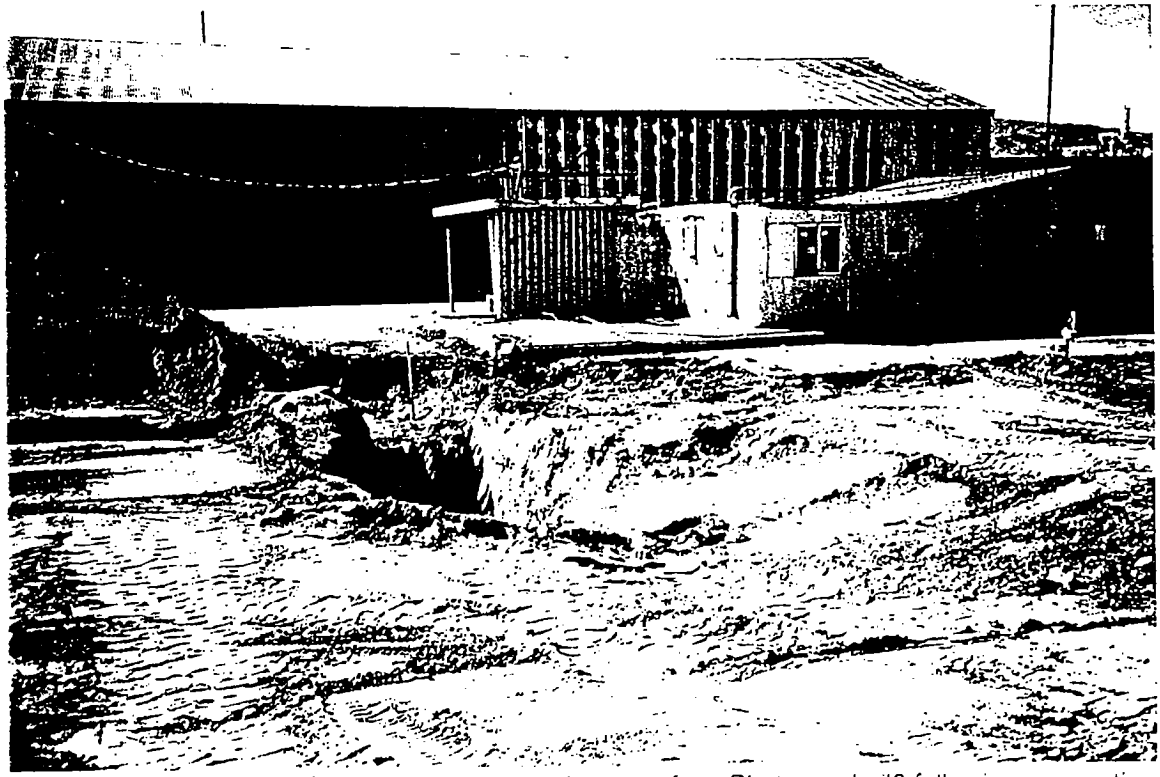


Photograph #1 View to the west showing project area prior to excavation activities.

Photograph #2 View to the west showing project area following excavation activities.



Photograph #3 View to the east showing oil impacted soils situated southwest of former DGO tank (in background). This localized area required excavation to 12 feet bgs.



Photograph #4 View to the south showing area from Photograph #3 following excavation activities.

APPENDIX B

NEVADA ENVIRONMENTAL LABORATORY

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-800-368-5221

CLIENT: Western Technologies Inc.
3611 W. Tompkins Ave.
Las Vegas, NV 89103

ATTN: Tim Aten

PROJECT NAME: Koch Materials
PROJECT NUMBER: 4186JL080 NEL ID: L9603168

Attached are the analytical results for samples in support of the above referenced project.

Samples submitted for this project on 03/19/96 were received in good condition and under chain of custody. Unless otherwise noted, no anomalies were associated with this project.

Should you have any questions or comments, please feel free to contact our Client Services department (702) 657-1010.

Stan Van Wagenen
Laboratory Manager

3/26/96
Date

NEVADA ENVIRONMENTAL LABORATORY

CLIENT: Western Technologies
PROJECT NAME: Koch Materials
PROJECT NUMBER: 4186JL080 ANALYST: JW

METHOD: **TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS by EPA 8015M, July 1992**
SAMPLE MATRIX: **SOIL**

CLIENT ID	DATE SAMPLED	NEL ID	RESULTS mg/kg	REPORTING LIMIT[1]	EXTRACTED	ANALYZED
SP-1	03/18/96	L9603168-01	9000*	10 mg/kg	03/19/96	03/20/96

*TPH Components are in the range of Oil (C_{18} - C_{24}).
[1] Note: The detection limit for oil is 50 mg/kg

QUALITY CONTROL DATA (Total for Gasoline and Diesel Ranges):

Sample ID	Result	Acceptable Range
Method Blank	ND	<10 mg/kg
L960319-LCS	83% Recovery	67-110%

ND - Not Detected

NEVADA ENVIRONMENTAL LABORATORY

CLIENT: Western Technologies Inc.
PROJECT NAME: Koch Materials
PROJECT NUMBER: 4186JL080

ANALYST: JY

METHOD: **TCLP BY EPA 1311, July 1992 & 3 METALS BY 6010A, July 1992**
MATRIX: **SOIL**

CLIENT ID: SP-01
DATE SAMPLED: 3/18/96
NEL ID: L9603168-01

EXTRACTED:03/19/96
DIGESTED:03/20/96
ANALYZED:03/20/96

PARAMETER	RESULT mg/L	REPORTING LIMIT
Cadmium	ND	0.010 mg/L
Chromium	ND	0.010 mg/L
Lead	ND	0.050 mg/L

CLIENT ID: Method Blank
DATE SAMPLED:
NEL IDENTIFIED:1311 BLK

EXTRACTED:03/19/96
DIGESTED:03/20/96
ANALYZED:03/20/96

PARAMETER	RESULT mg/L	REPORTING LIMIT
Cadmium	ND	0.010 mg/L
Chromium	ND	0.010 mg/L
Lead	ND	0.050 mg/L

ND - Not Detected

NEVADA ENVIRONMENTAL LABORATORY

CLIENT: Western Technologies
PROJECT NAME: Koch Materials
PROJECT NUMBER: 4186JL080

CLIENT ID: SP-01
DATE SAMPLED: 03/18/96
NEL ID: L9603168-01

ANALYZED: 03/25/96
ANALYST: SJ

METHOD: **8240 VOLATILE ORGANIC COMPOUNDS BY EPA 8260A, September 1994**
SAMPLE MATRIX: **SOIL**

COMPOUND	RESULT µg/kg	REPORTING LIMIT[1]	COMPOUND	RESULT µg/kg	REPORTING LIMIT[1]
Acetone	ND	1200µg/kg	Styrene	ND	120µg/kg
Benzene	ND	120µg/kg	Tetrachloroethene (PCE)	ND	120µg/kg
Bromodichloromethane	ND	120µg/kg	1,1,2,2-Tetrachloroethane	ND	120µg/kg
Bromoform	ND	120µg/kg	Toluene	ND	120µg/kg
Bromomethane	ND	120µg/kg	1,1,1-Trichloroethane (1,1,1-TCA)	ND	120µg/kg
2-Butanone	ND	620µg/kg	1,1,2-Trichloroethane (1,1,2-TCA)	ND	120µg/kg
Carbon disulfide	ND	120µg/kg	Trichloroethene (TCE)	ND	120µg/kg
Carbon tetrachloride	ND	120µg/kg	Vinyl acetate	ND	120µg/kg
Chlorobenzene	ND	120µg/kg	Vinyl chloride	ND	120µg/kg
Chloroethane	ND	120µg/kg	m,p-Xylene	ND	120µg/kg
Chloroform	ND	120µg/kg	o-Xylene	ND	120µg/kg
Chloromethane	ND	120µg/kg			
2-Chloroethyl vinyl ether	ND	120µg/kg	**Additional Parameters**		
Dibromochloromethane	ND	120µg/kg	1,3-Dichlorobenzene (m-DCB)	ND	120µg/kg
1,1-Dichloroethane (1,1-DCA)	ND	120µg/kg	1,4-Dichlorobenzene (p-DCB)	ND	120µg/kg
1,2-Dichloroethane (1,2-DCA)	ND	120µg/kg	1,2-Dichlorobenzene (o-DCB)	ND	120µg/kg
1,1-Dichloroethene (1,1-DCE)	ND	120µg/kg			
cis-1,2-Dichloroethene	ND	120µg/kg			
trans-1,2-Dichloroethene	ND	120µg/kg			
1,2-Dichloropropane	ND	120µg/kg			
cis-1,3-Dichloropropene	ND	120µg/kg			
trans-1,3-Dichloropropene	ND	120µg/kg			
Ethylbenzene	ND	120µg/kg			
2-Hexanone	ND	620µg/kg			
Methylene chloride (Dichloromethane)	ND	620µg/kg			
4-Methyl-2-pentanone	ND	620µg/kg			

[1] Sample diluted 1:25. Dilluted due to matrix interference.

QUALITY CONTROL DATA:

Surrogate	% Recovery	Acceptable Range
Dibromofluoromethane	93	81-117%
Toluene-d8	94	81-117%
4-Bromofluorobenzene	93	74-121%

ND - Not Detected

NEVADA ENVIRONMENTAL LABORATORY

CLIENT: Western Technologies
PROJECT NAME: Koch Materials
PROJECT NUMBER: 4186JL080

CLIENT ID: Method Blank
DATE SAMPLED: NA
NEL ID: VBLK960332B

ANALYZED: 03/25/96
ANALYST: SJ

METHOD: **8240 VOLATILE ORGANIC COMPOUNDS BY EPA 8260A, September 1994**
SAMPLE MATRIX: **SOIL**

COMPOUND	RESULT µg/kg	REPORTING LIMIT	COMPOUND	RESULT µg/kg	REPORTING LIMIT
Acetone	ND	25µg/kg	Styrene	ND	5µg/kg
Benzene	ND	5µg/kg	Tetrachloroethene (PCE)	ND	5µg/kg
Bromodichloromethane	ND	5µg/kg	1,1,2,2-Tetrachloroethane	ND	5µg/kg
Bromoform	ND	5µg/kg	Toluene	ND	5µg/kg
Bromomethane	ND	5µg/kg	1,1,1-Trichloroethane (1,1,1-TCA)	ND	5µg/kg
2-Butanone	ND	25µg/kg	1,1,2-Trichloroethane (1,1,2-TCA)	ND	5µg/kg
Carbon disulfide	ND	5µg/kg	Trichloroethene (TCE)	ND	5µg/kg
Carbon tetrachloride	ND	5µg/kg	Vinyl acetate	ND	5µg/kg
Chlorobenzene	ND	5µg/kg	Vinyl chloride	ND	5µg/kg
Chloroethane	ND	5µg/kg	m,p-Xylene	ND	5µg/kg
Chloroform	ND	5µg/kg	o-Xylene	ND	5µg/kg
Chloromethane	ND	5µg/kg			
2-Chloroethyl vinyl ether	ND	5µg/kg	**Additional Parameters**		
Dibromochloromethane	ND	5µg/kg	1,3-Dichlorobenzene (m-DCB)	ND	5µg/kg
1,1-Dichloroethane (1,1-DCA)	ND	5µg/kg	1,4-Dichlorobenzene (p-DCB)	ND	5µg/kg
1,2-Dichloroethane (1,2-DCA)	ND	5µg/kg	1,2-Dichlorobenzene (o-DCB)	ND	5µg/kg
1,1-Dichloroethene (1,1-DCE)	ND	5µg/kg			
cis-1,2-Dichloroethene	ND	5µg/kg			
trans-1,2-Dichloroethene	ND	5µg/kg			
1,2-Dichloropropane	ND	5µg/kg			
cis-1,3-Dichloropropene	ND	5µg/kg			
trans-1,3-Dichloropropene	ND	5µg/kg			
Ethylbenzene	ND	5µg/kg			
2-Hexanone	ND	25µg/kg			
Methylene chloride (Dichloromethane)	ND	25µg/kg			
4-Methyl-2-pentanone	ND	25µg/kg			

QUALITY CONTROL DATA:

Surrogate	% Recovery	Acceptable Range
Dibromofluoromethane	93	81-117%
Toluene-d8	93	81-117%
4-Bromofluorobenzene	90	74-121%

ND - Not Detected

P.O. 41565P-9

CHAIN OF CUSTODY RECORD

Custody Seal Intact? Y N None Temp. 6°
Condition when received good

JOB NO	SAMPLER
4186JLC80	Tim Aten

PROJECT NAME: KOCH MATERIALS

SAMPLE IDENTIFICATION NUMBER	DATE	TIME	SAMPLE LOCATION (Depth)	NUMBER OF CONTAINERS	SAMPLE METHOD: VACSAM	SOIL SCOOP	SOIL AUGER	SPLIT-SPOON	BAILER	GRAB		REMARKS (Physical Appearance, Compositing Instructions, etc.)	LABORATORY IDENTIFICATION NUMBER
SP-01	3/18	15:00	stockpile	2 jars						X		oil impacted soil stockpile - composite	9603168-01

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
Tim Aten	3/19/96	1150	Wesley Hart				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE	TIME	SHIPPING TEMPERATURE (°F) →	MINIMUM / MAXIMUM

COMMENTS: Analyze sample for TPH by EPA 8015 (modified); VOCs by EPA 8240; and 3 TCLP metals (Cd, Cr, Pb). Normal tat. Hydrocarbon is oil/diesel.

White - Testing Laboratory; Yellow - Department Job File; Pink - Field Sampler

Western Technologies Inc.

APPENDIX C

General Engineering
Contractors
Since 1958

LAS VEGAS PAVING CORP.

WE'RE #1

4420 South Decatur Blvd.
Las Vegas, Nevada 89103
(702) 251-5800
Fax (702) 251-1968

April 19, 1996

Western Technologies
3611 West Tompkins, Suite A
Las Vegas, Nevada 89103-5618

Attention: Tim Aten

Las Vegas Paving Corp.
Hydrocarbon Remediation
Job #6799 Weight Tickets
Koch Materials

Dear Mr. Aten:

Enclosed please find the weight tickets for the above referenced project. The tickets reflect the tonnage received on April 16 and 17, 1996. The total tonnage received was 511.12 tons. I have enclosed an additional copy for the Koch Materials.

This is not an invoice. Once the soil has been thermally treated to Non-detection limits as confirmed by an outside independent laboratory, an invoice will be forwarded.

Las Vegas Paving Corp. strives to insure complete client satisfaction for each and every project. For all future projects, I will mail the weight tickets for the week on Friday. I hope this will alleviate future questions or problems regarding various projects.

If there are any questions or suggestions that you may have to help us serve you more efficiently, please call me at (702) 649-7423.

Thank you for your time and consideration.

Sincerely,

LAS VEGAS PAVING CORPORATION

David C. Breault

David C. Breault
Operations Manager
Hydrocarbon Remediation

APPENDIX D

NEVADA ENVIRONMENTAL LABORATORY

Las Vegas Division
4208 Arcata Way, Suite A • Las Vegas, NV 89030
(702) 657-1010 • Fax: (702) 657-1577
1-800-368-5221

CLIENT: Western Technologies Inc.
3611 W. Tompkins Ave.
Las Vegas, NV 89103

ATTN: Tim Aten

PROJECT NAME: Koch Materials-BMI Complex
PROJECT NUMBER: 4186JL080 NEL ID: L9604188

Attached are the analytical results for samples in support of the above referenced project.

Samples submitted for this project on 04/17/96 were received in good condition and under chain of custody. Unless otherwise noted, no anomalies were associated with this project.

Should you have any questions or comments, please feel free to contact our Client Services department (702) 657-1010.

Stan Van Wagenen
Laboratory Manager

4/24/96
Date

NEVADA ENVIRONMENTAL LABORATORY

CLIENT: Western Technologies
PROJECT NAME: Koch Materials-BMI Complex
PROJECT NUMBER: 4186JL080 ANALYST: JW

METHOD: **TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS by EPA 8015M, July 1992**
SAMPLE MATRIX: **SOIL**

CLIENT ID	DATE SAMPLED	NEL ID	RESULTS mg/kg	REPORTING LIMIT	EXTRACTED	ANALYZED
KM-11	04/17/96	L9604188-01	32*	10 mg/kg	04/17/96	04/17/96

Note: The detection limit for oil is 50 mg/kg
* TPH components are in the range of diesel (C_9 - C_{24})

QUALITY CONTROL DATA (Total for Gasoline and Diesel Ranges):

Sample ID	Result	Acceptable Range
Method Blank L960417-BLK	ND	<10 mg/kg
L960417-LCS	91% Recovery	67-110%

ND - Not Detected

P.O. #41856P10

CHAIN OF CUSTODY RECORD

Custody Seal intact? Y N (None) Temp. 5°C

Condition when received (good)

6JL080 SAMPLER Tim Aten

PROJECT NAME Koch Materials - BMI complex

SAMPLE IDENTIFICATION NUMBER	DATE	TIME	SAMPLE LOCATION (Depth)	NUMBER OF CONTAINERS	SAMPLE METHOD: VACSAM	SOIL SCOOP	SOIL AUGER	SPLIT-SPOON	BAILER	GRAB	REMARKS (Physical Appearance, Compositing Instructions, etc.)	LABORATORY IDENTIFICATION NUMBER
M-11	4/17	9:00	1.5'	1 jar						X	composite from bottom of over-excavation	L9604188-01

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
Tim At.	4/17/96	1235	Wesley Hatch

SHIPPING TEMPERATURE (°F) →

COMMENTS Analyze sample for TPH by EPA 8015. Hydrocarbon is oil/diesel. Normal tat.

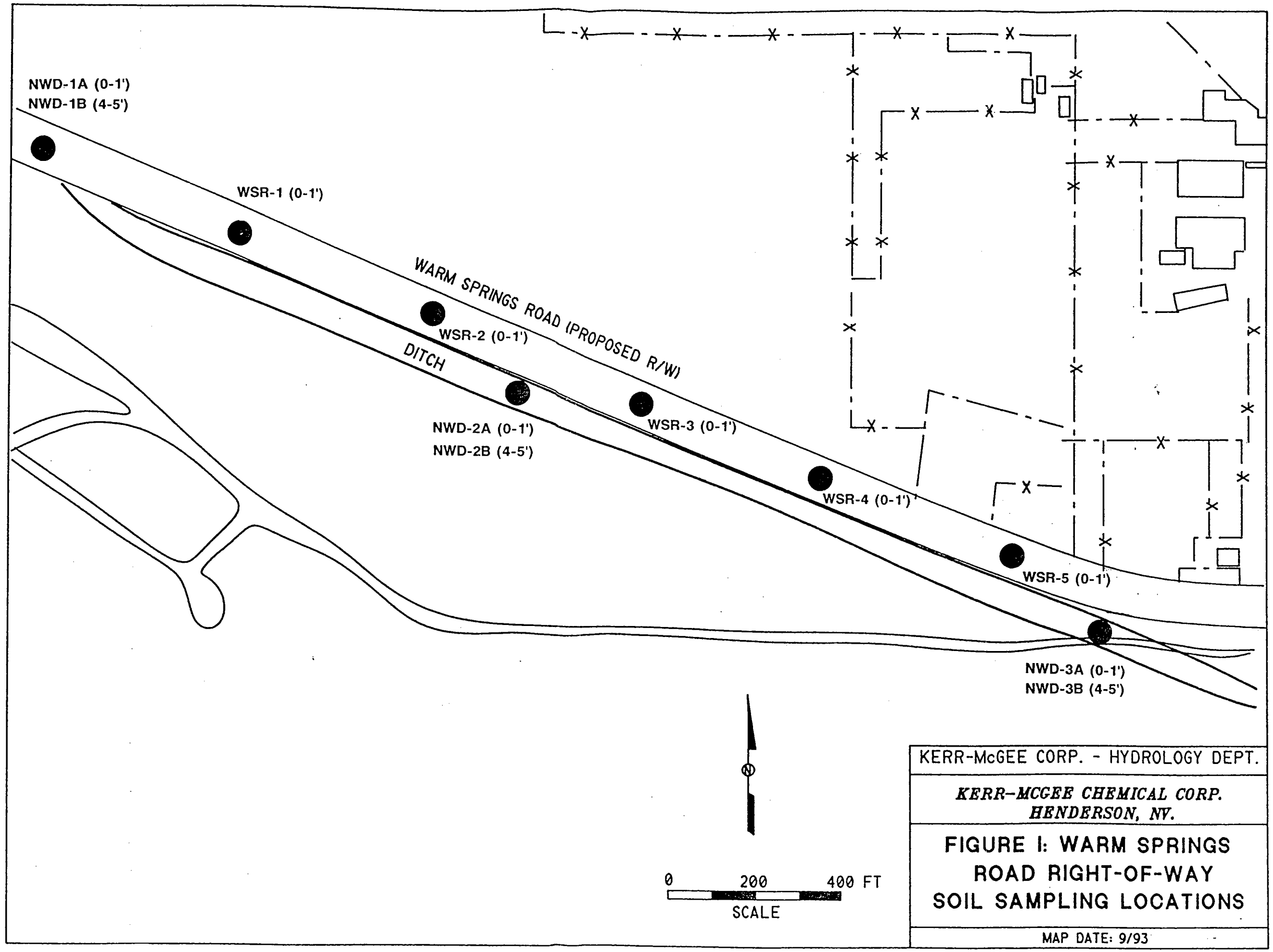
White - Testing Laboratory; Yellow - Department Job File; Pink - Field Sampler

Western Technologies Inc.

ATTACHMENT 23

LOU ITEM 6

NORTHWEST DRAINAGE DITCH INFORMATION



KERR-McGEE CORP. - HYDROLOGY DEPT.

KERR-MCGEE CHEMICAL CORP.
HENDERSON, NV.

FIGURE I: WARM SPRINGS ROAD RIGHT-OF-WAY SOIL SAMPLING LOCATIONS

MAP DATE: 9/93

ATTACHMENT 24

GROUNDWATER REMEDIATION EVALUATION

KERR-McGEE CHEMICAL CORPORATION
POST OFFICE BOX 55 • HENDERSON, NEVADA 89009

July 22, 1996

Mr. Allen Biaggi
State of Nevada
Division of Environmental Protection
333 West Nye Lane
Carson City, Nevada 89710

Subject: First Half 1996 Performance Report
Chromium Mitigation Program

Enclosed are two copies of the First Half 1996, Semi-Annual Chromium Mitigation Program Report for the Kerr-McGee Chemical Corporation, Henderson facility.

This Report presents information regarding the groundwater interception, treatment and recharge systems of the chromium mitigation program.

If you have any questions or comments concerning this information, please contact me at (702) 651-2234.

Sincerely,

SM Crowley

Susan M. Crowley
Staff Environmental Specialist

smc\GWCVLTR.WPD

cc: PSCorbett
WJGanus w/o attachment
Joe Livak (NV Division Environmental Protection)
RANapier
MJPorterfield w/o attachment
TWReed

Copy 6

SEMI-ANNUAL PERFORMANCE REPORT
CHROMIUM MITIGATION PROGRAM
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

JANUARY - JUNE 1996

Submitted in Accordance with:

Chromium Mitigation Program
Consent Order
September 9, 1986

Prepared by:

Thomas W. Reed
Hydrology Department
Kerr-McGee Corporation

July 26, 1996

Susan Crowley, Environmental Engineer
Kerr-McGee Chemical Corporation
Henderson, Nevada

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CONTINUOUS WATER LEVEL RECORDERS 2

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SEMI-ANNUAL PERFORMANCE REPORT
CHROMIUM MITIGATION PROGRAM
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

INTRODUCTION

In accordance with the Consent Order for cleanup of chromium contaminated groundwater at the Henderson facility, finalized September 9, 1986, Kerr-McGee Chemical Corporation (KMCC) submits this semi-annual performance report to the Nevada Department of Environmental Protection. This report, covering the period January through June, 1996, summarizes performance data for the groundwater treatment plant and evaluates the effectiveness of the groundwater interception and treatment system installed to carry out the chromium mitigation program.

GROUNDWATER SURFACE CONFIGURATION

Figure 1 illustrates the Consent Order Monitoring Area as defined in Appendix D of the Consent Order, and shows the locations of all groundwater interceptor and monitor wells installed by KMCC within this area. Appendix A of this report lists monthly groundwater elevations recorded since January 1994 in wells within the Consent Order area.

The water table configuration is presented in two formats, potentiometric surface maps and cross-sections for the first half of 1996, reflecting quarterly groundwater level measurements. Figure 2 shows the potentiometric surface within the consent order monitoring area for the first quarter of

1996. Groundwater elevation data were recorded on March 15, 1996. Figure 3 presents a cross-section of the groundwater interceptor line for the same date. Figures 4 and 5 present the same type map and cross-section for the second quarter of 1996, based on groundwater elevation data recorded on June 20, 1996. The static water level shown on the cross-sections represents the Consent Order reference groundwater elevation, established September 14, 1987, prior to startup of the interception system. Groundwater elevations continue to confirm that water levels in the Consent Order monitoring area have stabilized since the discharge of cooling water to the beta ditch was discontinued in November, 1987.

CONTINUOUS WATER LEVEL RECORDERS

Wells M-78 and M-80 (Figure 1) are equipped with continuous water level recorders. Appendix B contains copies of the recorder charts generated during the first half of 1996. The charts for M-80 (within the trench recharge area) and M-78 (upgradient from the trench area) display similar groundwater level variations indicating that recharge from the trenches is not adversely affecting groundwater levels in the area.

INTERCEPTOR SYSTEM PERFORMANCE

Figures 2 through 5 show the potentiometric surface configuration in the interceptor area during the first half of 1996. Cross-sections show that drawdown consistently exceeded the one foot below reference water level criterion across the entire interceptor well line.

Although the potentiometric surface maps (Figures 2 and 4) do not generally show overlapping drawdown cones along the entire interceptor line, the cross-sections show the majority of interceptor wells are drawn down to the Muddy Creek Clay. Drawdowns to this degree indicate that the alluvial aquifer is locally being depleted of water and that interception of groundwater has been maximized with this recovery system.

Unrelated to the interception program, groundwater levels have declined across the area due to the discontinuation of upgradient water infiltration from the Beta Ditch. Since 1987, the Beta Ditch has been utilized almost exclusively for stormwater flow.

In May, 1990, KMCC began monthly analyses for chromium in several other wells located both upgradient and downgradient from the recharge trench. The data are shown in Table 1, and are presented graphically as Figures 6 and 7. The M-70 series wells presented in Figure 6 are located upgradient from the recharge trench. The M-80 series wells presented in Figure 7 are located downgradient from the recharge trench. The M-70 series wells show a gradual increase in chromium concentrations while the M-80 series wells exhibit a leveling off or decline in chromium concentrations during the first half of 1996. The decline in chromium concentrations can be attributed to the efficient functioning of the extraction and recharge portions of the groundwater treatment system.

Chromium concentration data from the five Consent Order Appendix J wells (see Figure 8) are contained in Table 3. Figure 9 presents these data graphically. During the first half of 1996 well M-11 displayed a decline in chromium concentration. Wells M-36 and M-72, downgradient from M-11 but still upgradient from the recharge trenches, showed a gradual increase in chromium. Wells M-86 and M-23, downgradient from the recharge system, continue to level off or decline in chromium concentration.

KMCC instituted a management program to assure maximization of groundwater removal at the individual well locations along the interceptor line by focusing on those wells showing the highest chromium concentrations. Figure 10 portrays chromium concentration for each interceptor well for the past year. Discharge rates for each well are monitored and adjusted to provide maximum recovery of chromium based on the potentiometric surface configuration, chromium concentration, and well production capability. Table 2 lists the pumping rate of each interceptor well for the months of December, 1991 through 1995, as compared to June, 1996.

IMPACT OF DISPOSAL SYSTEM ON DOWNGRADIENT WATER LEVELS

The Disposal Contingency Plan (Appendix J) of the Consent Order identifies specific monitor wells that are to be utilized to evaluate any water level impact from recharge of treated water into the alluvium. Fifteen wells are monitored monthly for groundwater levels. Figure 8 shows the location of these wells. Data presented in Appendix A show that groundwater elevations have stabilized in that portion of the facility downgradient from the recharge system (evidenced by wells M-47, M-23, and M- 49), and have continued to decline.

CHROMIUM TREATMENT SYSTEM EFFECTIVENESS

The Consent Order specifies the following effluent concentration limits for the treatment plant discharge water:

Monthly average

Total Chromium	1.7 mg/l
Hexavalent Chromium	0.05 mg/l

Maximum single value on a composite sample

Total Chromium	3.4 mg/l
Hexavalent Chromium	0.1 mg/l

Table 4 updates the treatment plant feed and discharge chromium concentration data with data for the first half of 1996. Total Chromium and Hexavalent Chromium values for the first half of 1996 did not exceed either the monthly permissible average or the maximum composite sample value.

RECOVERY/TREATMENT SYSTEM MAINTENANCE

Approximately every twenty days, the electrodes in the treatment plant's electrolytic cells deteriorate to the point they require replacement. During electrode replacement, a backup cell is placed in active service in the circuit to maintain groundwater treatment.

Engine hour meters determine the average number of hours per day individual pumps operate. Six of the interceptor wells utilize a time-marking device that shuts the pump off for a pre-determined amount of time if the well runs dry. If a pump spends a significant amount of time shut down, overall recovery can be increased by decreasing the pump rate, allowing a smaller discharge to occur a greater percentage of the time. Well discharge rates are adjusted periodically, as engine hour meters show either continuous pumping or a low percentage of pumping time.

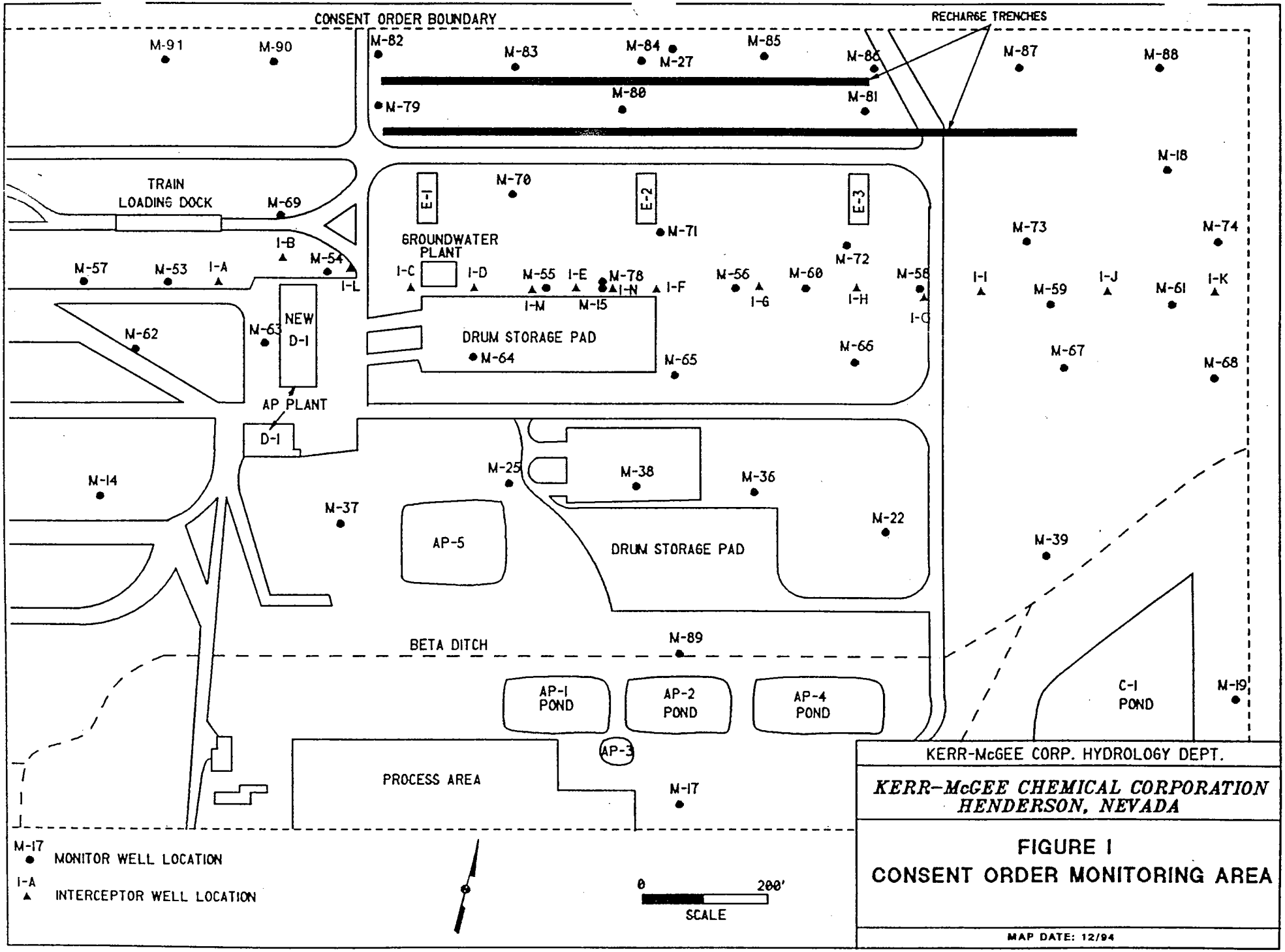
All interceptor wells are checked for operation each day; flow rates are recorded for each well twice weekly. Flowmeter readings (total volume) are recorded for each time-marking well twice weekly. These records indicate when a pump needs to be replaced or a flow rate adjusted. In addition, other maintenance associated with maintaining treatment plant operations was performed. During the second half of 1995, maintenance work was performed on the pumping systems in recovery wells I-I (1/23-30), I-N (4/10-18), and I-D (4/17-18), and I-H (5/13-15). Low current system shutdowns were noted on 1/22, 1/24, 1/25, 2/26, and 3/22. The average down time for the system during each of these shutdowns was 2 hours.

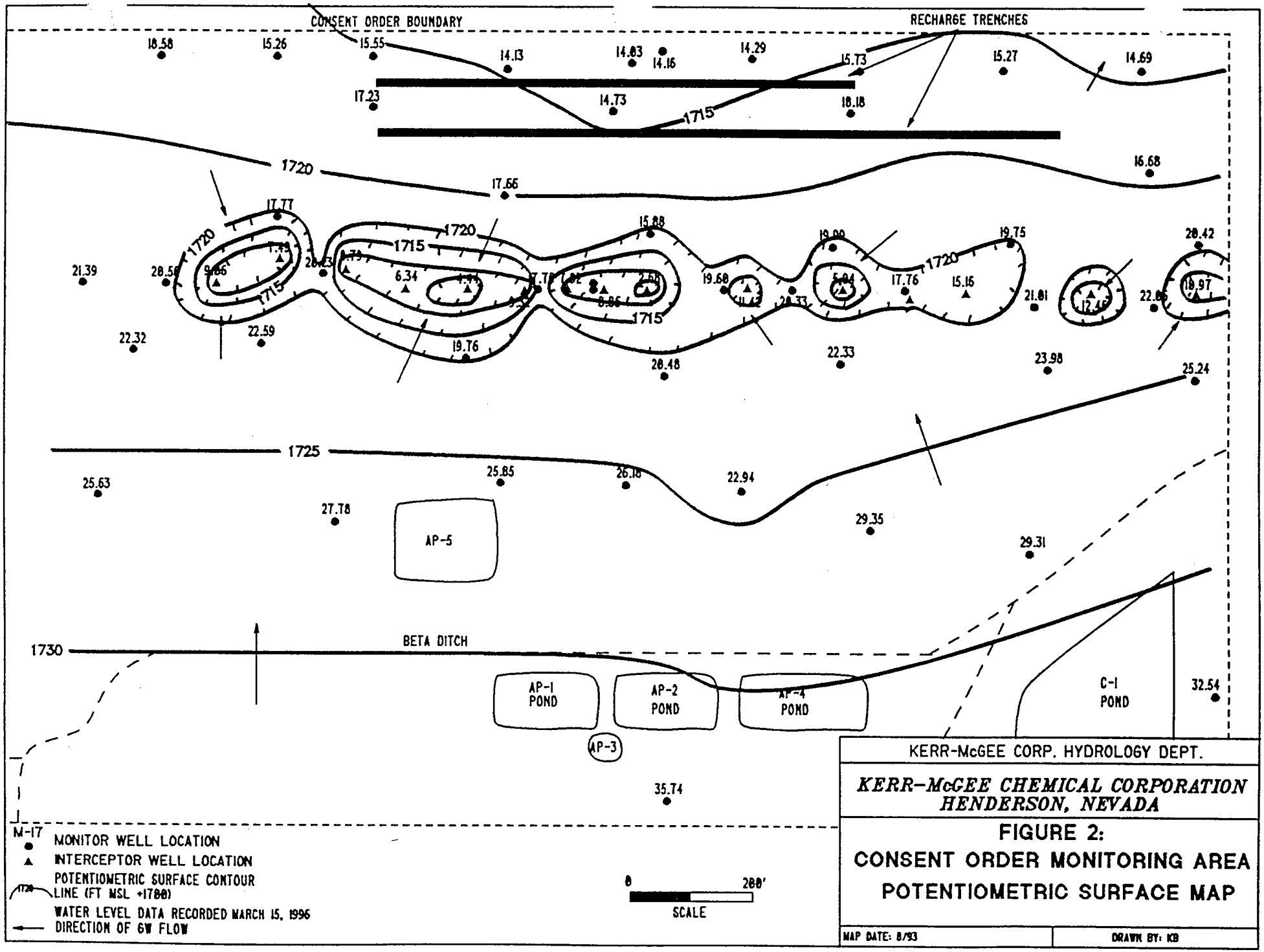
CONCLUSIONS

Discharge chromium concentrations for the treatment facility are below established requirements. No adverse impacts to downgradient groundwater levels have been observed as a result of returning treated groundwater to the near-surface aquifer via the recharge galleries. Chromium concentrations in the majority of monitor wells immediately downgradient from the recharge trenches have stabilized or declined indicating that the recharge system is functioning properly. Chromium concentrations in monitor wells immediately downgradient from the groundwater interception wells have also declined or stabilized in response to more efficient capture of the groundwater chromium plume.

PROPOSED FUTURE ACTIVITIES

KMCC will continue to record water levels in the consent order area on a quarterly basis. Quarterly potentiometric surface maps and cross-sections will be developed. The effect of changing the pumping rates of the interceptor wells will be monitored, and appropriate responses (i.e.- future pump rate adjustments) will be taken to assure optimal drawdown and plume interception.


CONSENT ORDER BOUNDARY
RECHARGE TRENCHES
M-91
M-90
M-82
M-83
M-84
M-27
M-85
M-86
M-87
M-88
M-79
M-80
M-81
M-18
TRAIN
LOADING DOCK
M-69
E-1
M-70
E-2
E-3
M-71
M-73
M-74
GROUNDWATER
PLANT
M-72
I-B
M-54
M-57
M-53
I-A
I-C
I-D
M-55
I-E
M-78
I-N
I-F
M-56
M-60
M-58
I-I
M-59
I-J
M-61
I-K
I-L
I-M
M-15
I-G
I-H
I-O
M-62
M-63
NEW
D-1
DRUM STORAGE PAD
M-64
M-65
M-66
M-67
M-68
AP PLANT
D-1
M-14
M-25
M-38
M-36
M-37
AP-5
M-22
DRUM STORAGE PAD
M-39
BETA DITCH
M-89
AP-1
POND
AP-2
POND
AP-4
POND
C-1
POND
M-19
AP-3
PROCESS AREA
M-17
M-17
MONITOR WELL LOCATION
I-A
INTERCEPTOR WELL LOCATION
0
200'
SCALE
KERR-McGEE CORP. HYDROLOGY DEPT.
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
FIGURE 1
CONSENT ORDER MONITORING AREA
MAP DATE: 12/94

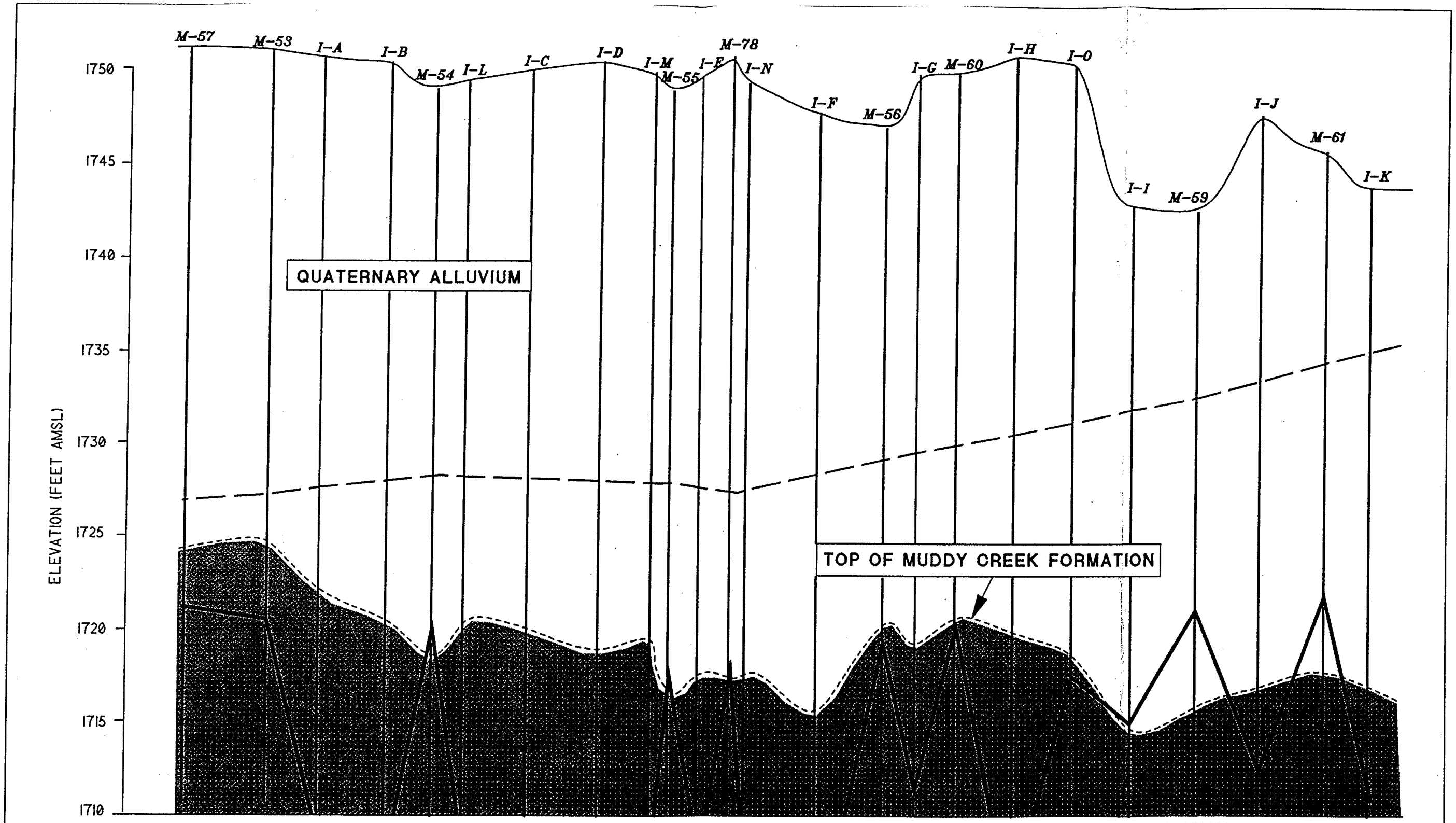


KERR-McGEE CORP. HYDROLOGY DEPT.

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

FIGURE 2:
CONSENT ORDER MONITORING AREA POTENTIOMETRIC SURFACE MAP

MAP DATE: 8/93 | DRAWN BY: KB



POTENTIOMETRIC SURFACE MEASURED ON 3-15-96

STATIC WATER LEVEL (9/14/87)

0 150 FT

HORIZONTAL SCALE

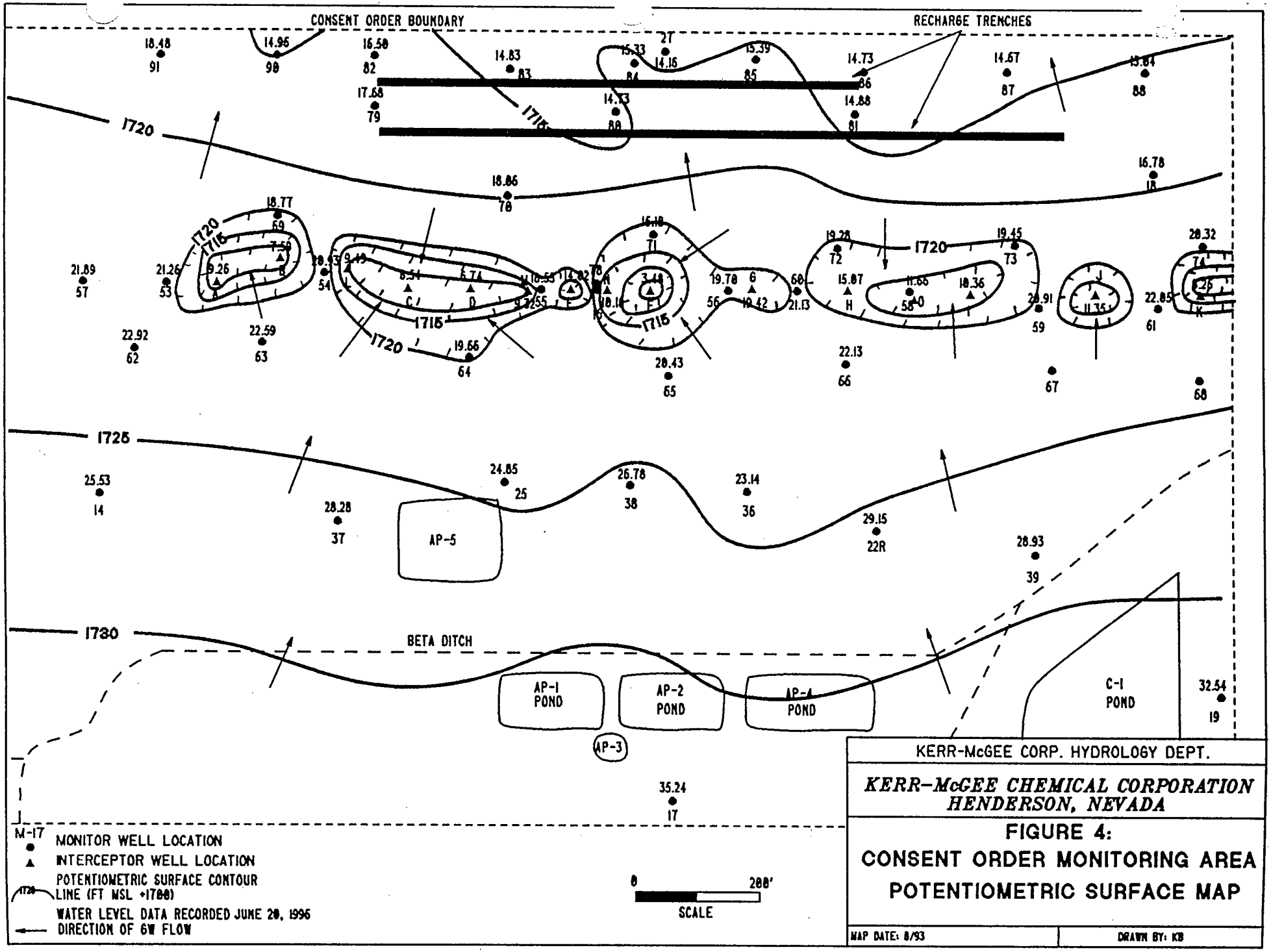
VERTICAL EX. = 30

FIGURE 3: GROUNDWATER INTERCEPTOR CROSS-SECTION - 3-15-96

KERR-McGEE CORP. - HYDROLOGY DEPT.

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

MAP DATE: 7/95 | DRAWN BY: KB



KERR-McGEE CORP. HYDROLOGY DEPT.

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

FIGURE 4:
CONSENT ORDER MONITORING AREA
POTENTIOMETRIC SURFACE MAP

MAP DATE: 8/93 | DRAWN BY: KB

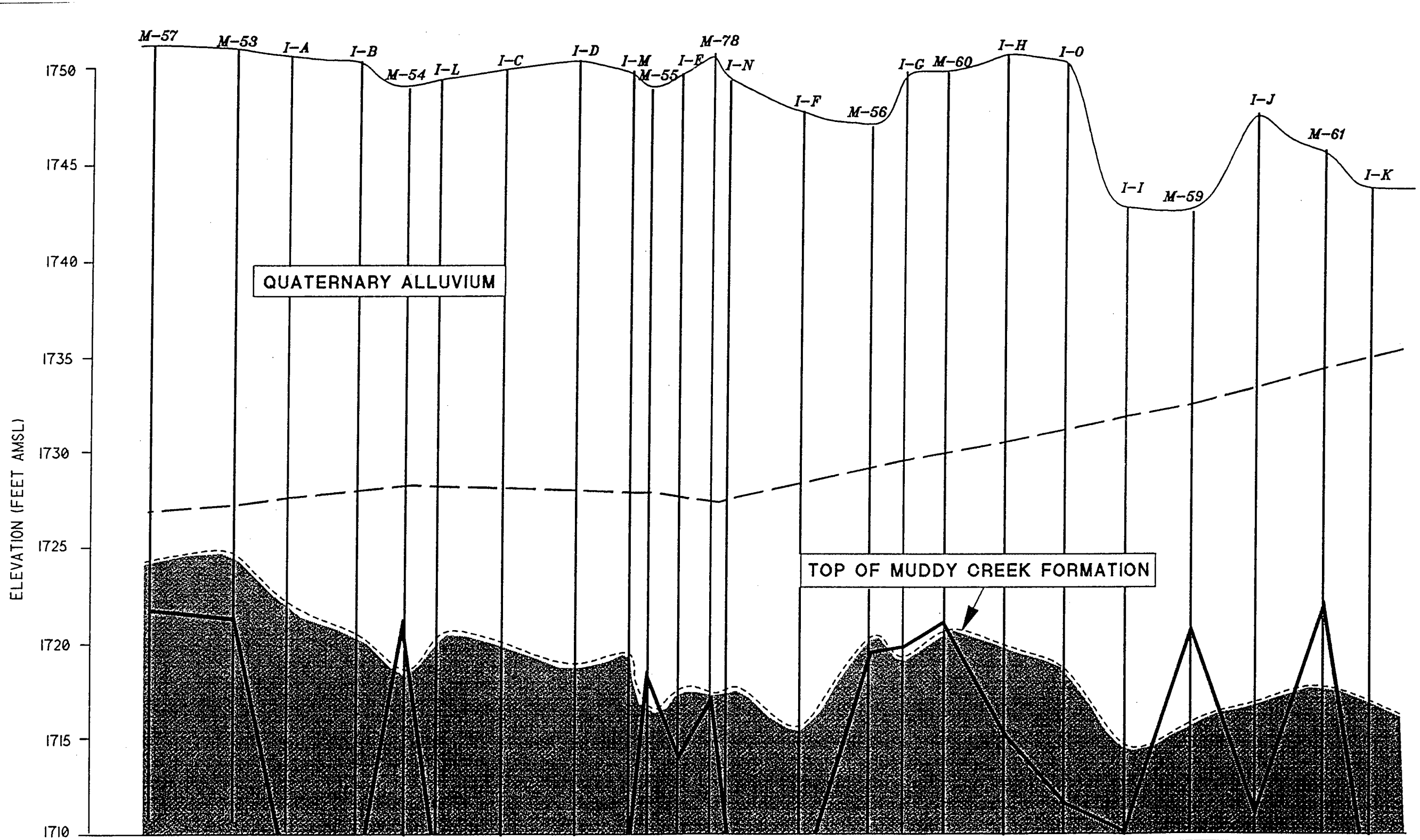


FIGURE 5: GROUNDWATER INTERCEPTOR CROSS-SECTION - 6-20-96

KERR-McGEE CORP. - HYDROLOGY DEPT.

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

MAP DATE: 7/96 | DRAWN BY: KB

FIGURE 6 : UPGRADIENT MONITOR WELLS
KMCC HENDERSON, NEVADA FACILITY

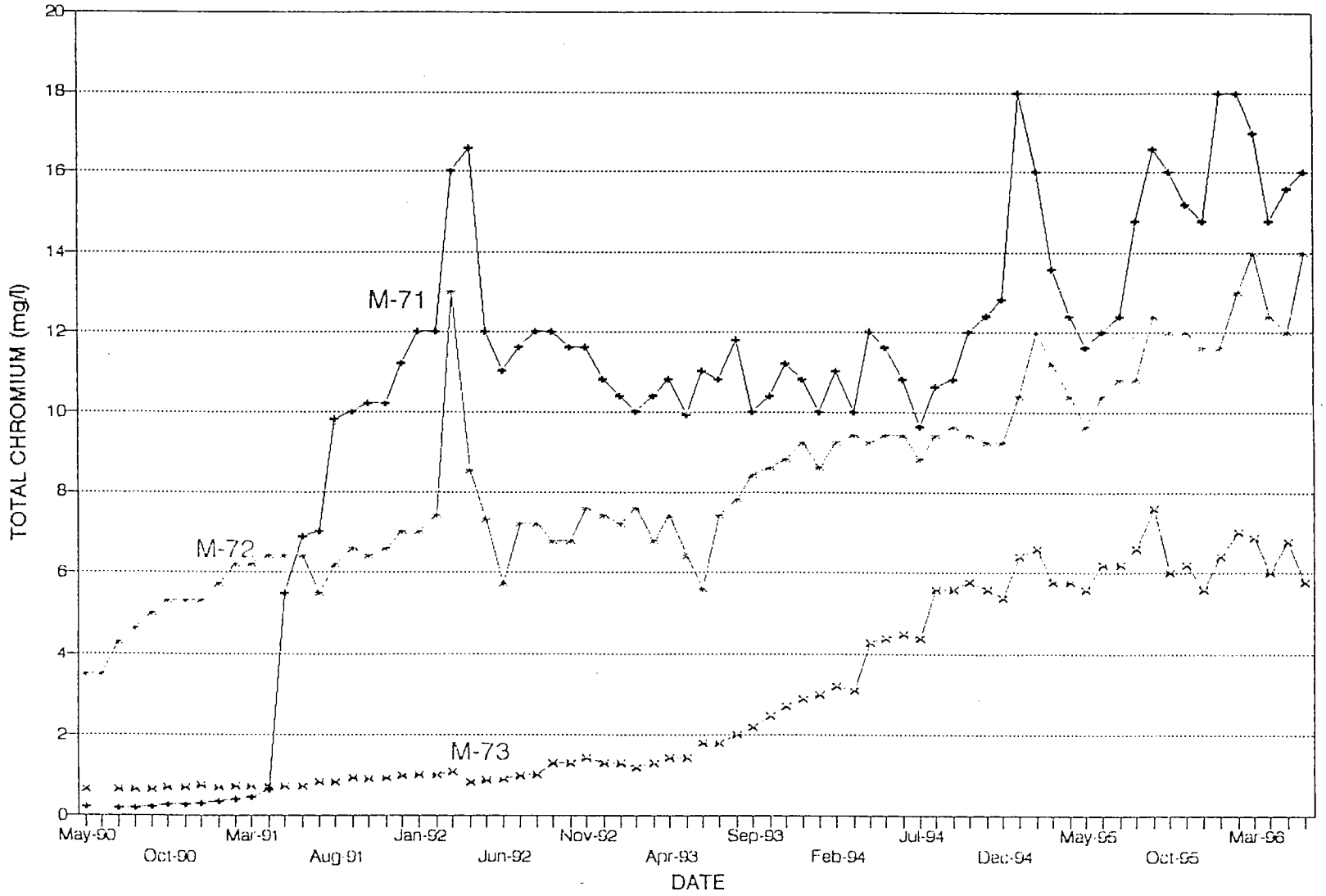
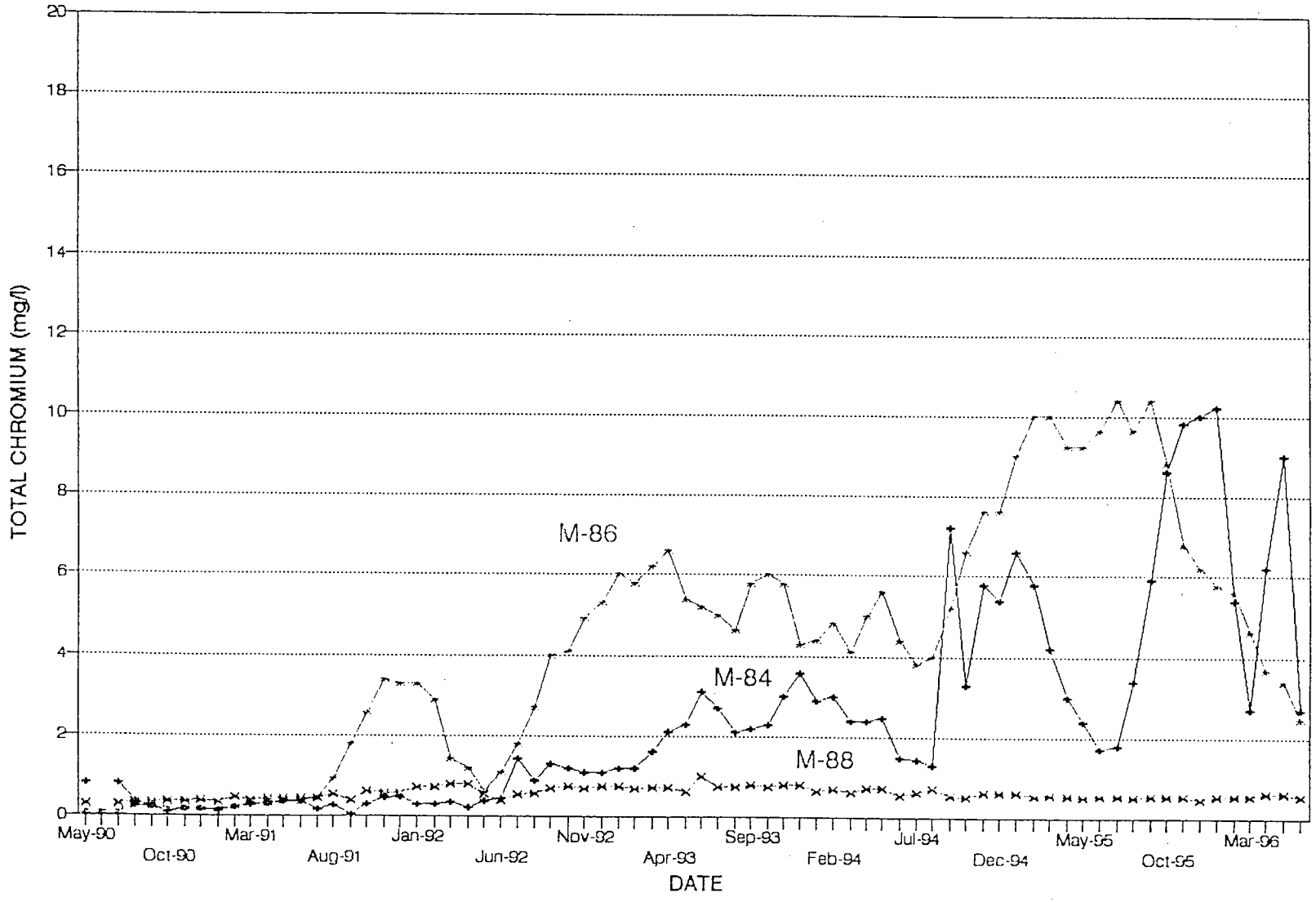


FIGURE 7 : DOWNGRADIENT MONITOR WELLS
KMCC HENDERSON, NEVADA FACILITY



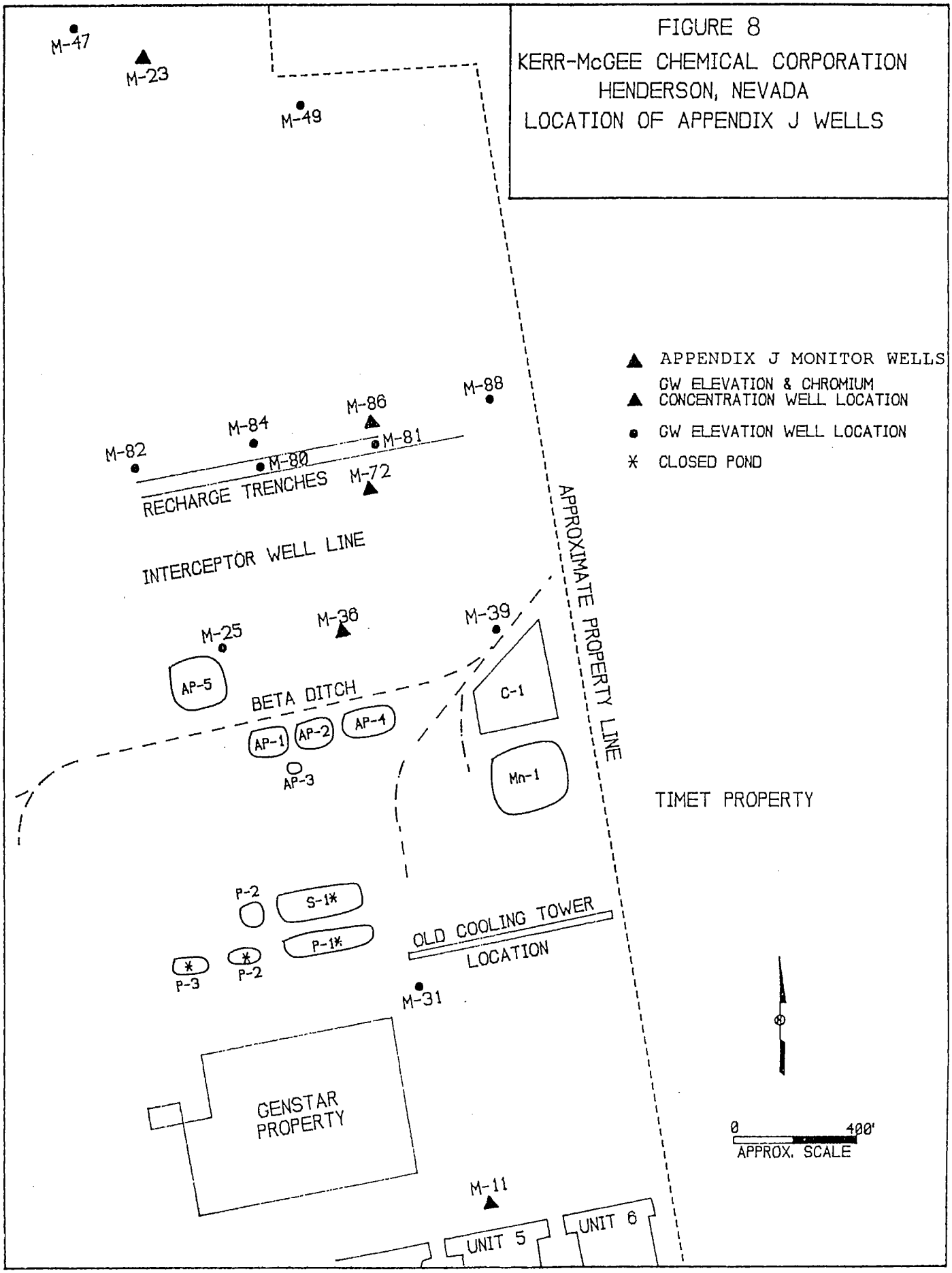


FIGURE 8
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA
LOCATION OF APPENDIX J WELLS
APPENDIX J MONITOR WELLS
GW ELEVATION & CHROMIUM CONCENTRATION WELL LOCATION
GW ELEVATION WELL LOCATION
CLOSED POND
M-47
M-23
M-49
M-88
M-86
M-84
M-82
M-81
M-80
M-72
RECHARGE TRENCHES
INTERCEPTOR WELL LINE
APPROXIMATE PROPERTY LINE
M-25
M-36
M-39
AP-5
BETA DITCH
AP-1
AP-2
AP-4
AP-3
C-1
Mn-1
TIMET PROPERTY
P-2
S-1*
P-1*
P-3
P-2
OLD COOLING TOWER
LOCATION
M-31
GENSTAR
PROPERTY
M-11
UNIT 5
UNIT 6
0
400'
APPROX. SCALE

FIGURE 9 : APPENDIX J WELLS
KMCC HENDERSON, NEVADA FACILITY

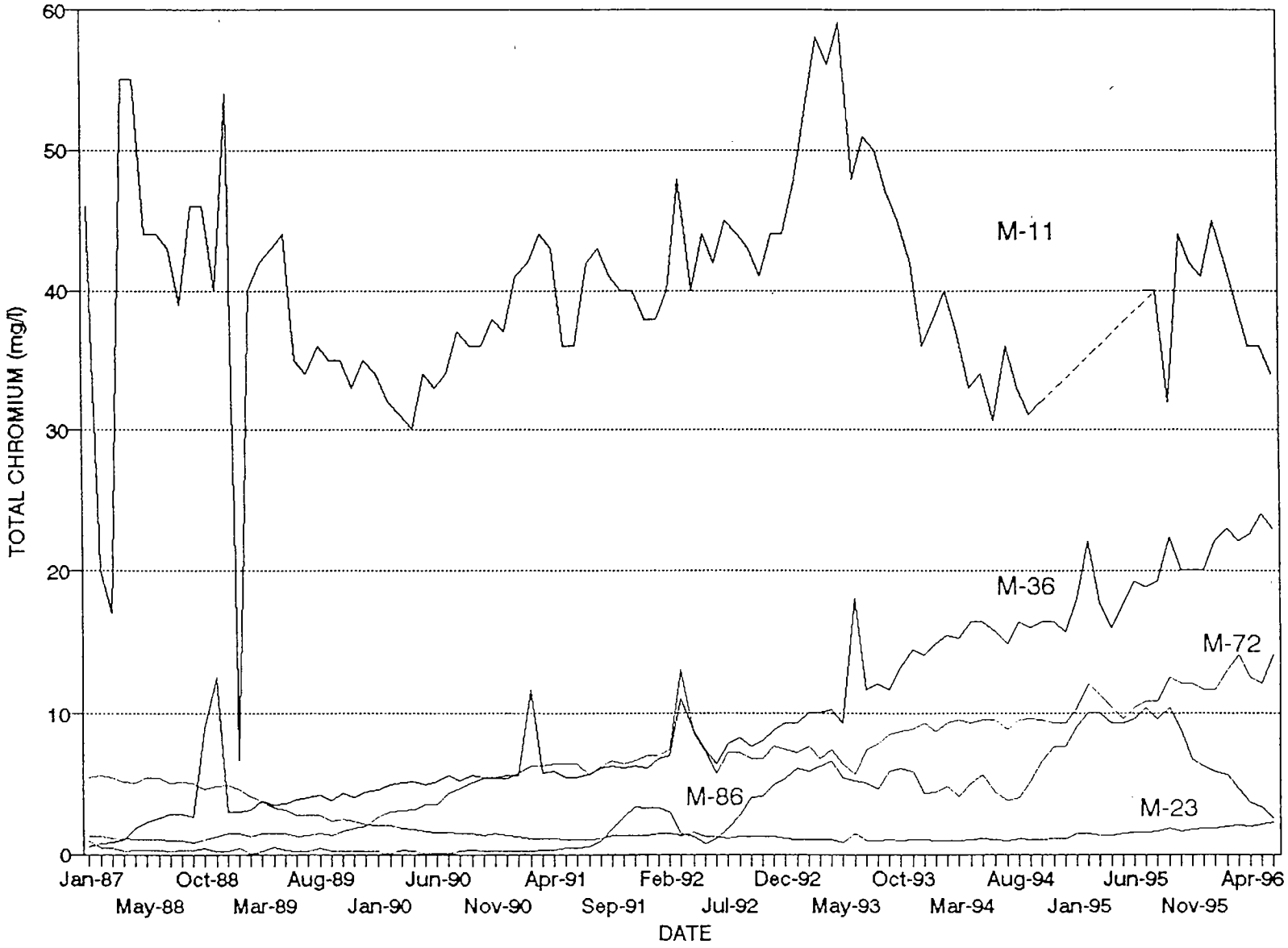


FIGURE 10 : INTERCEPTOR LINE GRAPH
KMCC HENDERSON, NEVADA FACILITY

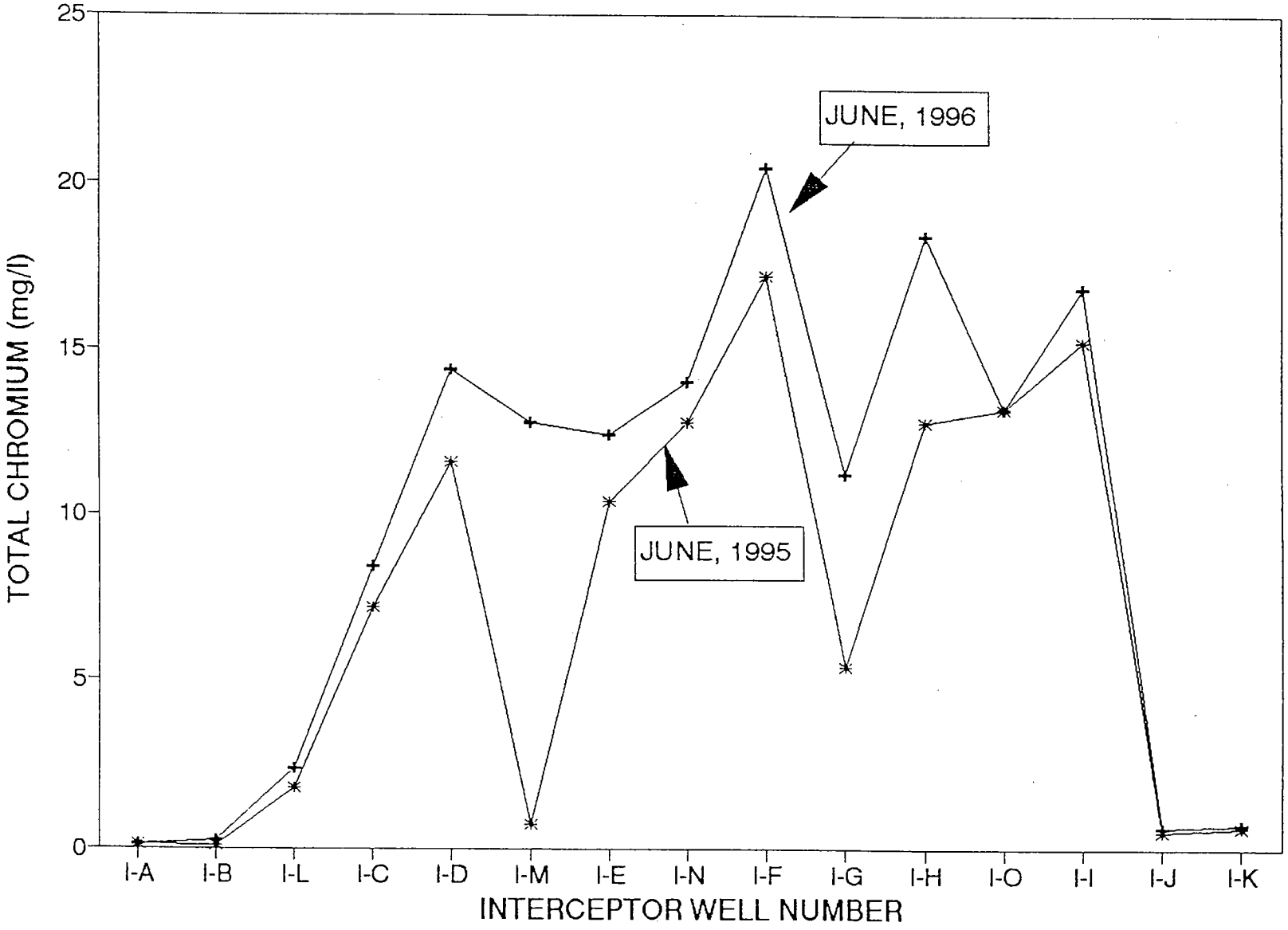


TABLE 1

TOTAL CHROMIUM (mg/l)
IN SELECTED MONITOR WELLS
KMCC HENDERSON NEVADA

DATE	WELL #			
	M-71	M-73	M-84	M-88
Jul-91	7.00	0.83	0.14	0.43
Aug-91	9.80	0.84	0.24	0.55
Sep-91	10.00	0.94	0.02	0.40
Oct-91	10.20	0.90	0.29	0.61
Nov-91	10.20	0.94	0.44	0.56
Dec-91	11.20	0.97	0.45	0.58
Jan-92	12.00	1.00	0.27	0.72
Feb-92	12.00	1.00	0.29	0.70
Mar-92	16.00	1.10	0.30	0.80
Apr-92	16.60	0.84	0.21	0.80
May-92	12.00	0.87	0.34	0.55
Jun-92	11.00	0.89	0.43	0.39
Jul-92	11.60	0.96	1.40	0.53
Aug-92	12.00	1.00	0.87	0.56
Sep-92	12.00	1.30	1.30	0.69
Oct-92	11.60	1.30	1.20	0.76
Nov-92	11.60	1.40	1.10	0.68
Dec-92	10.80	1.30	1.10	0.75
Jan-93	10.40	1.30	1.20	0.74
Feb-93	10.00	1.20	1.20	0.69
Mar-93	10.40	1.30	1.60	0.70
Apr-93	10.80	1.40	2.10	0.72
May-93	9.90	1.40	2.30	0.59
Jun-93	11.00	1.80	3.10	1.00
Jul-93	10.80	1.80	2.70	0.74
Aug-93	11.80	2.00	2.10	0.75
Sep-93	10.00	2.20	2.20	0.80
Oct-93	10.40	2.50	2.30	0.74
Nov-93	11.20	2.70	3.00	0.80
Dec-93	10.80	2.90	3.60	0.79

TABLE 1 (cont)

TOTAL CHROMIUM (mg/l)
IN SELECTED MONITOR WELLS
KMCC HENDERSON NEVADA

DATE	WELL #			
	M-71	M-73	M-84	M-88
Jan-94	10.00	3.00	2.90	0.65
Feb-94	11.00	3.20	3.00	0.67
Mar-94	10.00	3.10	2.40	0.59
Apr-94	12.00	4.30	2.40	0.71
May-94	11.60	4.40	2.50	0.70
Jun-94	10.80	4.50	1.50	0.54
Jul-94	9.60	4.40	1.40	0.62
Aug-94	10.60	5.60	1.30	0.71
Sep-94	10.80	5.60	7.20	0.53
Oct-94	12.00	5.80	3.30	0.50
Nov-94	12.40	5.60	5.80	0.60
Dec-94	12.80	5.40	5.40	0.62
Jan-95	18.00	6.40	6.60	0.60
Feb-95	16.00	6.60	5.80	0.52
Mar-95	13.60	5.80	4.20	0.57
Apr-95	12.40	5.80	3.00	0.52
May-95	11.60	5.60	2.40	0.48
Jun-95	12.00	6.20	1.70	0.52
Jul-95	12.40	6.20	1.80	0.52
Aug-95	14.80	6.60	3.40	0.51
Sep-95	16.60	7.60	5.90	0.52
Oct-95	16.00	6.00	8.60	0.52
Nov-95	15.20	6.20	9.80	0.53
Dec-95	14.80	5.60	10.00	0.47
Jan-96	18.00	6.40	10.20	0.54
Feb-96	18.00	7.00	5.40	0.55
Mar-96	17.00	6.90	2.70	0.53
Apr-96	14.80	6.00	6.20	0.59
May-96	15.60	6.80	9.00	0.61
Jun-96	16.00	5.80	2.70	0.53

TABLE 2
INTERCEPTOR WELL DISCHARGE RATES
DISCHARGE RATE (GPM)

WELL #	DEC. 1991	DEC. 1992	DEC. 1993	DEC. 1994	DEC. 1995	JUNE 1996
I-A	2.5	2.4	2.7	2.7	2.2	2.0
I-B	2.0	1.9	2.2	2.3	1.6	1.4
I-C	3.8	3.8	4.0	1.1	3.1	3.0
I-D	1.0	1.0	1.0	0.7	0.9	0.8
I-E	1.4	1.0	2.0	0.8	0.8	0.3
I-F	11.7	6.2	6.3	4.2	5.2	7.0
I-G	1.1	0.3	0.3	0.2	0.5	0.1
I-H	1.4	1.2	2.1	0.7	1.0	0.4
I-I	7.1	6.7	6.5	5.8	7.0	7.2
I-J	4.6	4.5	4.5	3.9	3.8	4.4
I-K	4.3	3.9	3.9	3.0	2.4	2.4
I-L				1.7	1.4	1.2
I-M				2.7	2.8	2.6
I-N				1.7	2.9	2.1
I-O				0.3	1.8	1.9
TOTAL	40.9	32.9	35.5	31.5	40.4	36.8

TABLE 3

TOTAL CHROMIUM CONCENTRATION (mg/l)
IN APPENDIX J WELLS
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

DATE	WELL #				
	M-11	M-23	M-36	M-72	M-86
Jul-90	34.00	1.50	5.50	4.30	0.04
Aug-90	37.00	1.40	5.20	4.60	0.19
Sep-90	36.00	1.40	5.50	5.00	0.21
Oct-90	36.00	1.30	5.40	5.30	0.12
Nov-90	38.00	1.40	5.40	5.30	0.14
Dec-90	37.00	1.30	5.50	5.30	0.13
Jan-91	41.00	1.20	5.50	5.70	0.13
Feb-91	42.00	1.10	11.60	6.20	0.20
Mar-91	44.00	1.10	5.70	6.20	0.27
Apr-91	43.00	1.10	5.80	6.40	0.29
May-91	36.00	1.00	5.40	6.40	0.32
Jun-91	36.00	1.00	5.40	6.40	0.32
Jul-91	42.00	0.94	5.60	5.50	0.46
Aug-91	43.00	1.10	6.00	6.20	0.92
Sep-91	41.00	1.30	6.20	6.60	1.80
Oct-91	40.00	1.30	6.00	6.40	2.60
Nov-91	40.00	1.30	6.20	6.60	3.40
Dec-91	38.00	1.30	6.00	7.00	3.30
Jan-92	38.00	1.40	6.80	7.00	3.30
Feb-92	40.00	1.40	7.00	7.40	2.90
Mar-92	48.00	1.30	11.00	13.00	1.40
Apr-92	40.00	1.50	8.60	8.50	1.20
May-92	44.00	1.20	7.40	7.30	0.62
Jun-92	42.00	1.20	6.40	5.70	1.10
Jul-92	45.00	1.10	7.80	7.20	1.80
Aug-92	44.00	1.20	8.20	7.20	2.70
Sep-92	43.00	1.20	7.60	6.80	4.00
Oct-92	41.00	1.20	8.00	6.80	4.10
Nov-92	44.00	1.20	8.70	7.60	4.90
Dec-92	44.00	1.10	9.20	7.40	5.30
Jan-93	48.00	1.00	9.20	7.20	6.00
Feb-93	53.00	0.99	10.00	7.60	5.80
Mar-93	58.00	0.97	10.00	6.80	6.20
Apr-93	56.00	0.98	10.20	7.40	6.60
May-93	59.00	0.82	9.20	6.40	5.40
Jun-93	48.00	1.40	18.00	5.60	5.20

TABLE 3 (cont)

TOTAL CHROMIUM CONCENTRATION (mg/l)
IN APPENDIX J WELLS
KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA

DATE	WELL #				
	M-11	M-23	M-36	M-72	M-86
Jul-93	51.00	0.87	11.60	7.40	5.00
Aug-93	50.00	0.89	12.00	7.80	4.60
Sep-93	47.00	0.93	11.60	8.40	5.80
Oct-93	45.00	0.89	13.20	8.60	6.00
Nov-93	42.00	0.98	14.40	8.80	5.80
Dec-93	36.00	0.94	14.00	9.20	4.30
Jan-94	38.00	0.90	14.80	8.60	4.40
Feb-94	40.00	0.88	15.40	9.20	4.80
Mar-94	37.00	0.91	15.20	9.40	4.10
Apr-94	33.00	1.00	16.40	9.20	5.00
May-94	34.00	1.10	16.40	9.40	5.60
Jun-94	30.60	1.00	15.80	9.40	4.40
Jul-94	36.00	0.90	14.80	8.80	3.80
Aug-94	33.00	1.08	16.40	9.40	4.00
Sep-94	31.00	0.96	16.00	9.60	5.20
Oct-94	32.00	1.00	16.40	9.40	6.60
Nov-94		1.10	16.40	9.20	7.60
Dec-94		1.10	15.60	9.20	7.60
Jan-95		1.40	18.00	10.40	9.00
Feb-95		1.40	22.00	12.00	10.00
Mar-95		1.30	17.60	11.20	10.00
Apr-95		1.30	16.00	10.40	9.20
May-95		1.40	17.60	9.60	9.20
Jun-95		1.50	19.20	10.40	9.60
Jul-95	40.00	1.50	18.80	10.80	10.40
Aug-95	40.00	1.60	19.20	10.80	9.60
Sep-95	32.00	1.80	22.40	12.40	10.40
Oct-95	44.00	1.60	20.00	12.00	8.80
Nov-95	42.00	1.70	20.00	12.00	6.80
Dec-95	41.00	1.80	20.00	11.60	6.20
Jan-96	45.00	1.80	22.00	11.60	5.80
Feb-96	42.00	1.90	23.00	13.00	5.60
Mar-96	39.00	2.00	22.00	14.00	4.60
Apr-96	36.00	1.90	22.60	12.40	3.70
May-96	36.00	2.10	24.00	12.00	3.40
Jun-96	34.00	2.20	23.00	14.00	2.50

TABLE 4
GROUNDWATER CHROMIUM TREATMENT ANALYSIS

WEEK OF	VOLUME TREATED (M gal)	TREATED TOTAL (mg/l)	EFFLUENT HEXAVALENT (mg/l)
Jul. 2 - Jul . 8	423	0.16	0.002
Jul. 9 - Jul. 15	394	0.19	0.05
Jul. 16 - Jul. 22	372	0.02	0.003
Jul. 23 - Jul. 29	398	0.01	0.006
Jul. 1995 Average	396	0.10	0.02
Jul. 30 - Aug. 5	331	0.02	0.002
Aug. 6 - Aug. 12	398	1.02	0.05
Aug. 13 - Aug. 19	381	0.04	0.03
Aug. 20 - Aug. 26	396	0.46	0.03
Aug. 27 - Sep. 2	451	0.35	0.03
Aug. 1995 Average	391	0.38	0.03
Sep. 3 - Sep. 9	367	1.70	0.01
Sep. 10 - Sep. 16	426	0.32	0.002
Sep. 17 - Sep 23	386	0.19	0.02
Sep. 24 - Sep. 30	399	0.09	0.02
Sep. 1995 Average	394	0.16	0.01
Oct. 1 - Oct. 7	380	0.12	0.02
Oct. 8 - Oct. 14	376	1.69	0.003
Oct. 15 - Oct 21	362	0.12	0.01
Oct. 22 - Oct 28	335	0.16	0.01
Oct. 29 - Nov. 4	401	0.01	0.001
Oct. 1995 Average	370	0.42	0.01
Nov. 5 - Nov. 11	428	0.03	0.03
Nov. 12 - Nov. 18	310	0.04	0.01
Nov. 19 - Nov. 25	405	0.06	0.01
Nov. 26 - Dec. 2	400	0.05	0.003
Nov. 1995 Average	385	0.05	0.01
Dec. 3 - Dec. 9	378	0.04	0.01
Dec. 10 - Dec. 16	384	0.04	0.002
Dec. 17 - Dec. 23	459	0.47	0.03
Dec. 24 - Dec. 30	387	0.05	0.004
Dec. 1995 Average	402	0.15	0.01

(Note: average feed chromium to treatment system July - December, 1995: 9.9 mg/l)

TABLE 4 (cont.)
GROUNDWATER CHROMIUM TREATMENT ANALYSIS

WEEK OF	VOLUME TREATED (M gal)	TREATED TOTAL (mg/l)	EFFLUENT HEXAVALENT (mg/l)
Dec. 27 - Jan. 2	172	0.07	0.04
Jan. 3 - Jan. 8	391	0.04	0.01
Jan. 9 - Jan. 15	452	0.07	0.01
Jan. 16 - Jan. 22	331	0.07	0.01
Jan. 23 - Jan. 29	390	0.03	0.01
Jan. 1996 Average	312	0.06	0.02
Jan. 30 - Feb. 5	450	0.05	0.01
Feb. 6 - Feb. 12	444	0.07	0.01
Feb. 13 - Feb. 19	445	0.08	0.01
Feb. 20 - Feb. 26	454	0.11	0.02
Feb. 1996 Average	448	0.08	0.01
Feb. 27 - Mar. 4	446	0.05	0.01
Mar. 5 - Mar. 11	449	0.07	0.01
Mar. 12 - Mar 18	464	0.05	0.01
Mar. 19 - Mar. 25	341	0.09	0.01
Mar. 1996 Average	425	0.07	0.01
Mar. 26 - Apr. 1	450	0.10	0.02
Apr. 2 - Apr. 8	431	0.06	0.01
Apr. 9 - Apr. 15	383	0.07	0.01
Apr. 16 - Apr. 22	452	0.04	0.01
Apr. 23 - Apr. 29	440	0.09	0.02
Apr. 1996 Average	431	0.07	0.01
Apr. 30 - May 6	450	0.09	0.04
May 7 - May 13	429	0.08	0.01
May 14 - May 20	427	0.08	0.02
May 21 - May 27	434	0.10	0.01
May 1996 Average	435	0.09	0.02
May 28 - Jun. 3	432	0.29	0.02
Jun. 4 - Jun. 10	434	0.10	0.01
Jun. 11 - Jun. 17	424	0.12	0.01
Jun. 18 - Jun. 24	415	0.21	0.01
Jun. 1996 Average	426	0.18	0.01

(Note: average feed chromium to treatment system January - June, 1996: 9.14 mg/l)

APPENDIX A

GROUNDWATER ELEVATIONS

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

TOC--->	M-11 1813.46		M-14 1758.83		M-15 1749.69		M-17 1769.54		M-18 1738.28		M-19 1766.55		M-22R 1758.68		M-23 1712.78		M-25 1758.15		M-27 1740.16	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
14-Jan-94	43.00	1770.46					35.00	1734.54			33.00	1733.54	29.95	1728.40	21.00	1691.78	33.40	1724.75		
22-Feb-94	42.65	1770.81					34.70	1734.84			32.80	1733.74	29.85	1728.50	21.15	1691.63	33.30	1724.85		
21-Mar-94	42.45	1771.01	33.50	1725.33	32.90	1716.79	34.65	1734.89	22.15	1716.13	34.00	1732.54	29.80	1728.55	21.20	1691.58	33.30	1724.85	25.80	1714.67
26-Apr-94	42.40	1771.06					34.65	1734.89			34.00	1732.54	29.70	1728.65	21.35	1691.43	33.30	1724.85		
19-May-94	42.45	1771.01					34.40	1735.14			30.70	1735.84	29.50	1728.85	21.40	1691.38	33.10	1725.05		
23-Jun-94	42.50	1770.96	32.40	1726.43	32.15	1717.54	34.10	1735.44	22.20	1716.08	34.80	1731.74	29.35	1729.00	21.55	1691.23	33.30	1724.85	-DRY-	
20-Jul-94	42.85	1770.61					34.45	1735.09			34.80	1731.74	29.70	1728.65	21.65	1691.13	33.25	1724.90		
23-Aug-94	42.95	1770.51					33.65	1735.89			34.00	1732.54	29.70	1728.65	21.70	1691.08	33.20	1724.95		
30-Sep-94	42.90	1770.56	32.60	1726.23	32.15	1717.54	34.85	1734.69	22.20	1716.08	34.00	1732.54	29.85	1728.50	22.40	1690.38	33.30	1724.85	out	
18-Oct-94	42.85	1770.61					34.90	1734.64			34.00	1732.54	29.85	1728.50	21.85	1690.93	33.45	1724.70		
16-Nov-94	out						34.80	1734.74			34.00	1732.54	out		22.00	1690.78	33.80	1724.35		
02-Dec-94	42.65	1770.81	33.50	1725.33	33.55	1716.14	34.65	1734.89	22.50	1715.78	34.50	1732.04	30.10	1728.25	22.00	1690.78	33.45	1724.70	out	
27-Jan-95	out						34.20	1735.34			33.90	1732.64	29.15	1729.20	21.90	1690.88	33.00	1725.15		
16-Feb-95	out						33.60	1735.94			34.00	1732.54	28.80	1729.55	21.75	1691.03	33.50	1724.65		
22-Mar-95	42.65	1770.81	32.40	1726.43	32.00	1717.69	33.50	1736.04	22.15	1716.13	34.00	1732.54	28.75	1729.60	21.80	1690.98	32.75	1725.40	25.90	1714.57
25-Apr-95	out						33.50	1736.04			33.30	1733.24	28.75	1729.60	21.85	1690.93	32.65	1725.50		
18-May-95	out						33.40	1736.14			33.25	1733.29	28.75	1729.60	21.90	1690.88	32.80	1725.35		
29-Jun-95	41.65	1771.81	32.00	1726.83	31.60	1718.09	33.55	1735.99	22.00	1716.28	33.40	1733.14	28.75	1729.60	21.85	1690.93	32.80	1725.35	25.90	1714.57
19-Jul-95	42.05	1771.41					33.95	1735.59			34.00	1732.54	28.95	1729.40	21.90	1690.88	32.95	1725.20		
24-Aug-95	42.25	1771.21					34.10	1735.44			34.00	1732.54	29.05	1729.30	21.95	1690.83	33.00	1725.15		
28-Sep-95	42.20	1771.26	32.65	1726.18	31.95	1717.74	34.15	1735.39	22.00	1716.28	32.90	1733.64	29.20	1729.15	22.00	1690.78	33.16	1724.99	25.65	1714.82
19-Oct-95	42.15	1771.31					34.30	1735.24			34.00	1732.54	29.30	1729.05	22.20	1690.58	33.00	1725.15		
21-Nov-95	41.90	1771.56					34.15	1735.39			34.00	1732.54	29.15	1729.20	22.00	1690.78	33.05	1725.10		
12-Dec-95	41.40	1772.06	33.00	1725.83	31.60	1718.09	34.15	1735.39	21.90	1716.38	34.00	1732.54	29.15	1729.20	22.00	1690.78	33.05	1725.10	25.80	1714.36
11-Jan-96	41.35	1772.11					33.70	1735.84			33.50	1733.04	28.90	1729.45	22.20	1690.58	33.00	1725.15		
12-Feb-96	41.25	1772.21					33.90	1735.64			33.60	1732.94	28.70	1729.65	22.40	1690.38	33.10	1725.05		
15-Mar-96	42.40	1771.06	33.20	1725.63	32.50	1717.19	33.80	1735.74	21.60	1716.68	34.00	1732.54	29.00	1729.35	22.80	1689.98	32.30	1725.85	26.00	1714.16
30-Apr-96	41.60	1771.86					34.10	1735.44			33.70	1732.84	29.05	1729.30	22.40	1690.38	33.20	1724.95		
16-May-96	41.75	1771.71					34.15	1735.39			34.00	1732.54	29.05	1729.30	22.35	1690.43	33.30	1724.85		
20-Jun-96	42.00	1771.46	33.30	1725.53	32.10	1717.59	34.30	1735.24	21.50	1716.78	34.00	1732.54	29.20	1729.15	22.40	1690.38	33.30	1724.85	26.00	1714.16

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

TOC-->	M-31 1788.39		M-36 1757.94		M-37 1759.28		M-38 1757.88		M-39 1759.31		M-47 1716.51		M-49 1718.78		M-53 1751.56		M-54 1748.93		M-55 1749.35	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW		DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
14-Jan-94	40.00	1748.39	32.00	1725.94					31.20	1728.11	19.35	1697.16	19.55	1699.23						
22-Feb-94	39.65	1748.74	32.10	1725.84					31.10	1728.21	19.55	1696.96								
21-Mar-94	39.70	1748.69	32.40	1725.54	31.45	1727.83	31.00	1726.88	31.00	1728.31	19.60	1696.91	19.85	1698.93	30.50	1721.06	28.00	1720.93	30.75	1718.60
26-Apr-94	39.35	1749.04	32.40	1725.54					31.00	1728.31	19.75	1696.76								
19-May-94	39.55	1748.84	32.50	1725.44					30.70	1728.61	19.80	1696.71								
23-Jun-94	39.70	1748.69	32.10	1725.84	31.00	1728.28	30.65	1727.23	30.45	1728.86	20.00	1696.51	20.00	1698.78	30.50	1721.06	28.00	1720.93	30.70	1718.65
20-Jul-94	39.30	1749.09	32.80	1725.14					30.95	1728.36	19.95	1696.56								
23-Aug-94	39.00	1749.39	32.80	1725.14					31.05	1728.26	20.00	1696.51								
30-Sep-94	38.55	1749.84	32.90	1725.04	31.10	1728.18	30.65	1727.23	31.15	1728.16	20.20	1696.31	20.00	1698.78	30.50	1721.06	28.00	1720.93	30.75	1718.60
18-Oct-94	38.00	1750.39	32.00	1725.94					31.00	1728.31	20.30	1696.21								
16-Nov-94	37.95	1750.44							31.00	1728.31	20.40	1696.11								
02-Dec-94	37.40	1750.99	31.75	1726.19	31.67	1727.61	31.10	1726.78	30.95	1728.36	20.35	1696.16	20.45	1698.33	29.85	1721.71	27.85	1721.08	31.60	1717.75
27-Jan-95	36.30	1752.09	32.50	1725.44					30.30	1729.01	20.20	1696.31								
16-Feb-95	36.30	1752.09	32.60	1725.34					29.80	1729.51	20.00	1696.51								
22-Mar-95	36.50	1751.89	32.60	1725.34	30.70	1728.58	30.60	1727.28	29.90	1729.41	19.15	1697.36	20.30	1698.48	29.80	1721.76	27.30	1721.63	30.10	1719.25
25-Apr-95	33.60	1754.79	32.60	1725.34					29.80	1729.51	20.25	1696.26								
18-May-95	33.60	1754.79	32.60	1725.34					29.75	1729.56	20.30	1696.21								
29-Jun-95	37.75	1750.64	31.30	1726.64	31.00	1728.28	30.70	1727.18	29.85	1729.46	20.30	1696.21	20.20	1698.58	29.75	1721.81	26.80	1722.13	29.60	1719.75
19-Jul-95	38.70	1749.69	31.90	1726.04					30.00	1729.31	20.35	1696.16								
24-Aug-95	38.60	1749.79	38.60	1719.34					30.15	1729.16	20.40	1696.11								
28-Sep-95	38.90	1749.49	38.90	1719.04	31.00	1728.28	30.85	1727.03	30.30	1729.01	20.50	1696.01	20.30	1698.48	30.06	1721.50	28.25	1720.68	30.65	1718.70
19-Oct-95	39.20	1749.19	31.35	1726.59					30.40	1728.91	20.60	1695.91								
21-Nov-95	37.20	1751.19	31.35	1726.59					30.25	1729.06	20.80	1695.71								
12-Dec-95	37.60	1750.79	31.35	1726.59	31.20	1728.08	30.80	1727.08	30.30	1729.01	20.65	1695.86	20.30	1698.48	30.50	1721.06	28.15	1720.78	31.00	1718.35
11-Jan-96	37.75	1750.64	31.30	1726.64					30.00	1729.31	20.70	1695.81								
12-Feb-96	38.05	1750.34	31.35	1726.59					29.90	1729.41	20.80	1695.71								
15-Mar-96	38.30	1750.09	35.00	1722.94	31.50	1727.78	31.70	1726.18	30.00	1729.31	21.70	1694.81	20.50	1698.28	31.00	1720.56	28.70	1720.23	31.60	1717.75
30-Apr-96			35.00	1722.94					30.10	1729.21	20.80	1695.71								
16-May-96			34.50	1723.44					30.15	1729.16	20.80	1695.71								
20-Jun-96			34.80	1723.14	31.00	1728.28	31.10	1726.78	30.35	1728.96	20.85	1695.66	20.40	1698.38	30.30	1721.26	28.00	1720.93	30.80	1718.55

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

TOC—>	M-56 1749.60		M-57 1752.29		M-58 1749.25		M-59 1743.01		M-60 1750.13		M-61 1745.55		M-62 1752.92		M-63 1750.59		M-64 1749.76		M-65 1752.88	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW		DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
14-Jan-94																				
22-Feb-94																				
21-Mar-94	30.80	1718.80	30.50	1721.79	29.50	1719.75	22.75	1720.26	29.30	1720.83	24.30	1721.25	29.30	1723.62	28.10	1722.49	29.70	1720.06	32.45	1720.43
26-Apr-94																				
19-May-94																				
23-Jun-94	30.65	1718.95	30.50	1721.79	29.35	1719.90	22.55	1720.46	29.10	1721.03	24.00	1721.55	29.20	1723.72	28.00	1722.59	29.60	1720.16	32.20	1720.68
20-Jul-94																				
23-Aug-94																				
30-Sep-94	30.60	1719.00	30.10	1722.19	29.40	1719.85	22.55	1720.46	29.20	1720.93	24.10	1721.45	29.30	1723.62	28.00	1722.59	29.60	1720.16	32.30	1720.58
18-Oct-94																				
16-Nov-94																				
02-Dec-94	30.75	1718.85	30.10	1722.19	30.00	1719.25	22.90	1720.11	29.30	1720.83	24.10	1721.45	29.00	1723.92	27.90	1722.69	30.10	1719.66	32.30	1720.58
27-Jan-95																				
16-Feb-95																				
22-Mar-95	30.30	1719.30	29.80	1722.49	29.40	1719.85	22.45	1720.56	28.90	1721.23	23.80	1721.75	28.50	1724.42	27.40	1723.19	29.00	1720.76	32.00	1720.88
25-Apr-95																				
18-May-95																				
29-Jun-95	29.95	1719.65	29.90	1722.39	29.30	1719.95	22.35	1720.66	28.70	1721.43	23.80	1721.75	28.65	1724.27	27.30	1723.29	28.90	1720.86	32.00	1720.88
19-Jul-95																				
24-Aug-95																				
28-Sep-95	29.35	1720.25	30.55	1721.74	28.39	1720.86	22.40	1720.61	28.90	1721.23	23.90	1721.65	28.70	1724.22	27.70	1722.89	29.60	1720.16	31.90	1720.98
19-Oct-95																				
21-Nov-95																				
12-Dec-95	29.35	1720.25	30.35	1721.94	29.35	1719.90	22.35	1720.66	28.70	1721.43	23.80	1721.75	29.10	1723.82	28.00	1722.59	29.80	1719.96	31.90	1720.98
11-Jan-96																				
12-Feb-96																				
15-Mar-96	30.00	1719.60	30.90	1721.39	29.00	1720.25	22.00	1721.01	29.80	1720.33	23.50	1722.05	30.60	1722.32	28.00	1722.59	30.00	1719.76	32.40	1720.48
30-Apr-96																				
16-May-96																				
20-Jun-96	29.90	1719.70	30.40	1721.89	29.25	1720.00	22.10	1720.91	29.00	1721.13	23.50	1722.05	30.00	1722.92	28.00	1722.59	30.10	1719.66	32.45	1720.43

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

TOC--->	M-66 1752.33		M-67 1744.98		M-68 1747.44		M-69 1748.77		M-70 1746.96		M-71 1745.88		M-72 1745.49		M-73 1740.05		M-74 1743.42		M-78 1751.01	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
14-Jan-94			21.50	1723.48	23.60	1723.84					30.45	1715.43	27.60	1717.69	20.80	1719.25				
22-Feb-94			21.45	1723.53	23.70	1723.74					30.70	1715.18	26.60	1718.69	20.80	1719.25				
21-Mar-94	30.70	1721.63	21.40	1723.58	23.30	1724.14	29.45	1719.32	28.50	1718.46	30.50	1715.38	26.55	1718.74	20.80	1719.25	23.50	1719.92	34.70	1716.31
26-Apr-94			21.40	1723.58	23.50	1723.94					30.35	1715.53	26.55	1718.74	20.85	1719.20				
19-May-94			21.35	1723.63	23.50	1723.94					31.55	1714.33	26.65	1718.64	20.95	1719.10				
23-Jun-94	30.40	1721.93	21.15	1723.83	23.45	1723.99	29.70	1719.07	28.70	1718.26	30.40	1715.48	26.40	1718.89	20.80	1719.25	23.45	1719.97	34.40	1716.61
20-Jul-94			21.40	1723.58	23.65	1723.79					30.50	1715.38	26.55	1718.74	21.00	1719.05				
23-Aug-94			21.70	1723.28	23.75	1723.69					30.50	1715.38	26.65	1718.64	21.00	1719.05				
30-Sep-94	30.50	1721.83	21.55	1723.43	23.65	1723.79	29.70	1719.07	28.70	1718.26	31.10	1714.78	27.40	1717.89	21.10	1718.95	23.50	1719.92	34.60	1716.41
18-Oct-94			21.60	1723.38	23.55	1723.89					31.40	1714.48	26.95	1718.34	21.20	1718.85				
16-Nov-94			21.50	1723.48	23.65	1723.79					31.40	1714.48	26.90	1718.39	21.20	1718.85				
02-Dec-94	30.80	1721.53	21.50	1723.48	23.65	1723.79	27.95	1720.82	28.80	1718.16	31.50	1714.38	27.05	1718.24	21.20	1718.85	23.75	1719.67	35.40	1715.61
27-Jan-95			21.05	1723.93	22.65	1724.79					31.35	1714.53	26.65	1718.64	21.00	1719.05				
16-Feb-95			21.00	1723.98	22.90	1724.54					30.90	1714.98	26.75	1718.54	20.85	1719.20				
22-Mar-95	30.10	1722.23	20.90	1724.08	23.00	1724.44	28.55	1720.22	26.80	1720.16	30.00	1715.88	26.40	1718.89	20.50	1719.55	23.25	1720.17	34.00	1717.01
25-Apr-95			20.75	1724.23	22.70	1724.74					29.15	1716.73	26.30	1718.99	20.70	1719.35				
18-May-95			20.80	1724.18	22.80	1724.64					29.75	1716.13	26.15	1719.14	20.60	1719.45				
29-Jun-95	30.00	1722.33	20.85	1724.13	22.90	1724.54	27.35	1721.42	26.60	1720.36	29.40	1716.48	26.25	1719.04	20.70	1719.35	23.20	1720.22	33.80	1717.21
19-Jul-95			21.00	1723.98	22.90	1724.54					30.00	1715.88	26.30	1718.99	20.70	1719.35				
24-Aug-95			21.00	1723.98	23.00	1724.44					28.60	1717.28	26.00	1719.29	20.65	1719.40				
28-Sep-95	30.35	1721.98	21.10	1723.88	23.20	1724.24	29.00	1719.77	28.10	1718.86	28.00	1717.88	26.30	1718.99	20.75	1719.30	23.30	1720.12	33.80	1717.21
19-Oct-95			21.10	1723.88	23.30	1724.14					27.90	1717.98	26.40	1718.89	20.65	1719.40				
21-Nov-95			21.50	1723.48	23.10	1724.34					27.80	1718.08	25.90	1719.39	20.55	1719.50				
12-Dec-95	30.30	1722.03	21.60	1723.38	23.20	1724.24	29.80	1718.97	28.50	1718.46	28.00	1717.88	25.30	1719.99	20.50	1719.55	23.15	1720.27	34.00	1717.01
11-Jan-96			20.80	1724.18	23.00	1724.44					28.40	1717.48	25.50	1719.79	20.25	1719.80				
12-Feb-96			20.80	1724.18	23.00	1724.44					29.40	1716.48	25.00	1720.29	20.20	1719.85				
15-Mar-96	30.00	1722.33	21.00	1723.98	22.20	1725.24	31.00	1717.77	29.30	1717.66	30.00	1715.88	25.30	1719.99	20.30	1719.75	23.00	1720.42	33.00	1718.01
30-Apr-96			20.75	1724.23	22.85	1724.59					29.80	1716.08	24.90	1720.39	20.00	1720.05				
16-May-96			20.65	1724.33	22.85	1724.59					30.10	1715.78	24.30	1720.99	19.65	1720.40				
20-Jun-96	30.20	1722.13	21.00	1723.98	23.00	1724.44	30.00	1718.77	28.90	1718.06	29.70	1716.18	26.01	1719.28	20.60	1719.45	23.10	1720.32	33.80	1717.21

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

TOC-->	M-79 1742.93		M-80 1745.73		M-81 1743.73		M-82 1739.38		M-83 1740.83		M-84 1739.63		M-85 1741.19		M-86 1742.73		M-87 1742.27		M-88 1737.99	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW		DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
14-Jan-94											25.68	1713.95								
22-Feb-94											25.85	1713.78								
21-Mar-94	26.20	1716.73	OUT		29.35	1714.38	23.35	1716.03	25.90	1714.93	25.80	1713.83	28.00	1713.19	28.50	1714.23	28.00	1714.27	23.25	1714.74
26-Apr-94											25.70	1713.93								
19-May-94											25.25	1714.38								
23-Jun-94	26.60	1716.33	31.50	1714.23	29.00	1714.73	23.75	1715.63	26.20	1714.63	25.40	1714.23	27.55	1713.64	28.20	1714.53	28.00	1714.27	23.40	1714.59
20-Jul-94											25.50	1714.13			28.10	1714.63			23.45	1714.54
23-Aug-94											25.55	1714.08			27.80	1714.93			23.45	1714.54
30-Sep-94	26.80	1716.13	31.70	1714.03	29.50	1714.23	23.90	1715.48	26.60	1714.23	26.60	1713.03	27.80	1713.39	29.00	1713.73	28.00	1714.27	23.60	1714.39
18-Oct-94											26.90	1712.73			29.30	1713.43			23.70	1714.29
16-Nov-94											27.10	1712.53			29.50	1713.23			23.70	1714.29
02-Dec-94	25.70	1717.23	32.90	1712.83	out		out		26.15	1714.68	26.90	1712.73	29.10	1712.09	29.55	1713.18	28.60	1713.67	23.75	1714.24
27-Jan-95											26.10	1713.53			29.50	1713.23			23.65	1714.34
16-Feb-95											25.70	1713.93			29.35	1713.38			23.55	1714.44
22-Mar-95	24.70	1718.23	29.60	1716.13	out		out		24.00	1716.83	24.55	1715.08	27.70	1713.49	29.05	1713.68	28.30	1713.97	23.50	1714.49
25-Apr-95											24.30	1715.33			28.55	1714.18			23.30	1714.69
18-May-95											24.95	1714.68			28.60	1714.13			23.30	1714.69
29-Jun-95	21.75	1721.18	29.45	1716.28	out		out		24.45	1716.38	24.20	1715.43	26.90	1714.29	28.50	1714.23	28.00	1714.27	23.30	1714.69
19-Jul-95											24.30	1715.33			28.65	1714.08			23.30	1714.69
24-Aug-95											24.35	1715.28			28.10	1714.63			23.30	1714.69
28-Sep-95	25.00	1717.93	29.90	1715.83	26.90	1715.18	22.00	1716.35	25.30	1715.53	24.25	1715.38	25.70	1715.49	27.85	1714.88	27.90	1714.37	23.30	1714.69
19-Oct-95											24.60	1715.03			27.35	1715.38			23.30	1714.69
21-Nov-95											24.50	1715.13			26.55	1716.18			23.10	1714.89
12-Dec-95	25.00	1717.93	30.30	1715.43	25.90	1716.18	22.30	1716.05	25.70	1715.13	24.60	1715.03	25.35	1715.84	26.80	1715.93	27.60	1714.67	23.10	1714.89
11-Jan-96											24.55	1715.08			26.00	1716.73			22.80	1715.19
12-Feb-96											25.10	1714.53			25.20	1717.53			22.60	1715.39
15-Mar-96	25.70	1717.23	31.00	1714.73	23.90	1718.18	22.80	1715.55	26.70	1714.13	25.60	1714.03	26.90	1714.29	27.00	1715.73	27.00	1715.27	23.30	1714.69
30-Apr-96											25.70	1713.93			25.20	1717.53			22.70	1715.29
16-May-96											25.95	1713.68			24.70	1718.03			22.30	1715.69
20-Jun-96	25.25	1717.68	31.00	1714.73	27.20	1714.88	21.85	1716.50	26.00	1714.83	24.30	1715.33	25.80	1715.39	28.00	1714.73	27.60	1714.67	22.95	1715.04

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

TOC--->	I-A 1751.06		I-B 1750.69		I-C 1750.44		I-D 1750.54		I-E 1750.22		I-F 1747.58		I-G 1750.42		I-H 1751.07	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW		DTW	ELEV.	DTW	ELEV.
14-Jan-94	41.10	1709.96	44.00	1706.69	36.00	1714.44	44.10	1706.44	43.85	1706.37	45.00	1702.58	39.00	1711.42	39.30	1711.77
22-Feb-94	32.60	1718.46	42.80	1707.89	43.30	1707.14	44.10	1706.44	44.10	1706.12	45.00	1702.58	40.60	1709.82	41.40	1709.67
21-Mar-94	41.00	1710.06	43.00	1707.69	31.20	1719.24	44.10	1706.44	42.90	1707.32	44.00	1703.58	40.60	1709.82	31.70	1719.37
26-Apr-94	41.00	1710.06	43.80	1706.89	41.80	1708.64	44.20	1706.34	44.30	1705.92	45.00	1702.58	40.60	1709.82	31.80	1719.27
19-May-94	43.00	1708.06	44.15	1706.54	33.70	1716.74	44.10	1706.44	45.15	1705.07	45.05	1702.53	40.55	1709.87	39.70	1711.37
23-Jun-94	42.00	1709.06	42.00	1708.69	36.00	1714.44	44.00	1706.54	38.30	1711.92	45.00	1702.58	40.50	1709.92	31.75	1719.32
20-Jul-94	41.10	1709.96	40.30	1710.39	38.20	1712.24	44.10	1706.44	44.00	1706.22	44.90	1702.68	40.10	1710.32	33.10	1717.97
23-Aug-94	42.10	1708.96	43.60	1707.09	44.00	1706.44	44.15	1706.39	45.10	1705.12	45.00	1702.58	40.55	1709.87	39.50	1711.57
30-Sep-94	41.00	1710.06	43.00	1707.69	33.40	1717.04	32.70	1717.84	34.60	1715.62	45.00	1702.58	40.50	1709.92	32.30	1718.77
18-Oct-94	42.00	1709.06	43.00	1707.69	32.40	1718.04	36.00	1714.54	40.00	1710.22	45.00	1702.58	41.90	1708.52	32.20	1718.87
16-Nov-94	41.00	1710.06	44.00	1706.69	32.70	1717.74	42.50	1708.04	40.00	1710.22	44.60	1702.98	39.00	1711.42	43.00	1708.07
02-Dec-94	42.00	1709.06	44.20	1706.49	32.00	1718.44	44.10	1706.44	38.70	1711.52	45.00	1702.58	40.50	1709.92	40.55	1710.52
27-Jan-95	42.00	1709.06	44.20	1706.49	36.00	1714.44	44.15	1706.39	43.40	1706.82	35.60	1711.98	42.00	1708.42	39.40	1711.67
16-Feb-95	42.00	1709.06	44.10	1706.59	35.40	1715.04	44.15	1706.39	42.50	1707.72	44.80	1702.78	39.90	1710.52	38.50	1712.57
22-Mar-95	42.00	1709.06	44.00	1706.69	43.80	1706.64	44.10	1706.44	40.40	1709.82	40.00	1707.58	40.80	1709.62	41.50	1709.57
25-Apr-95	42.00	1709.06	43.00	1707.69	31.00	1719.44	44.10	1706.44	33.00	1717.22	30.80	1716.78	30.60	1719.82	39.70	1711.37
18-May-95	42.00	1709.06	43.10	1707.59	43.90	1706.54	44.10	1706.44	32.90	1717.32	44.25	1703.33			44.50	1706.57
29-Jun-95	40.50	1710.56	30.00	1720.69	43.10	1707.34	44.10	1706.44	32.40	1717.82	44.00	1703.58	30.85	1719.57	39.25	1711.82
19-Jul-95	41.00	1710.06	43.50	1707.19	43.90	1706.54	44.10	1706.44	34.50	1715.72	44.00	1703.58	30.80	1719.62	43.15	1707.92
24-Aug-95	41.00	1710.06	43.30	1707.39	43.85	1706.59	43.80	1706.74	33.10	1717.12	31.50	1716.08	30.85	1719.57	38.60	1712.47
28-Sep-95	41.00	1710.06	44.10	1706.59	44.00	1706.44	43.00	1707.54	34.90	1715.32	31.00	1716.58	40.60	1709.82	40.80	1710.27
19-Oct-95	42.00	1709.06	42.80	1707.89	30.90	1719.54	43.80	1706.74	34.75	1715.47	31.20	1716.38	40.10	1710.32	39.70	1711.37
21-Nov-95	41.95	1709.11	43.70	1706.99	43.70	1706.74	43.80	1706.74	34.00	1716.22	31.00	1716.58	37.70	1712.72	41.80	1709.27
12-Dec-95	41.00	1710.06	42.95	1707.74	43.80	1706.64	44.00	1706.54	44.80	1705.42	30.70	1716.88	39.80	1710.62	41.00	1710.07
11-Jan-96	42.00	1709.06	44.10	1706.59	31.20	1719.24	43.80	1706.74	35.90	1714.32	39.80	1707.78	41.00	1709.42	40.20	1710.87
12-Feb-96	42.00	1709.06	43.80	1706.89	43.70	1706.74	44.00	1706.54	38.00	1712.22	44.00	1703.58	30.70	1719.72	44.50	1706.57
15-Mar-96	42.00	1709.06	43.20	1707.49	44.10	1706.34	46.10	1704.44	42.30	1707.92	44.90	1702.68	39.00	1711.42	46.00	1705.07
30-Apr-96	42.00	1709.06	43.50	1707.19	43.85	1706.59	46.00	1704.54	35.90	1714.32	44.00	1703.58	38.55	1711.87	45.60	1705.47
16-May-96	41.95	1709.11	43.20	1707.49	43.75	1706.69	43.85	1706.69	34.50	1715.72	40.00	1707.58	39.50	1710.92	30.45	1720.62
20-Jun-96	41.80	1709.26	43.10	1707.59	43.90	1706.54	43.80	1706.74	36.20	1714.02	44.10	1703.48	31.00	1719.42	36.00	1715.07

KERR-McGEE CHEMICAL CORPORATION
HENDERSON, NEVADA FACILITY
GROUNDWATER ELEVATIONS

	I-I		I-J		I-K		I-L		I-M		I-N		I-O	
TOC--->	1743.36		1747.95		1743.97		1749.49		1750.72		1749.26		1750.66	
	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.	DTW	ELEV.
14-Jan-94	41.70	1701.66	42.00	1705.95	33.00	1710.97								
22-Feb-94	41.80	1701.56	41.80	1706.15	31.00	1712.97								
21-Mar-94	41.70	1701.66	42.00	1705.95	36.00	1707.97								
26-Apr-94	41.70	1701.66	42.20	1705.75	42.00	1701.97								
19-May-94	41.75	1701.61	41.95	1706.00	36.80	1707.17								
23-Jun-94	42.10	1701.26	40.10	1707.85	36.80	1707.17								
20-Jul-94	42.10	1701.26	42.00	1705.95	36.60	1707.37	30.35	1719.14	33.30	1717.42	31.20	1718.06	34.10	1716.56
23-Aug-94	41.70	1701.66	42.00	1705.95	36.80	1707.17	30.30	1719.19	36.20	1714.52	33.20	1716.06	41.50	1709.16
30-Sep-94	41.70	1701.66	41.00	1706.95	36.80	1707.17	39.00	1710.49	41.60	1709.12	38.00	1711.26	38.50	1712.16
18-Oct-94	40.00	1703.36	42.00	1705.95	36.80	1707.17	38.00	1711.49	41.40	1709.32	39.00	1710.26	31.40	1719.26
16-Nov-94	41.70	1701.66	40.00	1707.95	35.00	1708.97	38.70	1710.79	41.60	1709.12	38.00	1711.26	40.40	1710.26
02-Dec-94	41.80	1701.56	41.80	1706.15	36.00	1707.97	37.20	1712.29	41.60	1709.12	38.00	1711.26	35.00	1715.66
27-Jan-95	40.10	1703.26	33.90	1714.05	26.20	1717.77	39.20	1710.29	41.40	1709.32	38.50	1710.76	40.65	1710.01
16-Feb-95	41.00	1702.36	34.25	1713.70	36.90	1707.07	39.60	1709.89	41.60	1709.12	38.20	1711.06	31.00	1719.66
22-Mar-95	41.10	1702.26	32.00	1715.95	32.00	1711.97	34.65	1714.84	38.00	1712.72	38.20	1711.06	34.00	1716.66
25-Apr-95	41.00	1702.36	40.00	1707.95	34.00	1709.97	37.00	1712.49	41.60	1709.12	38.30	1710.96	32.80	1717.86
18-May-95	41.00	1702.36	37.95	1710.00	29.00	1714.97	34.00	1715.49	37.50	1713.22	37.50	1711.76	30.60	1720.06
29-Jun-95	40.40	1702.96	32.80	1715.15	31.40	1712.57	33.00	1716.49	31.60	1719.12	38.10	1711.16	38.50	1712.16
19-Jul-95	34.50	1708.86	37.80	1710.15	35.50	1708.47	39.30	1710.19	40.70	1710.02	38.00	1711.26	30.70	1719.96
24-Aug-95	41.05	1702.31	37.00	1710.95	36.80	1707.17	39.90	1709.59	41.00	1709.72	38.10	1711.16	30.75	1719.91
28-Sep-95	41.00	1702.36	33.10	1714.85	32.00	1711.97	36.60	1712.89	41.00	1709.72	34.00	1715.26	34.00	1716.66
19-Oct-95	41.00	1702.36	33.10	1714.85	34.70	1709.27	40.00	1709.49	41.50	1709.22	38.20	1711.06	32.70	1717.96
21-Nov-95	38.00	1705.36	33.70	1714.25	36.60	1707.37	40.00	1709.49	41.00	1709.72	38.10	1711.16	36.00	1714.66
12-Dec-95	41.00	1702.36	33.60	1714.35	36.00	1707.97	39.90	1709.59	41.55	1709.17	31.60	1717.66	34.80	1715.86
11-Jan-96	34.00	1709.36	33.15	1714.80	34.30	1709.67	40.00	1709.49	41.50	1709.22	32.00	1717.26	34.70	1715.96
12-Feb-96	41.00	1702.36	35.40	1712.55	34.00	1709.97	40.00	1709.49	41.00	1709.72	38.40	1710.86	34.50	1716.16
15-Mar-96	28.20	1715.16	35.50	1712.45	33.00	1710.97	40.70	1708.79	41.40	1709.32	40.40	1708.86	32.90	1717.76
30-Apr-96	37.70	1705.66	34.90	1713.05	33.00	1710.97	39.90	1709.59	41.40	1709.32	38.00	1711.26	32.50	1718.16
16-May-96	31.00	1712.36	33.95	1714.00	36.00	1707.97	39.90	1709.59	41.00	1709.72	38.10	1711.16	33.00	1717.66
20-Jun-96	33.00	1710.36	36.60	1711.35	35.70	1708.27	40.00	1709.49	41.40	1709.32	39.10	1710.16	39.00	1711.66

APPENDIX B

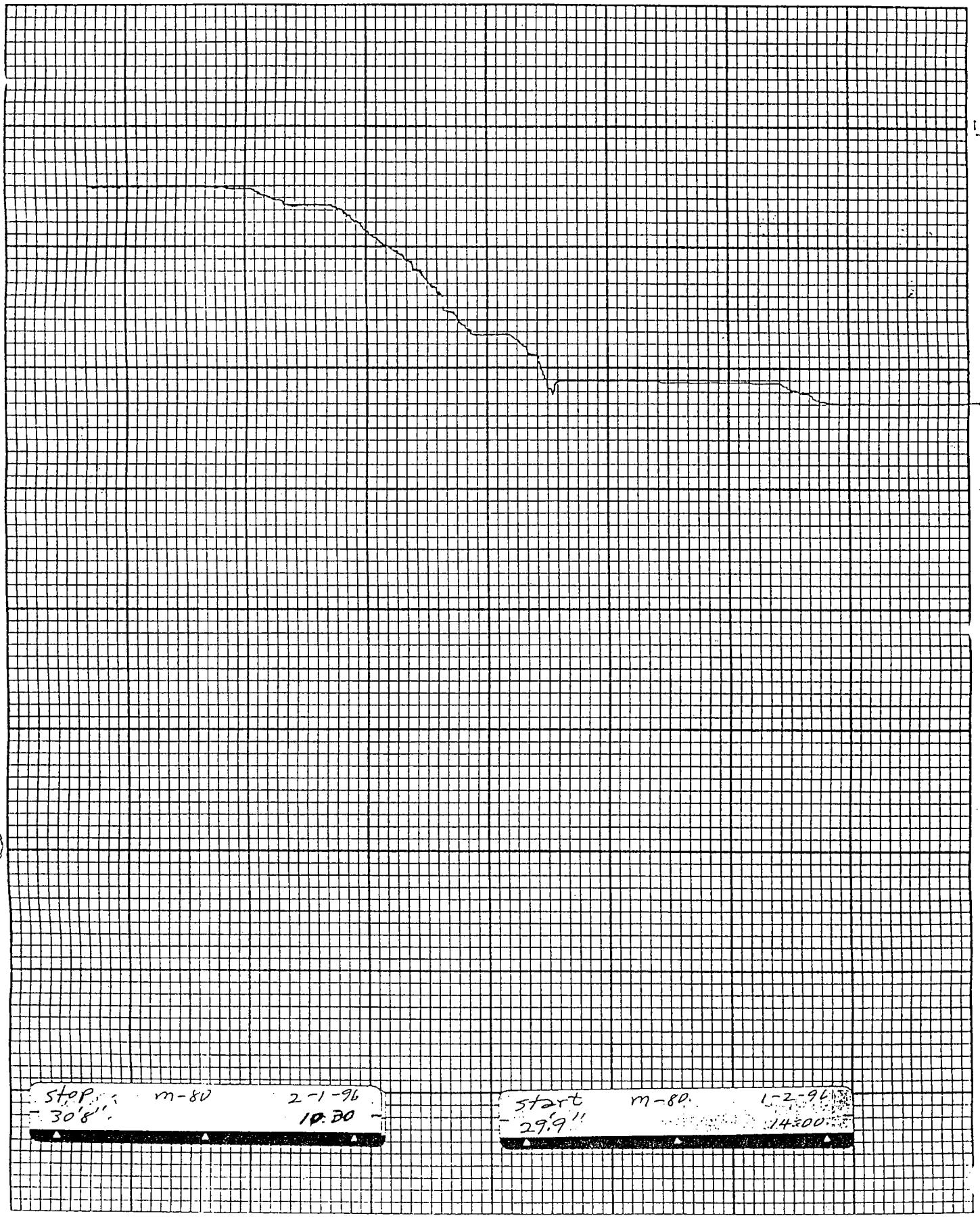
CONTINUOUS WATER LEVEL RECORDER CHARTS

Stevens Water Level Recorder — Type

Leupold & Stevens, Inc., Beaverton, Ore.

Printed in U.S.A.

Chart



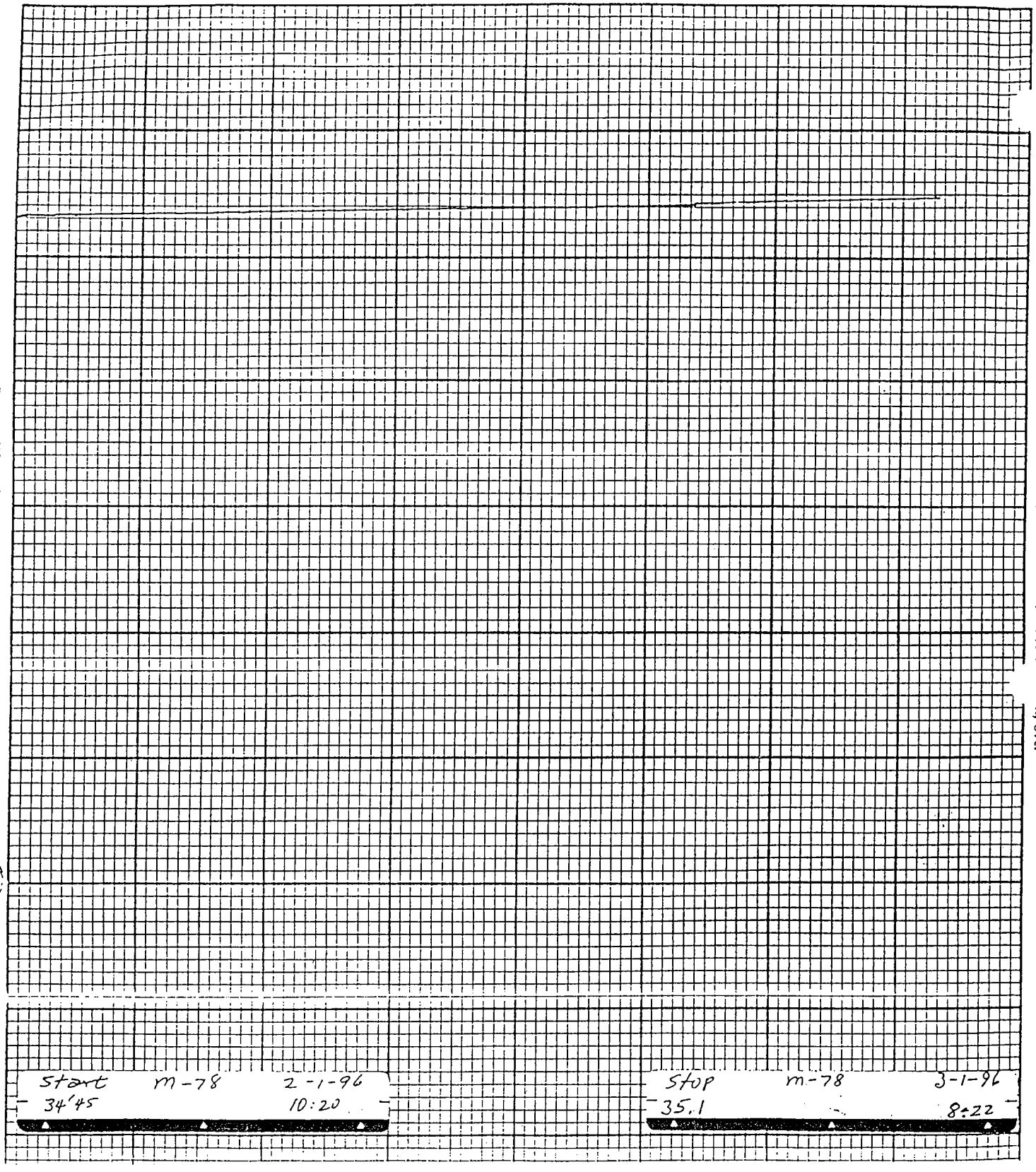
Stevens Water Level Recorder — Ty

Leupold & Stevens, Inc

erton, Ore.

Printed in U.S.A.

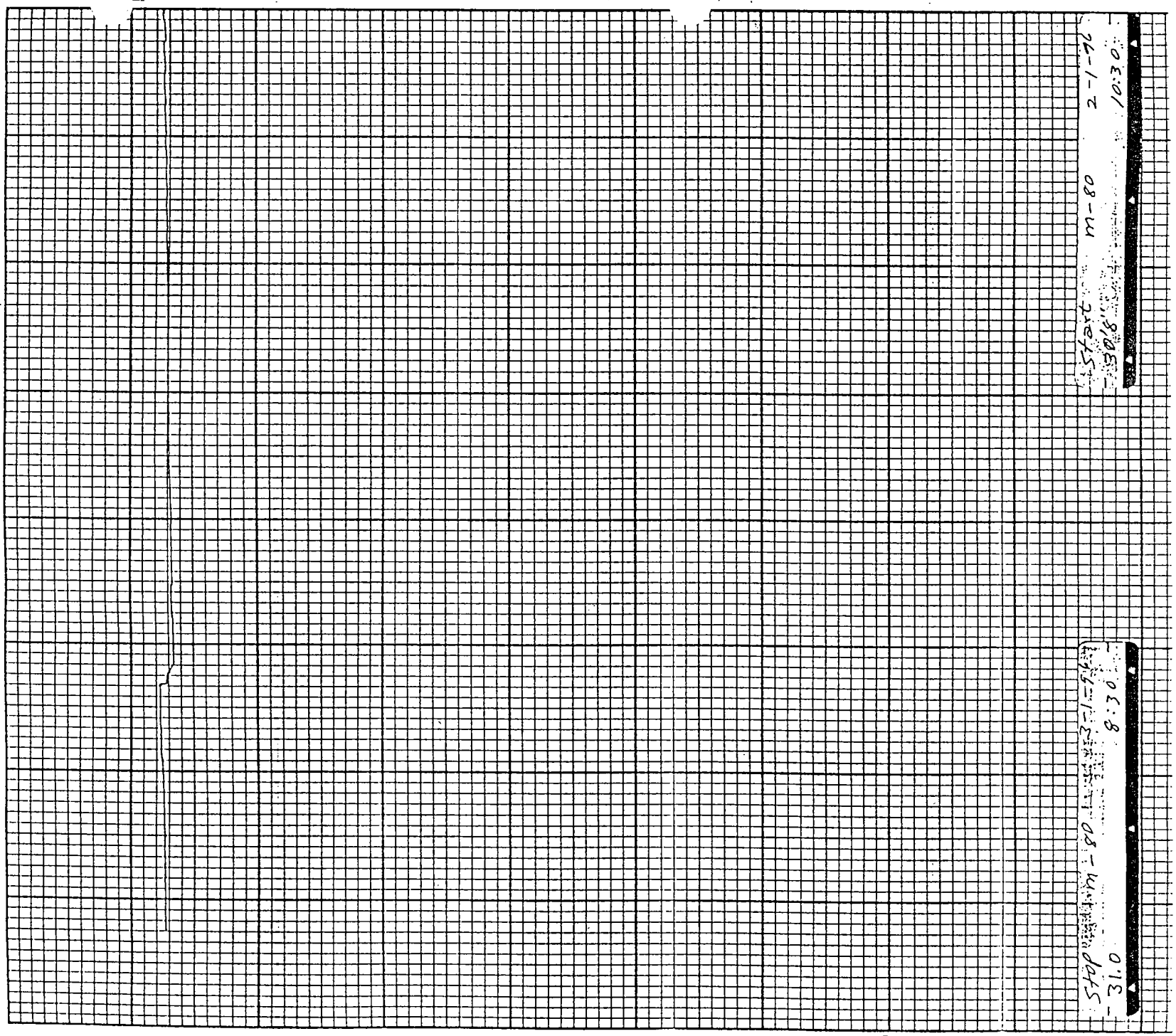
Chart

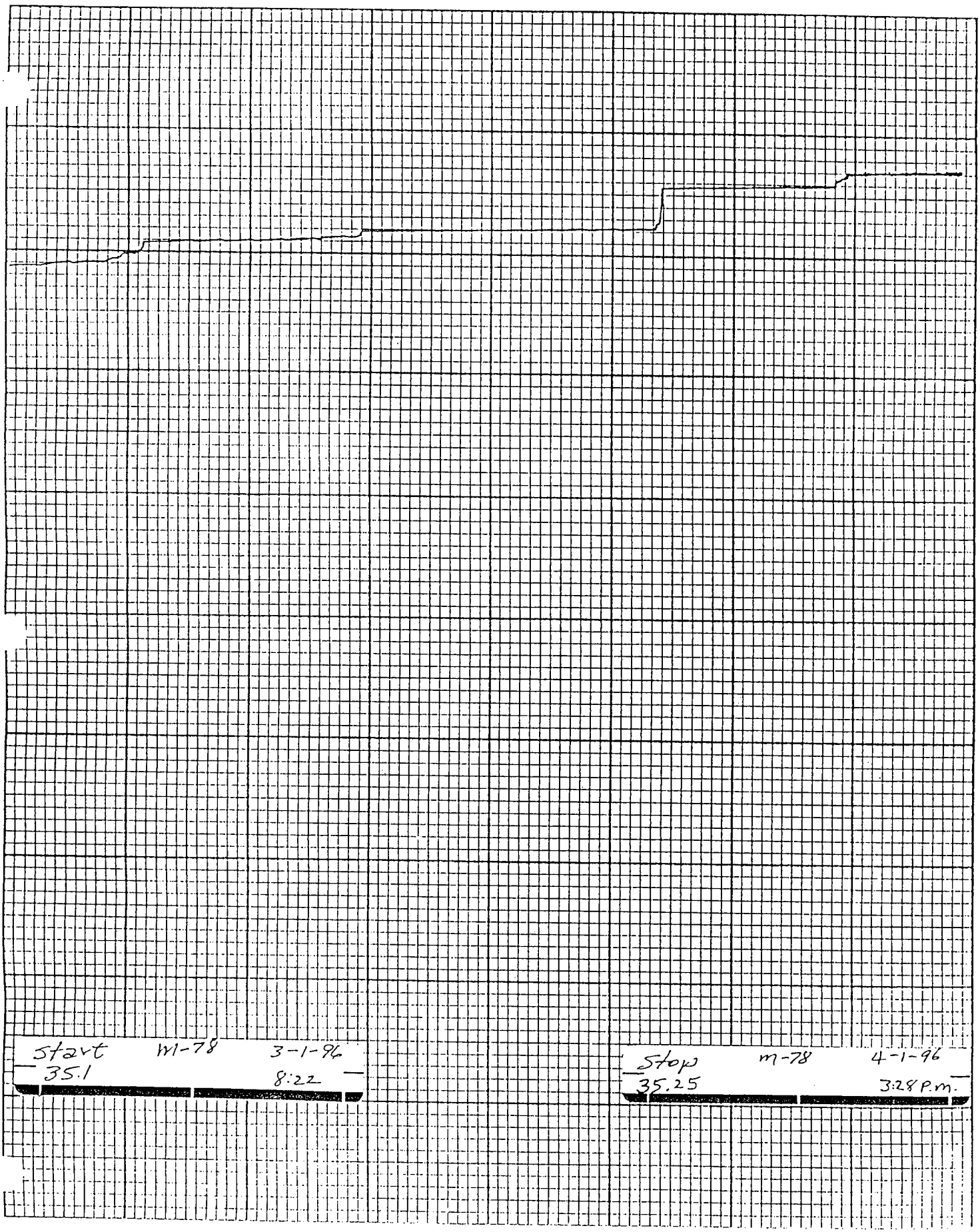


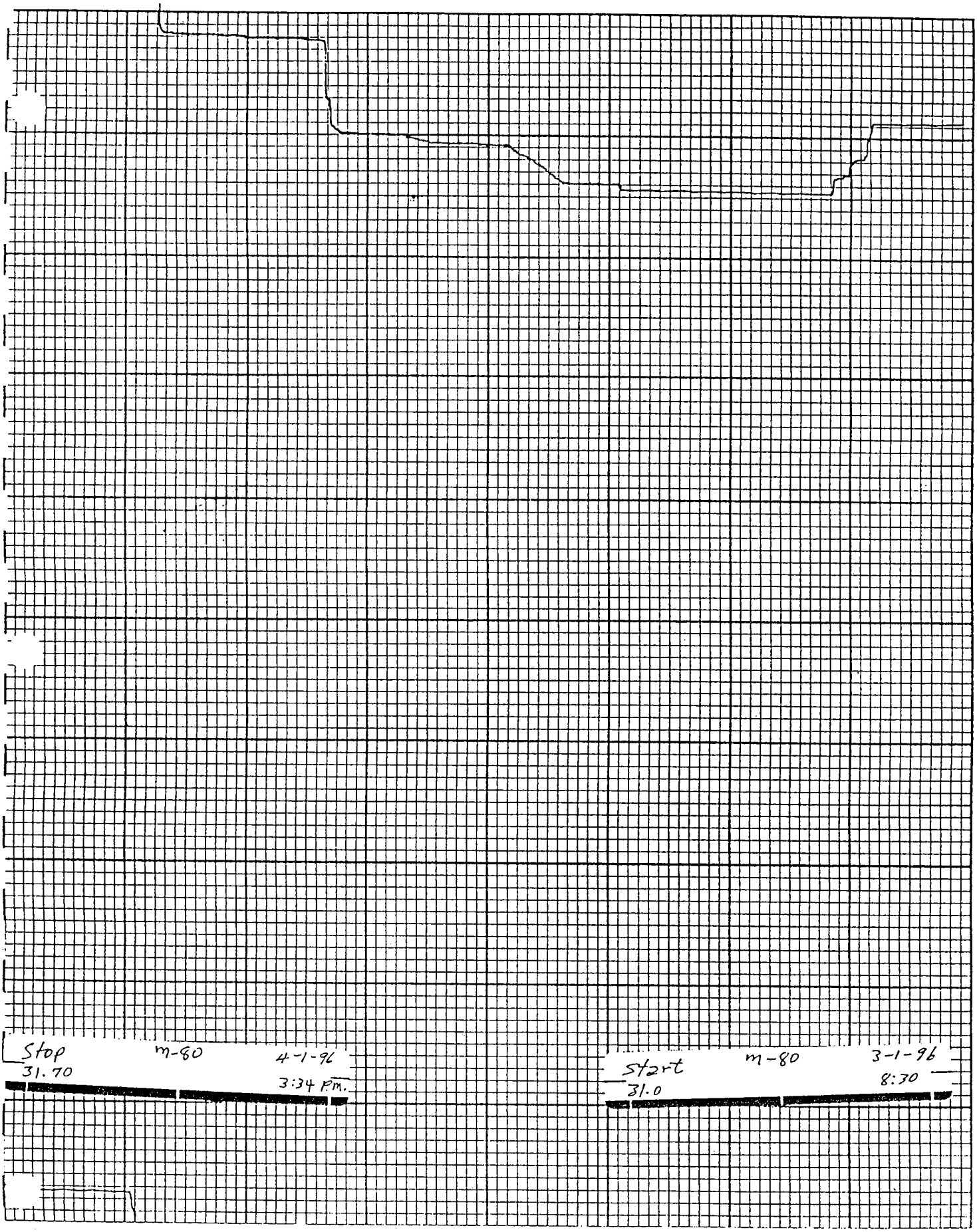
Stevens Water Level Recorder — Type F

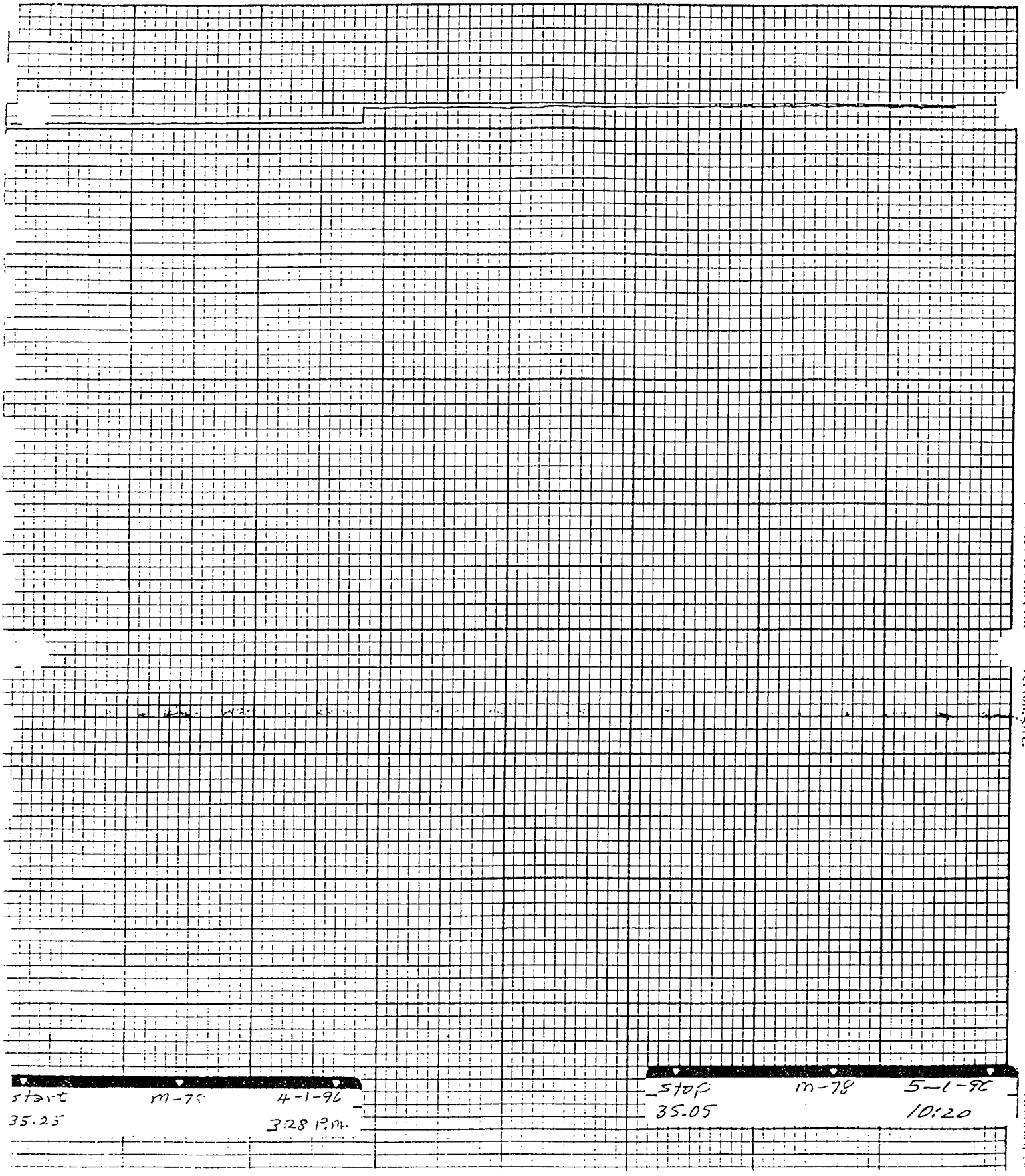
Leupold & Stevens, Inc., Be n, Ore.

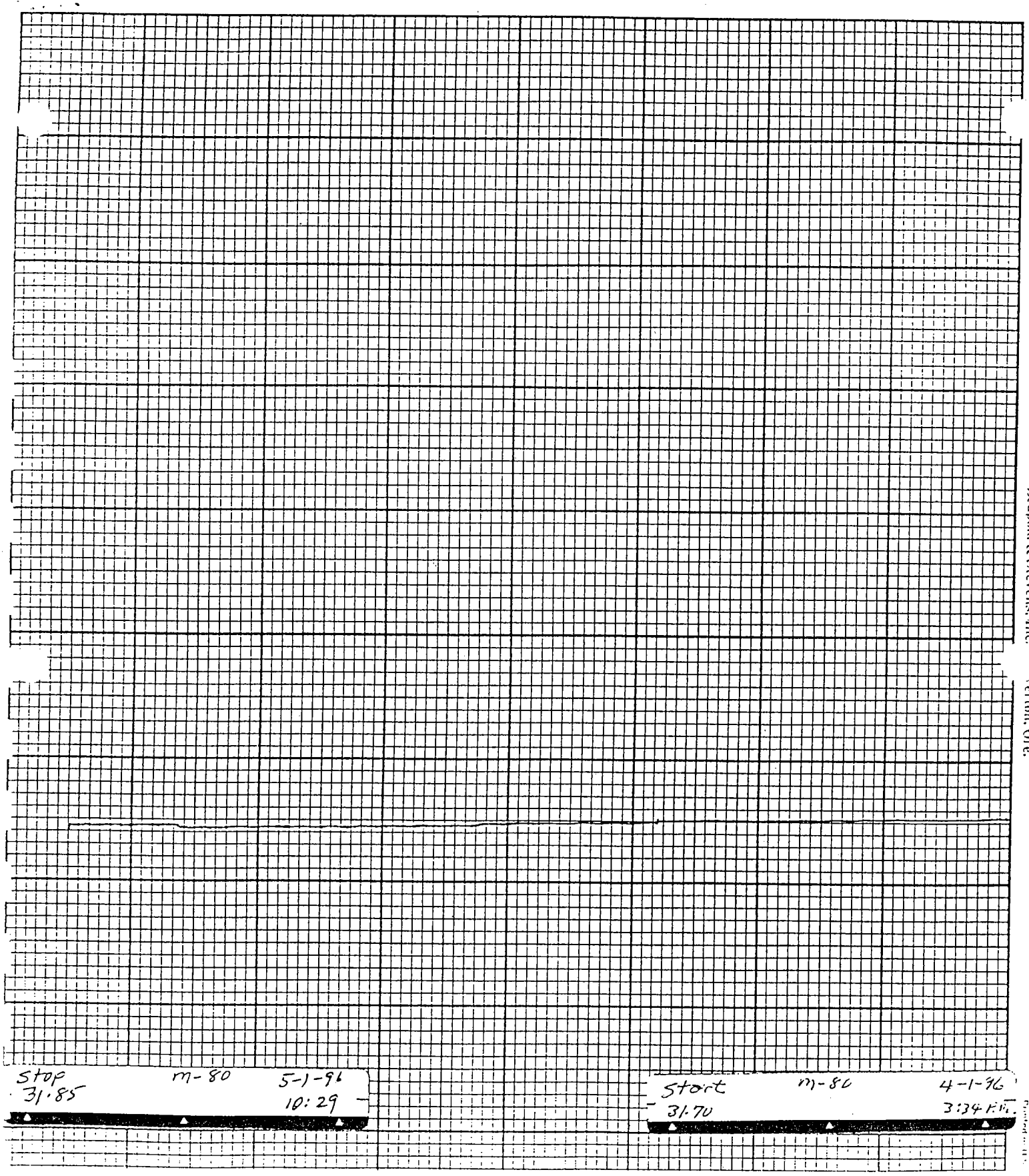
Leupold & Stevens, Inc., Bea n, Ore.

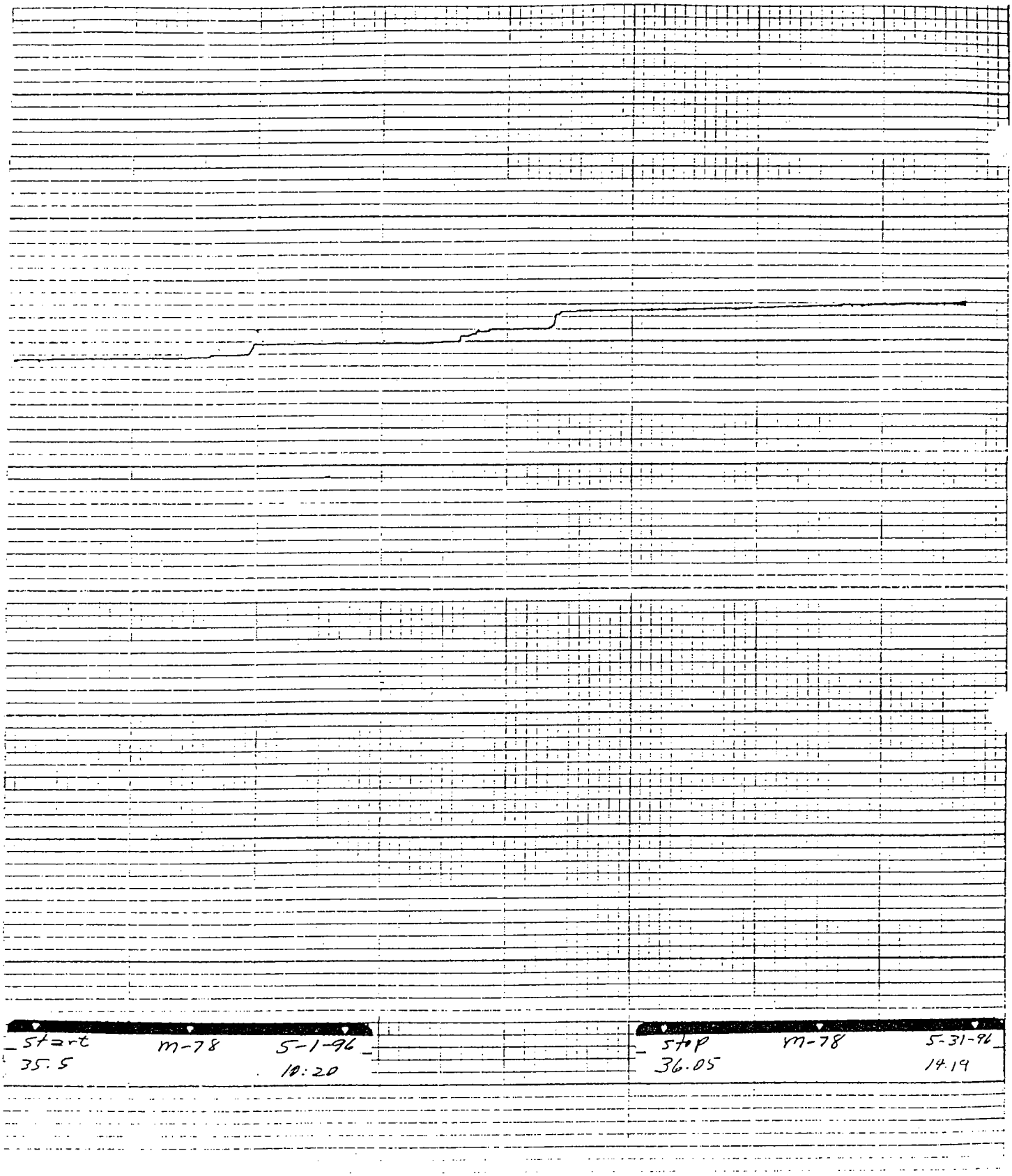



Start
35.1
M-78
3-1-96
8:22
Stop
35.25
M-78
4-1-96
3:28 P.M.

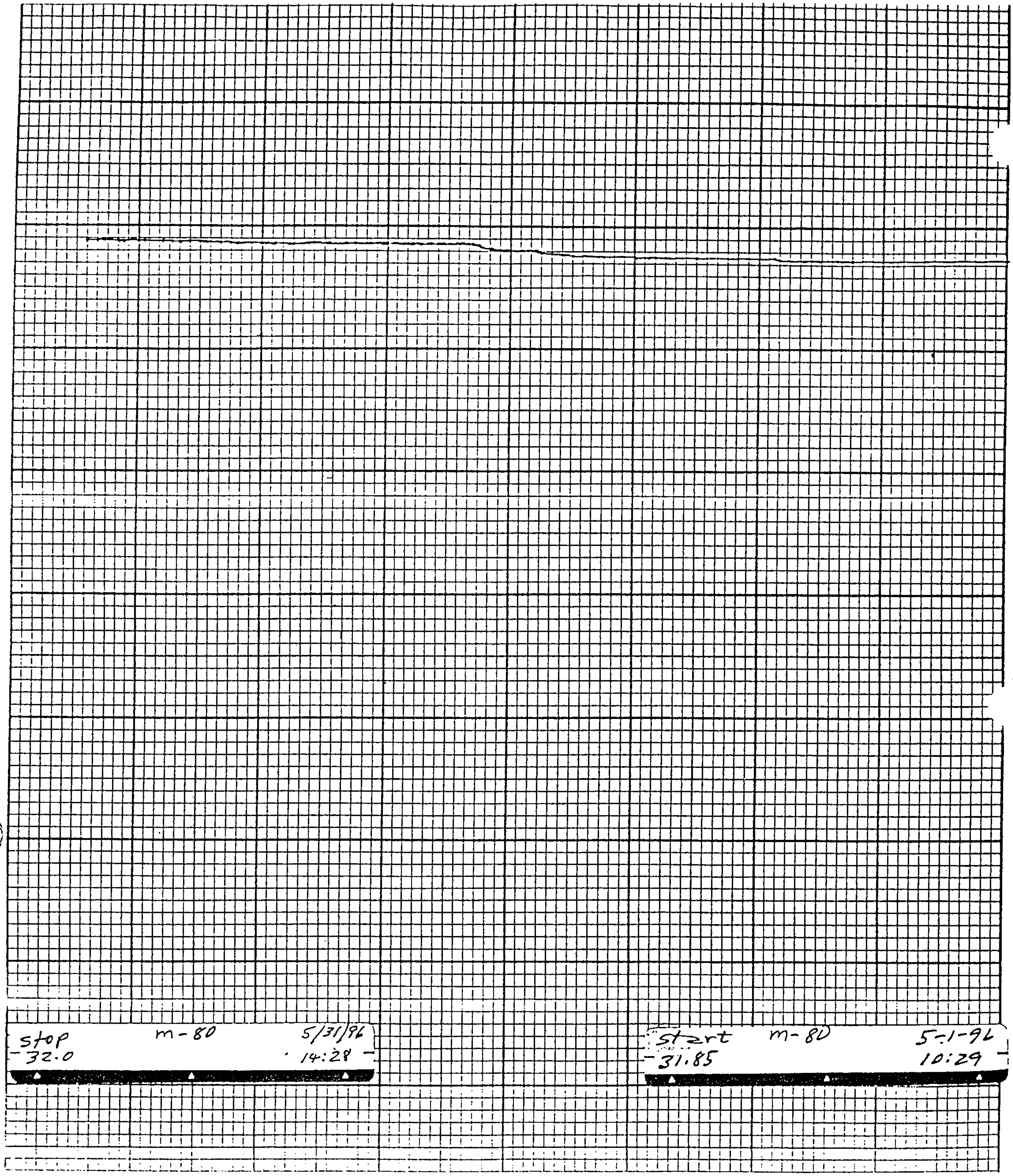






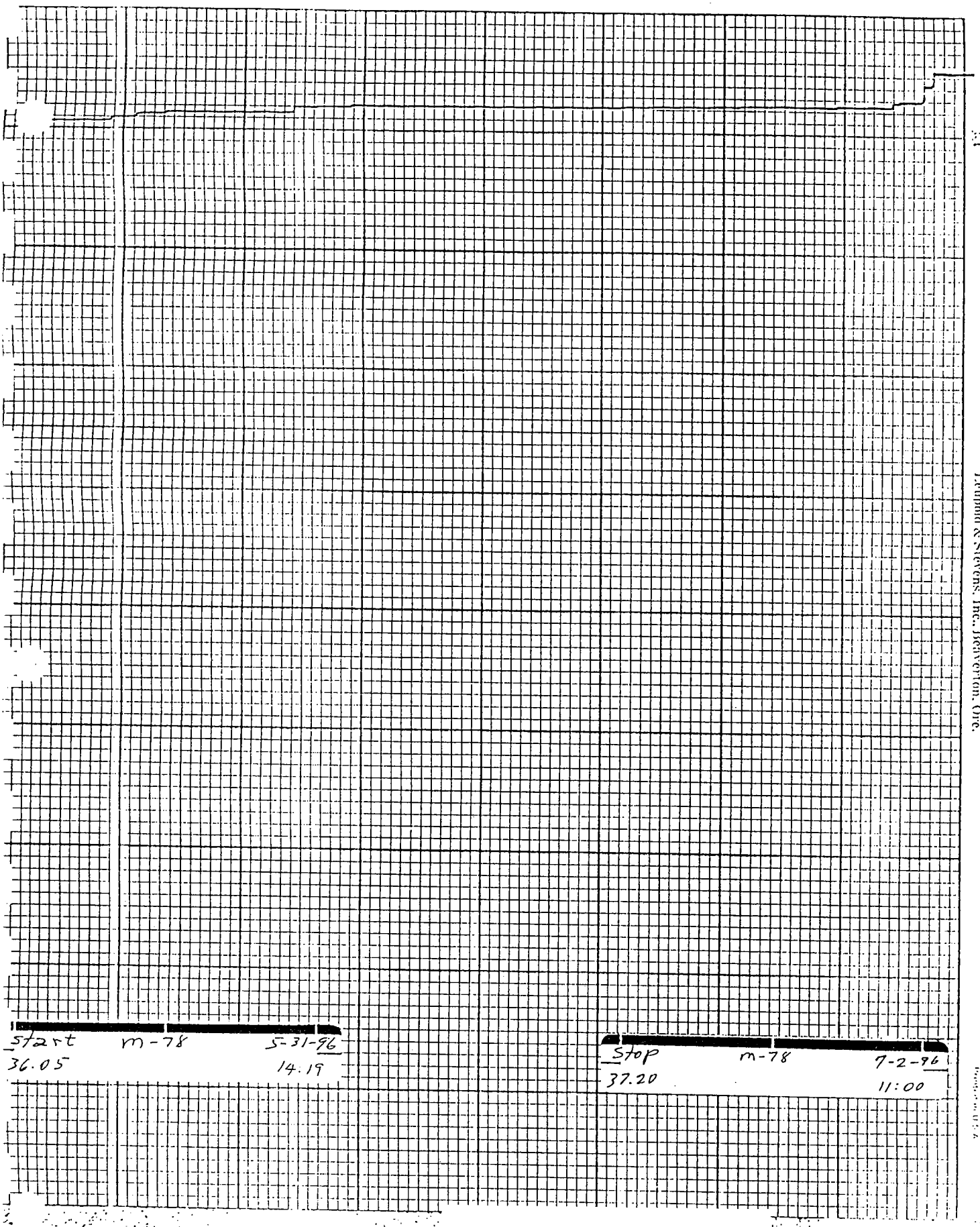

start
35.5
M-78
5-1-96
10:20
stop
36.05
M-78
5-31-96
14:19

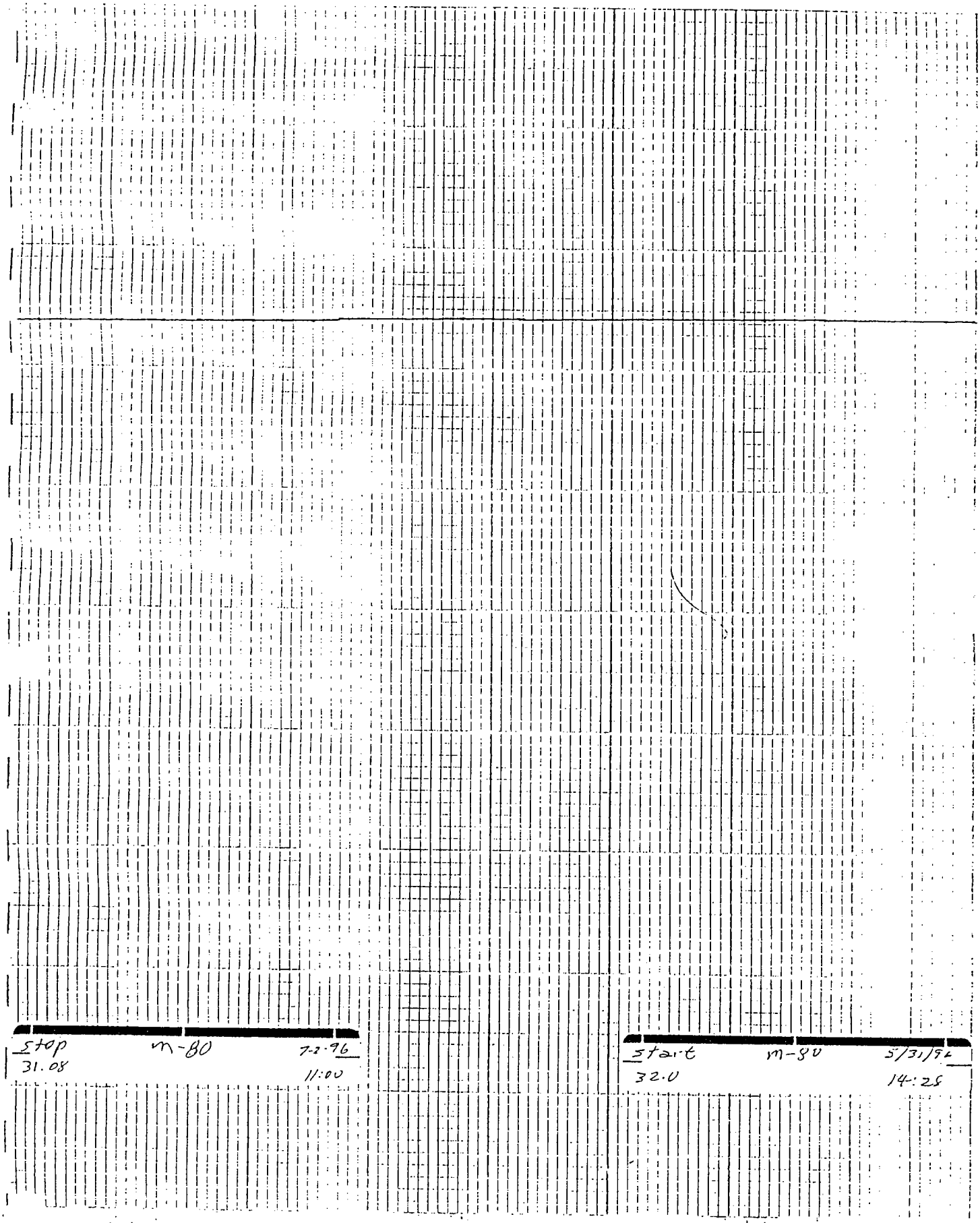
Stevens Water Level Recorder — Type F



Leupold & Stevens, Inc., Beaverton,

Printed in U.S.A.




Stop
31.08
M-80
7-2-96
11:00
Start
32.0
M-80
5/31/96
14:25

Western Technologies Inc.
The Quality People
Since 1955

3611 West Tompkins Avenue
Las Vegas, Nevada 89103-5618
(702) 798-8050 • fax 798-7664

April 26, 1996

Koch Materials Company
1429 Slover Avenue
Fontana, California 92335

atten: Mr. Joe Platt

Project No. 4186JL080

ref: Soil Excavation
Former Koch Materials Facility
BMI Industrial Complex
Henderson, Nevada

Dear Mr. Platt:

Western Technologies, Inc. (WT) is pleased to provide Koch Materials with this report regarding the excavation of oil and asphalt impacted soil from the former Koch Materials asphalt emulsion facility located within the Basic Management Inc. (BMI) Industrial Complex in Henderson, Nevada. WT performed the excavation oversight services to document the removal of oil stained areas and asphalt residue from the property. WT performed these services pursuant to the Scope of Work described in WT's Proposal No. 4186PT115 dated January 29, 1996 and an Intermittent Service Agreement No. HEND-96-1.

On March 18, 1996 and March 19, 1996, WT performed excavation oversight during the removal of oil and asphalt impacted soil from the project area. Using a rubber tire backhoe, the discolored soils were removed to depths ranging from a few inches below the ground surface (bgs) to approximately one foot below the ground surface. The limits of the excavation activities were based on visual indications (i.e. soil discolorations) and/or hydrocarbon odors. The impacted soils were situated between an access road to the facility and a concrete slab on which above-ground product storage tanks and a facility office were located.

During the excavation activities, one localized area of more extensive soil discoloration and hydrocarbon odor was noted. This area was situated approximately 15 feet southwest of the former gas oil area (DGO tank location) and adjoining the concrete slab. The soil was excavated to approximately 12 feet bgs from this area. Additionally, approximately 300 square feet of the concrete slab at this area was removed so that hydrocarbon impacted soils situated under the slab could be removed. These soils were excavated to approximately 1.0 to 1.5 feet below the six inch thick slab.

Photographs documenting the excavation activities at the project site are provided as Appendix A.

Excavated soils were stockpiled on-site on the concrete slab pending profiling and transportation to the disposal facility. On March 18, 1996, WT obtained one composite sample (number SP-1) from the stockpiled soils for analytical testing. The sample was placed into glass jars without voids to eliminate headspace and submitted to Nevada Environmental Laboratory of Las Vegas, Nevada. The sample was analyzed for total petroleum hydrocarbons (TPH) by EPA method 8015 (modified), three metals (cadmium, chromium and lead) using the toxicity characteristic leaching procedure (TCLP) by EPA method 6010/1311, and volatile organic compounds (VOCs) by EPA method 8260.

Analytical results show the TPH concentration of the composite sample to be 9000 milligrams per kilogram (mg/kg). This concentration exceeds the Nevada Division of Environmental Protection (NDEP) soil action level of 100 mg/kg, and therefore, the soil requires proper disposal/treatment. The data also indicates the hydrocarbons are in the range of oil. The results of the TCLP metals and VOCs show concentrations below their respective laboratory detection limits. A copy of the analytical results is provided in Appendix B.

On March 29, 1996, WT advanced 10 borings at the project area to obtain post-excavation soil samples. The soil samples were obtained from various depths and locations and analyzed for TPH by EPA method 8015. Except for one soil sample (number KM-9-1) collected under the northeast corner of the concrete slab, the analytical results show TPH concentrations below NDEP's soil action level of 100 mg/kg. This sample, collected at one foot bgs, has a TPH concentration of 190 mg/kg. Additional details of WT's subsurface soil evaluation are provided in a separate report dated April 25, 1996.

On April 17, 1996, approximately 150 square feet of the concrete slab at the location of sample KM-9-1 was removed and the soils from that area were excavated until there were no further soil discolorations and/or hydrocarbon odors (approximately two feet below bottom of the concrete slab). WT collected one additional post-excavation soil sample (number KM-11) for analytical testing by EPA method 8015. Analytical results show the TPH concentration from this sample to be 32 mg/kg, and therefore, below the NDEP soil action level. A copy of the analytical results are provided in Appendix D.

Table 6 contd---

100.0 ppb	0.0	4.10
	143.0	3.76
	192.0	3.94
	236.0	6.24
	336.0	12.49
	357.0	5.88
	405.0	3.81
	432.0	10.79
	454.0	5.38
	831.0	6.58
	1128.0	3.81
	1164.0	5.73
1.0 ppm	0.0	3.32
	143.0	3.32
	192.0	3.63
	236.0	5.72
	336.0	13.10
	357.0	4.75
	405.0	4.26
	432.0	9.88
	454.0	5.39
	831.0	5.07
	1128.0	4.26
	1164.0	4.76
10.0 ppm	0.0	3.16
	143.0	3.15
	192.0	2.69
	236.0	5.38
	336.0	15.49
	357.0	5.39
	405.0	2.69
	432.0	8.34
	454.0	4.89
	831.0	3.00
	1128.0	2.69
	1164.0	3.31
100.0 ppm	0.0	3.78
	143.0	3.78
	192.0	3.78
	336.0	14.88
	357.0	4.74
	405.0	3.14
	432.0	9.88
	454.0	5.23
	831.0	1.47
	1128.0	3.14
	1164.0	4.42

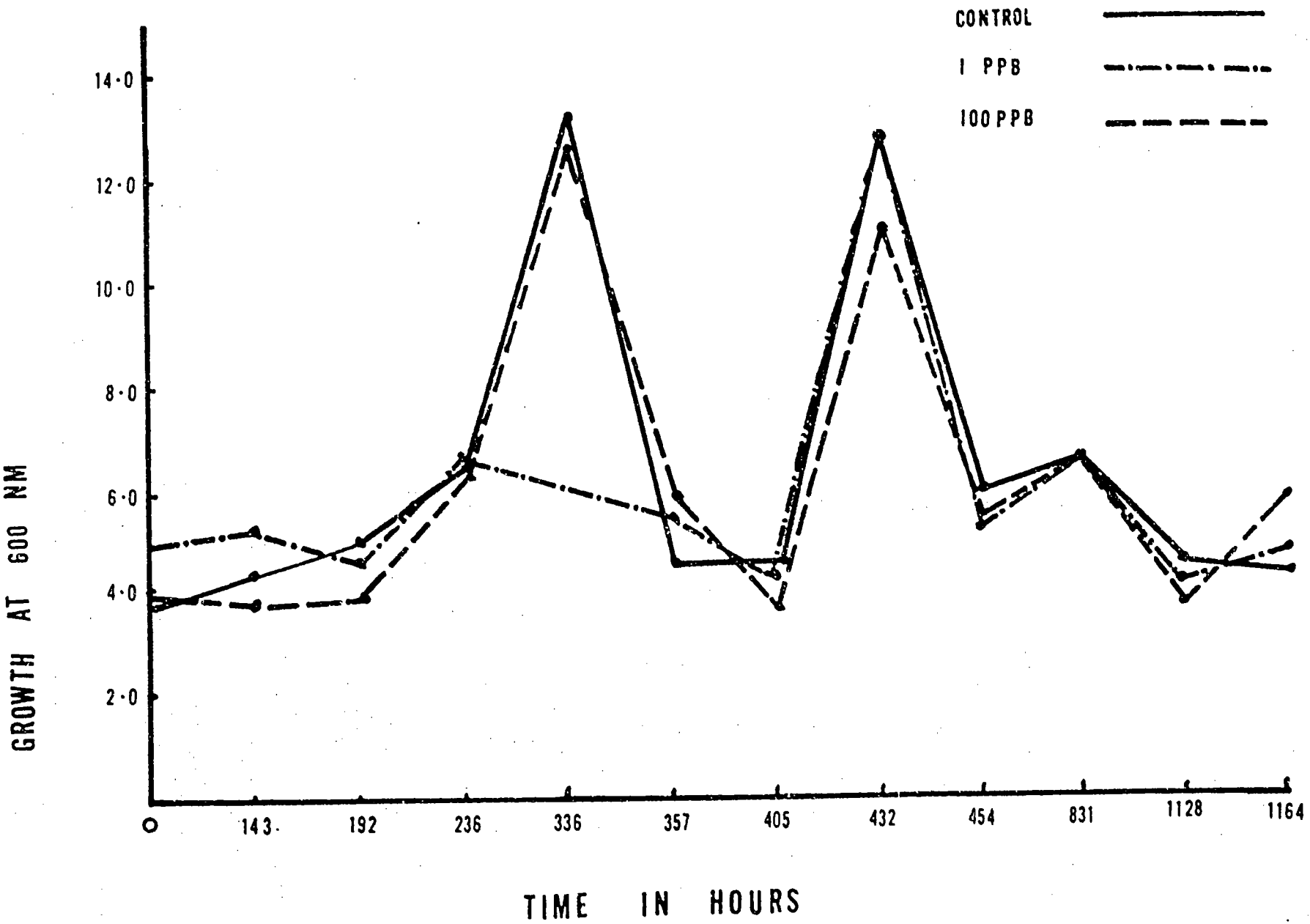


Fig. 6. Growth of Chlamydomonas spp. in various connentrations of ammonium perchlorate.

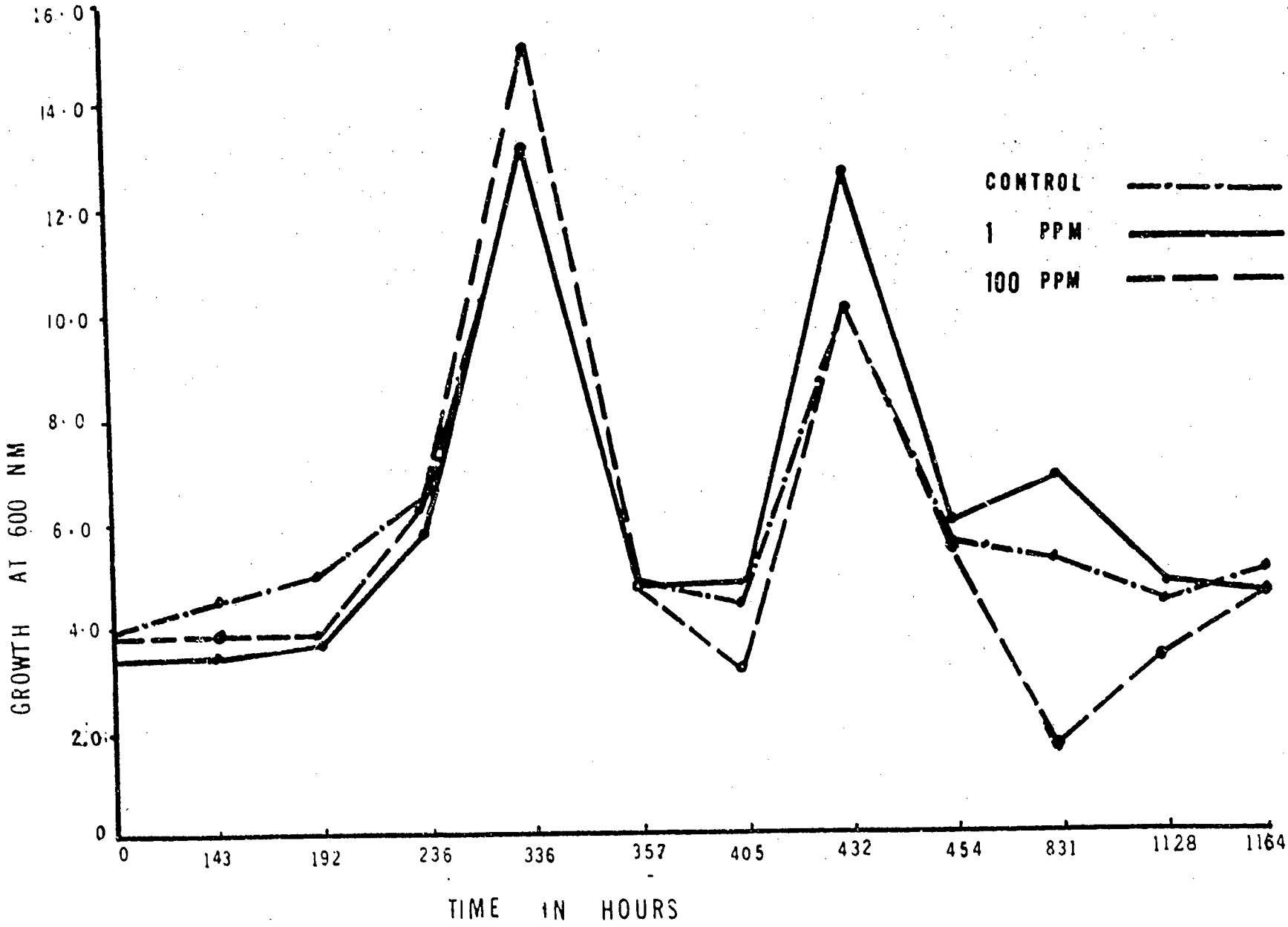


Fig. 7. Growth of Chlamydomonas spp. in various concentrations of ammonium perchlorate.

Conclusions: (Fig. 6,7, Table 6).

1. The growth of Chlamydomonas had 2 peaks at 336 and 432 hours after recording the initial growth.
2. No significant effect is noticed even in 100.0 ppm ammonium perchlorate treatments, except that in the above mentioned concentration, the growth of Chlamydomonas decreased very much in comparison to other treatments. However, at the end of 1164 hours, it was very close to the control.
3. At the end of 1164 hours growth of Chlamydomonas was approximately same in all the treatments, further exhibiting the fact that the compound had no marked toxicity in a long-term period.
4. Due to some unknown reason, growth of Chlamydomonas had only 1 peak in 1.0 ppb treatment, while there were two peaks in rest of the treatments including the control.

Escherichia freundii (Fig. 8, 9, Table 7)

Pure cultures of E. freundii and Bacillus proteus were purchased from Turtox Co. The colonies were transferred to autoclaved liquid media. Desired amounts of ammonium perchlorate stock solution were added subsequently to obtain the required concentrations. The cultures of E. freundii were kept at 38°C and of B. proteus at 24°C. The organisms were acclimatized at these temperatures 48 hours before ammonium perchlorate was added to culture media. The following consituents were

used to make the specified media:

	Amount/100 ml
Potassium phosphate monobasic 0.6%	4 ml
Potassium phosphate dibasic 0.6%	4 ml
Sodium chloride	0.5 g
Ammonium sulfate	0.5 g
Dextrose	0.2 g
Casein hydrolysate	0.2 g
Agar	1.0 g
Distilled water	92.0 ml

Table 7---Growth of Escherichia freundii meausred upto 192 hours at 600 nm (X 100).

No. of hours	Control	50 ppb	500 ppb	50 ppm	500 ppm
	Ammonium perchlorate concentration				
0.0	37.00	26.00	27.00	35.00	36.00
24.0	200.00	122.00	125.00	35.00	110.00
48.0	159.0	111.00	112.00	50.00	98.00
72.0	118.00	100.00	117.00	65.00	86.00
96.0	77.00	89.00	113.00	79.00	75.00
120.0	91.00	97.00	113.00	117.00	115.00
144.0	105.00	105.00	113.00	155.00	156.00
168.0	140.00	117.00	127.00	147.00	147.00
192.0	178.00	130.00	142.00	138.00	138.00

Figures 8 and 9 show growth of E. freundii in a graphical manner.

Conclusions:

1. The first peak of growth in control bacteria occurred at 24 hours; the growth declined upto 96 hours and then increased upto 192 hours.
2. Much shorter peak occurred in 50 and 500 ppb treated organisms at 24 hour. The growth did not show marked difference beyond this period, finishing slightly less than the control.
3. In 50 and 500 ppm treatments, bacterial growth was much reduced in the first 24 hours of incubation. Practically no growth occurred in 50 ppm. However, in both the treatments, another peak of growth occurred at 144 hours, which was not noticed in any other treatment or the control.
4. It is assumed that 50 and 500 ppm levels inhibited the initial growth but later this much amount of ammonium perchlorate increased the bacterial growth, probably by serving as an additional source of nitrogen.
5. The highest amount tested in this experiment (500 ppm) does not seem to be toxic for the growth of E. freundii, but on the contrary seems to benefit these microorganisms which is evident from their growth curve (Figure 9).

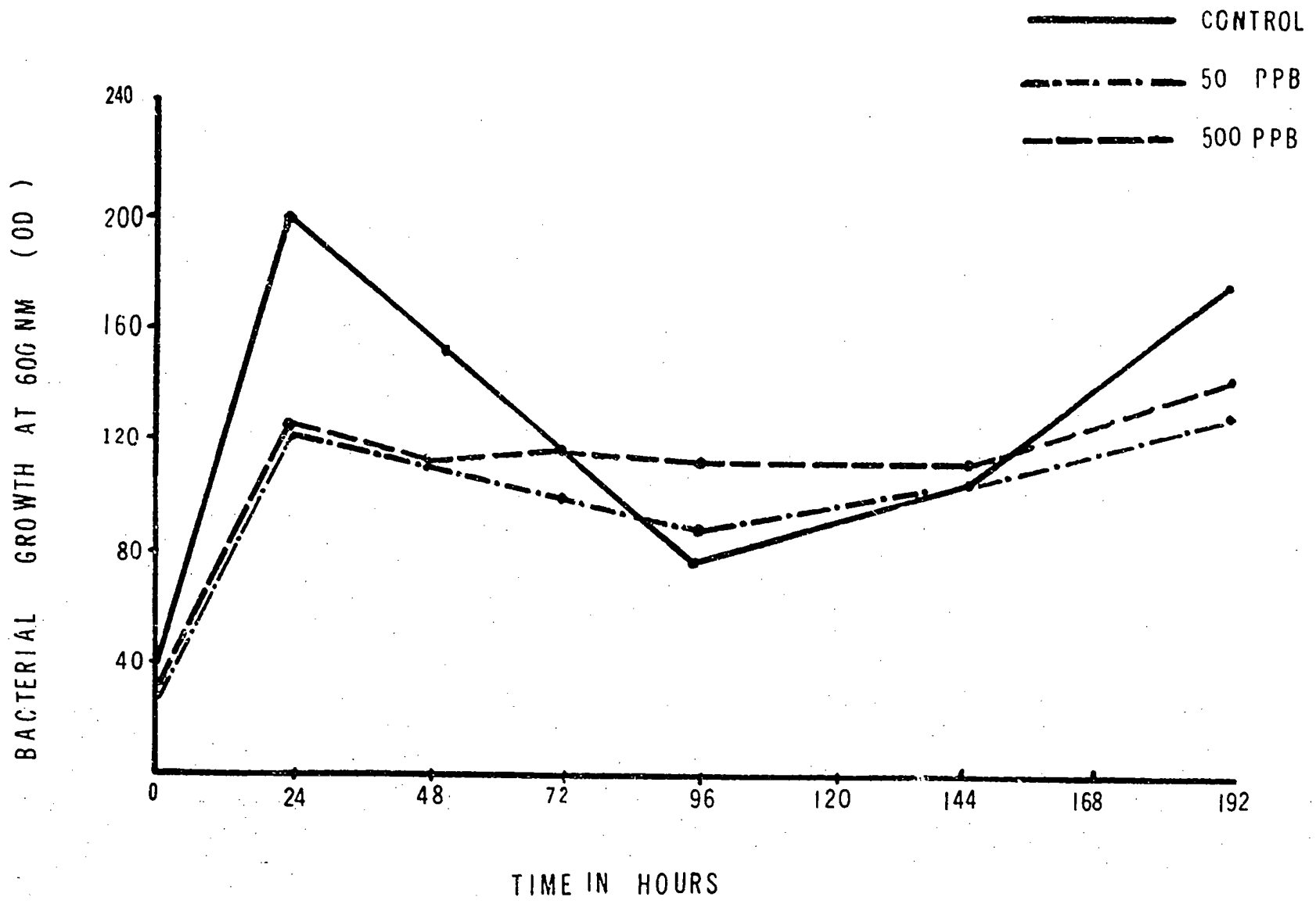


Fig. 8. Growth of Escherichia freundii in various concentrations of ammonium perchlorate.

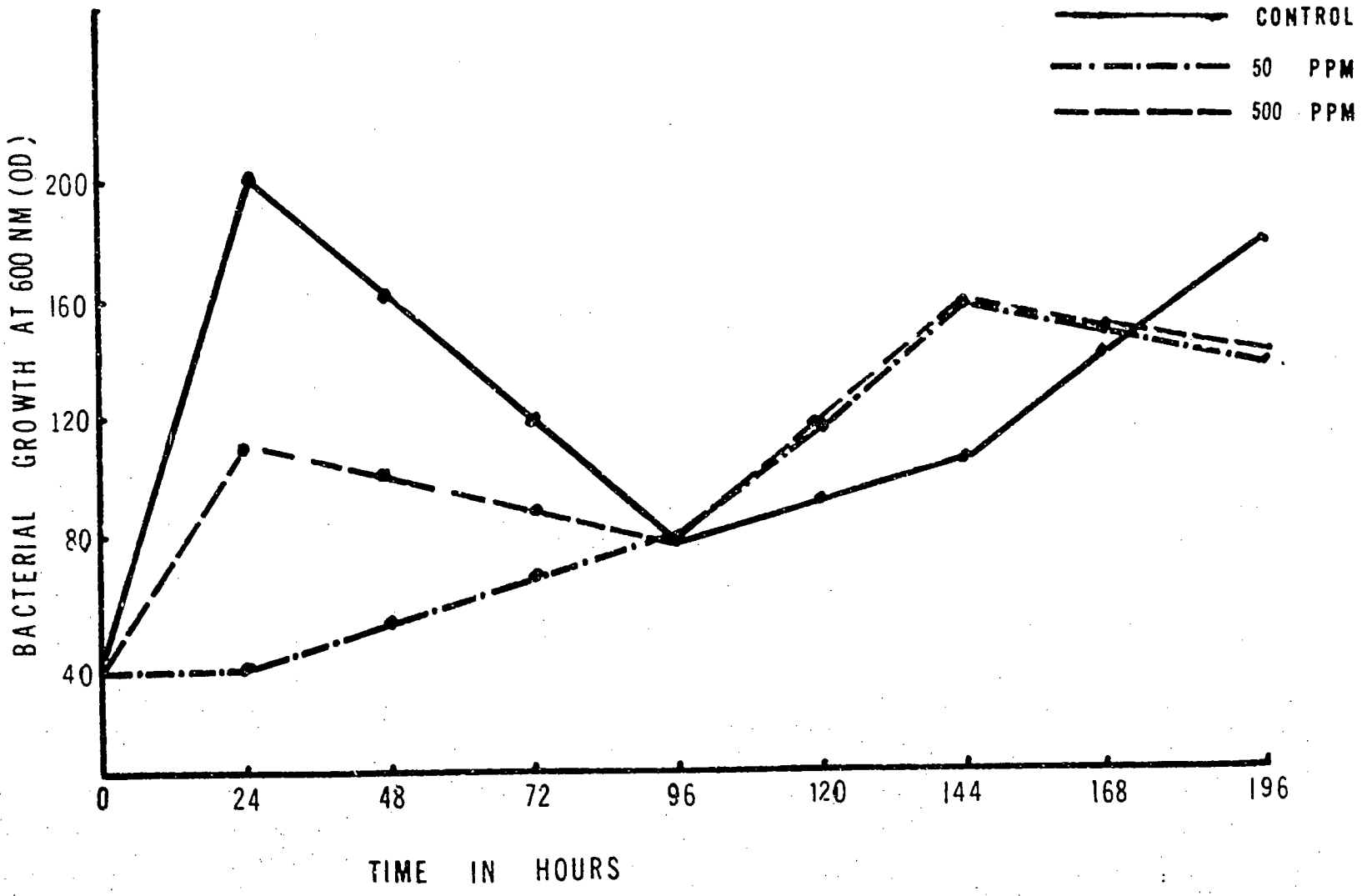


Fig. 9. Growth of Escherichia freundii in various concentrations of ammonium perchlorate.

Bacillus proteus:

Table 8---Growth of Bacillus proteus upto 192 hours, measured at 600 nm (X 10) on Spectronic-20.

No. of hours	Control	50 ppb	500 ppb	50 ppm	500 ppm
0.00	0.5	1.4	0.8	1.9	0.8
24.0	8.4	7.6	1.1	7.7	7.8
48.0	5.8	10.2	5.6	9.5	9.2
96.0	0.6	15.4	14.6	13.1	16.0
120.0	7.6	16.4	17.3	16.6	16.0
144.0	14.6	17.3	19.9	20.0	20.0
168.0	13.1	13.4	14.6	15.3	15.0
192.0	11.6	9.5	9.3	10.5	10.0

Conclusions: (Fig. 10, 11, Table 8)

1. In control group, the growth declined very much at 96 hours and then reached its maximum at 144 hours.
2. No such reduction in growth was noticed in 50 and 500 ppm; there was a consistent increase in bacterial growth upto 144 hours reaching its full saturation, which was greater than control.
3. Similarly much better growth occurred in 50 and 500 ppb treatments upto 144 hours.
4. No significant difference in growth of treated and control bacteria was observed at the end of testing period (192 hours).

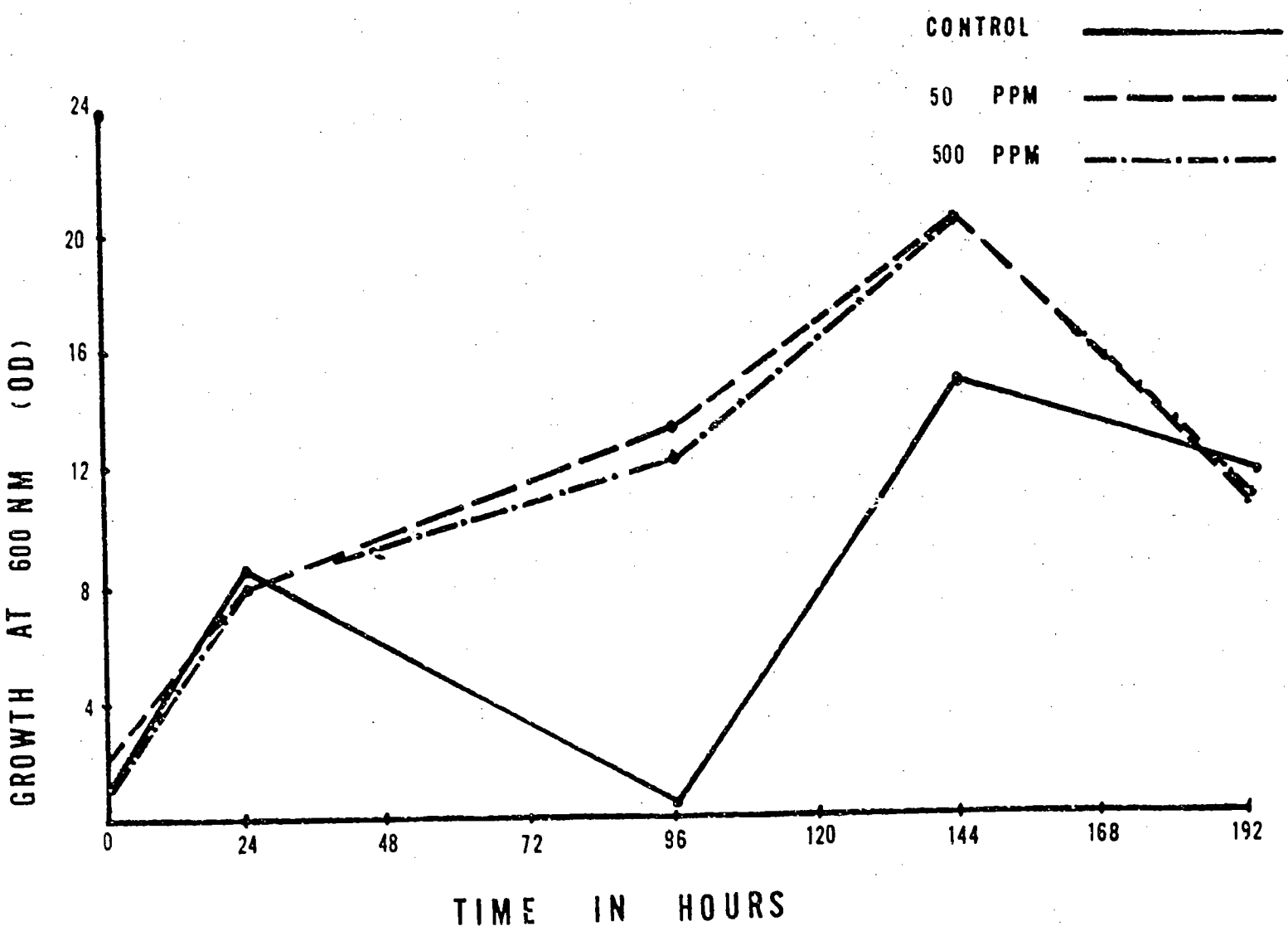


Fig. 11. Growth of Bacillus proteus in various concentrations of ammonium perchlorate.

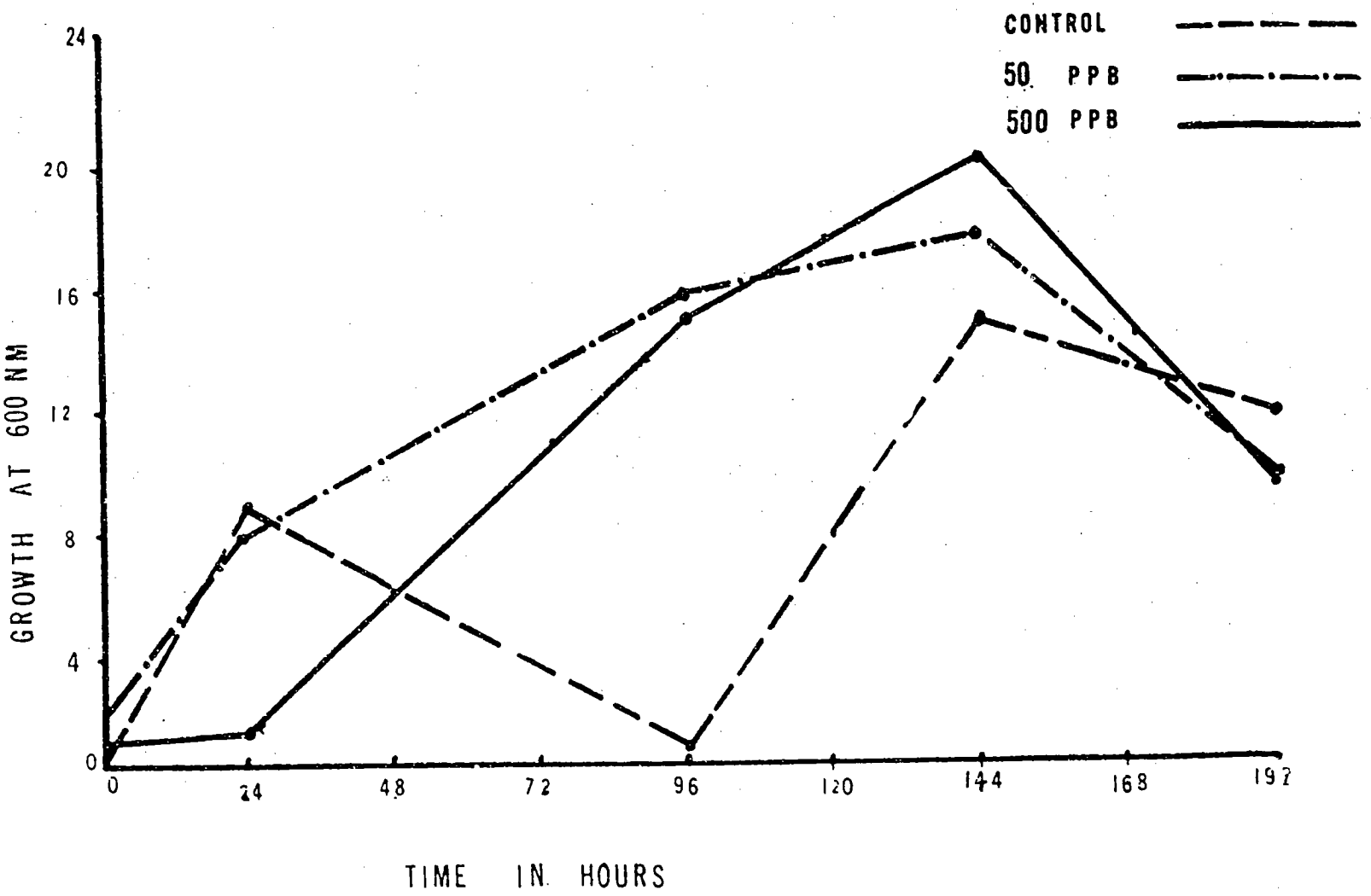


Fig. 10. Growth of Bacillus proteus in various concentrations of ammonium perchlorate.

5. In all the concentrations of ammonium perchlorate, growth of Bacillus proteus was better than control. This showed that this compound is non-toxic to B. proteus even in very high concentrations; and in addition somehow is responsible for better growth of these micro-organisms.

Azotobacter chroococcum: (Fig. 12, 13, Table 9)

Due to the fact that this species is one of the nitrogen-fixing bacteria, it prompted us to study in details. In natural environment these organisms fix atmospheric nitrogen, however, nitrates have been found to be lethal in higher concentrations for the growth of Azotobacter. Interesting results were obtained for these bacteria:

Table 9---Growth of Azotobacter chroococcum upto 192 hours in ammonium perchlorate (1 ppb-100ppm), measured on spectronic-20, at 600 nm. (OD X 10)

Number of Hours	Conc. of NH_4ClO_4 Control	1ppb	10ppb	100ppb	1ppm	10ppm	100ppm
0	0.655	0.458	0.809	1.135	1.135	0.915	0.862
24	1.135	0.969	1.249	1.457	1.487	1.177	1.549
48	1.805	1.534	2.093	2.182	2.024	**1.549**	1.549
72	2.076	2.024	2.460	2.347	2.460	2.129	1.956
96	2.596	2.596	2.819	2.164	2.518	2.460	2.076
192	3.690	4.690	5.380	4.850	3.770	3.670	2.950

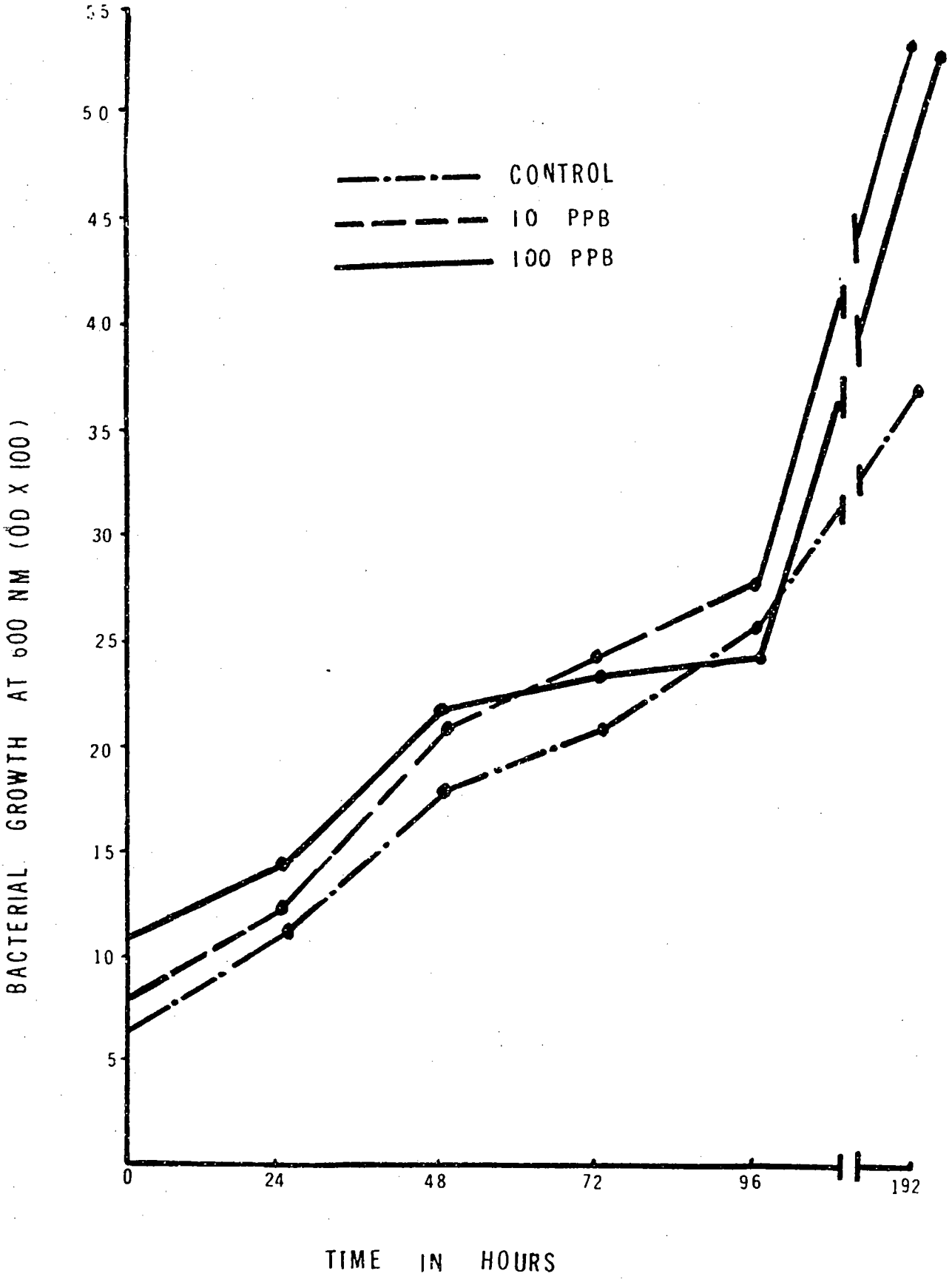


Fig. 12. Growth of Azotobacter chroococcum in various concentrations of ammonium perchlorate.

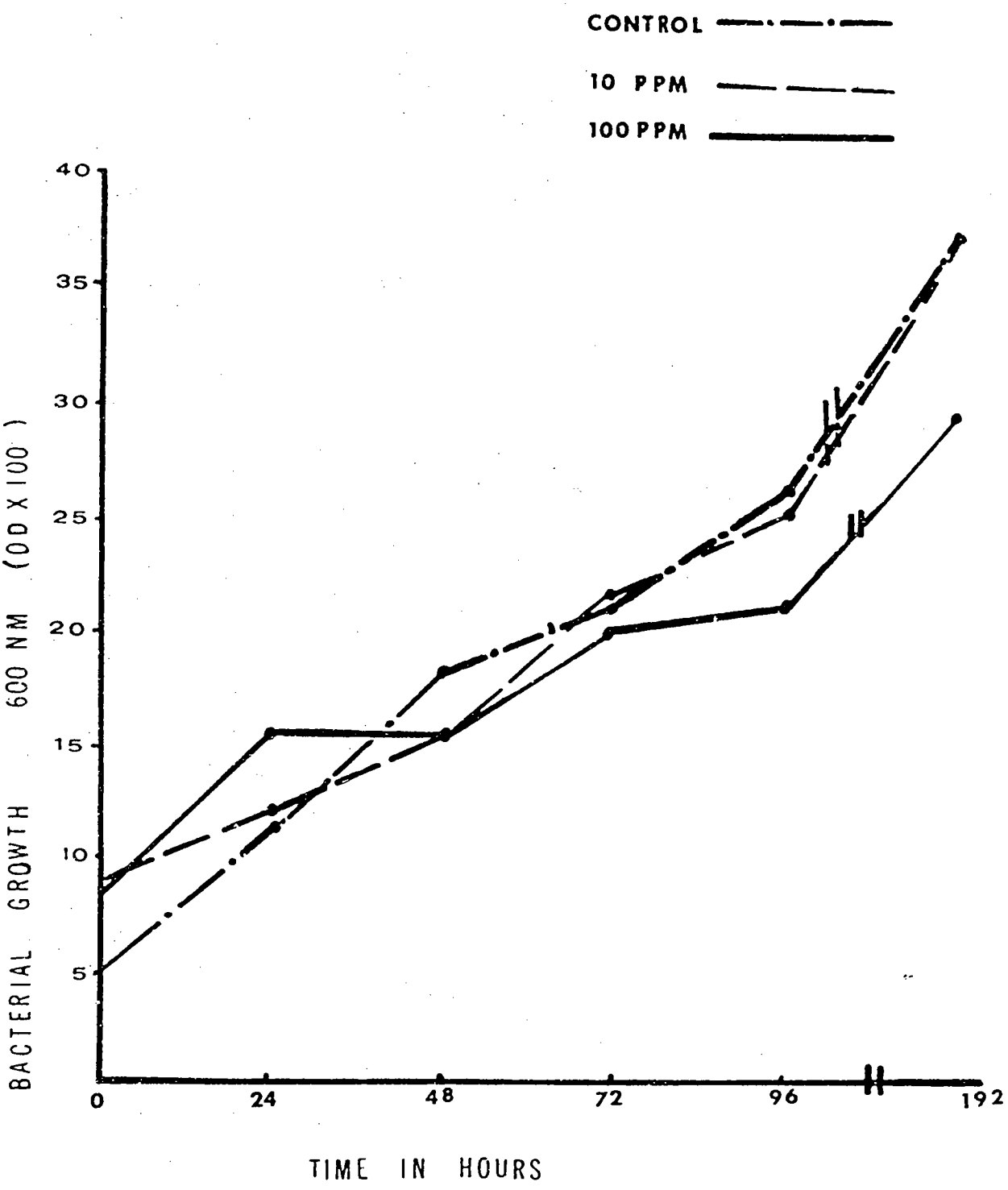


Fig. 13. Growth of Azotobacter chroococcum in various concentration of ammonium perchlorate.

Conclusions: (Table 9, Figures 12, 13)

1. In all the concentrations of ammonium perchlorate (1 ppb to 100 ppm range) growth of Azotobacter increased in direct proportion to time of incubation.
2. Growth of these bacteria reached the highest in 10 ppb, and was also better than control in 1 ppb.
3. In 10 ppm concentration, bacterial growth was very similar to control during the entire period of growth (192 hours).
4. Growth inhibition decidedly took place in 100 ppm, since there was a marked decline in the curve.

LONG-TERM EFFECTS OF AMMONIUM PERCHLORATE ON SOIL CHEMISTRY

A field experiment was set-up at N.ST.L., Bay St. Louis, Mississippi, where a 50^2 meter plot of land was cleared with the help of a tractor. Sixtyfour 1^2 meter plots were marked with wooden pegs, and a buffer zone between each plot (1/2 meter X 1 meter) was maintained. The 64 plots were further divided into 4 groups, each one consisting of 16 one-meter^2 plots. Fortyeight of these plots were treated with 0.5, 5.5 and 55.0 g ammonium perchlorate homogeneously mixed with surface soil. The rest 16 plots were kept as control. The plots were based on Completely Randomized Block Design.

Soil samples were removed with an auger and sent for analyses to Mississippi State Chemical Laboratory, Mississippi State, Mississippi. Total nitrogen and chloride contents

of soil were determined. Soluble chlorides were determined by Bolhard Method of Titration and total nitrogen as described in: "The Method of Analysis for the Association of Analytical Chemistry, AOAC Procedure 2.052".

In the final report of 1975, we have given results of pH analyses of soil taken after 2 months, which did not differ from each other statistically. Similarly, there was no significant difference in nitrogen and chloride contents of soil after 4 months. However, only chloride contents of soil were significantly higher in the first and second month samples. In Table 10 results of soil analyses performed after 4 months are given and Table 10 is a summary of results obtained by Analysis of Variance for the comparison of means.

Table 10--Total nitrogen (%) and Chloride contents of soil (ppm) in samples taken after 4 months of initial treatment.

NH_4ClO_4 g/m^2	12 MONTHS		16 MONTHS		22 MONTHS	
	TKN (ppm)*	Cl^-(ppm)**	TKN (ppm)*	Cl^-(ppm)**	TKN (ppm)*	Cl^-(ppm)**
0.00	630	12.0	400	40.0	300	43.0
0.00	630	12.0	300	55.0	250	29.8
0.55	630	20.0	400	55.0	400	46.2
0.55	630	24.0	300	95.0	300	66.0

5.5	700	18.0	300	80.0	400	43.0
5.5	700	20.0	300	50.0	400	50.0
55.0	560	16.0	400	35.0	250	59.4
55.0	665	16.0	300	40.0	400	33.0

*Calculated from chloride determination
**TKN=Total kjeldahl nitrogen

Table 11---Results of Analyses of variance obtained for chloride contnents of soil measured at different intervals.

No. of months	Source of variation	Degrees of freedom	Sum of squares	Mean square	F value
12	Treatments	3	9.5	3.17	0.12
	Error	4	110.0	27.50	
	Total	7	119.5		
	Table value F 0.95 (3,4) = 6.59				
16	Treatments	3	1712.5	570.83	1.66
	Error	4	1375.0	345.75	
	Total	7	3087.5		
	Table value F 0.95 (3,4) = 6.59				
22	Treatments	3	380.5	126.83	0.78
	Error	4	647.0	161.75	
	Total	7	1027.5		
	Table value F 0.95 (3,4) = 6.59				

Conclusions: (tables 10 and 11)

1. No statistically significant difference was obtained in chloride contents of soil, which was analyzed after 12, 16 and 22 months of the initial treatment.
2. Statistical analysis for nitrogen data was not done, however, the results are explicitly clear. No change in nitrogen contents of soil occurred any time after the initial treatment with ammonium perchlorate.
3. Soil pH was determined for all samples including the last taken (after 22 months), which revealed no significant difference.
4. Supporting data confirm our statement that the soil chemistry is not affected by the treatment of ammonium perchlorate.
5. Plant germination and growth experiments have shown that the toxicity of ammonium perchlorate is still persistent only in the highest treatment level (55 g active ingredient per square meter of soil). However, there is insignificant effect of this compound in lower treatment levels, i.e., 5.5 and 0.55 g/m^2.
6. Contrary to plant growth, microorganisms were unaffected even in the highest concentration of ammonium perchlorate. In most cases, their growth increased in treated cultures, presumably because ammonium perchlorate provided additional growth factors.

BIOGAS PRODUCTION

Alligator weeds, Alternanthera philoxirides were collected from a cooling pond located at Crosby Chemical Company, Picayune, Mississippi. They were transported to the laboratory in large plastic bags with nominal amount of water. The plants were chopped in ½ inch lengths, and 1000 g of this material was placed in several narrow-mouth bottles (10 liter capacity). The bottles were sealed with two-hole stoppers; one outlet was fitted with a rubber septum for easy accessibility in taking gas sample for chromatographic analyses. The other outlet was connected to another sealed bottle with a tflon tubing. This bottle contained water and 5 ml of saturated Phenol Red indicator. The displacement of water in the second bottle provided convenient method of monitoring the volume of gas produced.

To assess the effect of reducing agents as well as ammonium perchlorate, several treatments were made. Two weeks after the active formation of gas, samples were analyzed by Fisher Hamilton Gas Partitioner, at N.S.T.L. Environment Lab., Bay St. Louis, Mississippi.

The following particulars apply to the gas-analyzer at the time of sample analyses: Pyrex column 6' X 4', packing material: 30/60 Type 13 X molecular sieves; column temperature: 30°C; injector and detector temperature: 100°C; range-10^{-11}; attenuation: 512; carrier gas: nitrogen; flow rate: 40 ml/min.

recorder scale: 1 ma; sample size: 6 µl.

Table 12--Methane-gas production by alligator weeds, treated with various ingredients.

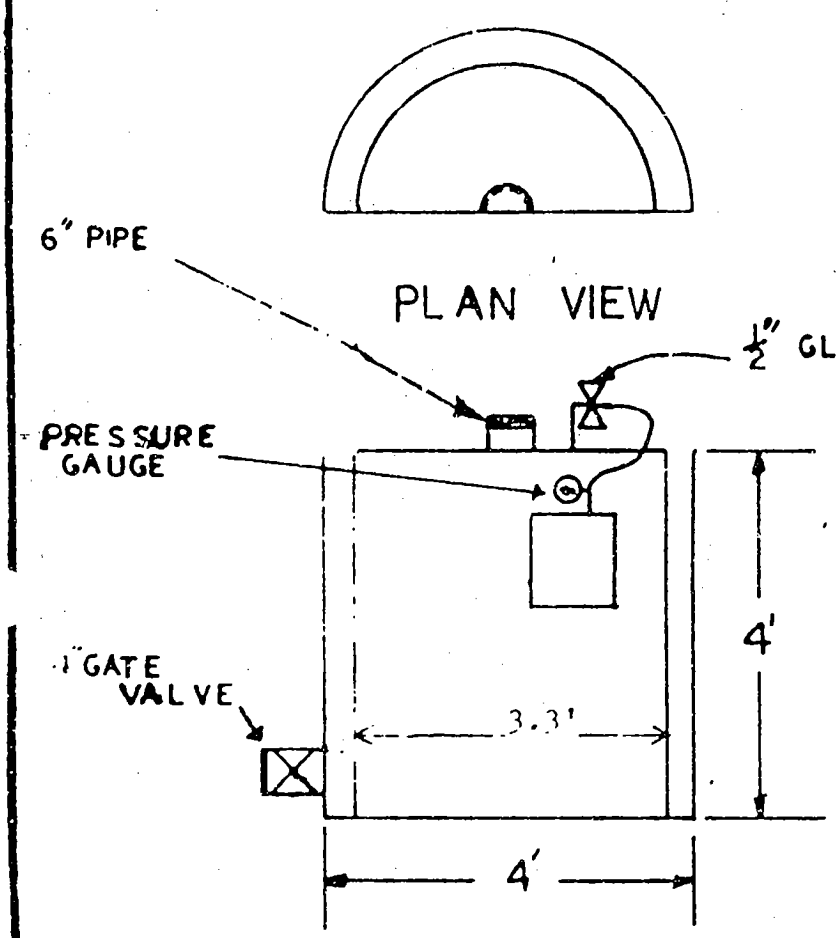
Treatment No. & Description	Initial Date	Volume displacement (ml)	%Methane	Date sample analyzed
1. Control	7/10/75	1,950	75.0	9/2/75
2. Control	"	2,100	62.3	8/18/75
3. Control	"	no change	86.0	8/27/75
4.0.15% NH_4ClO_4	"	"	2.1	-
5. 0.05% "	"	very little	10.5	8/18/75
6. 0.005% "	"	"	0.0	"
7. 40% chick manure	"	1,000	40.4	"
8. 20% chick manure	"	19,00	69.3	"
9. 20% chick manure	"	little change	52.0	"
10. 30% rumen content	"	no change	15.0	"

Conclusions:

1. No conclusive results were obtained from the above mentioned data which may be due to the following:

   A. Facilities for analyses of gas were not available at the University campus. Bottles containing the fermenting material were transported more than 200 miles for analyses, which may have resulted in gas leakage or intro-duction of air, in presumably air-tight bottles whose stoppers were thoroughly sealed with a rubber glue.

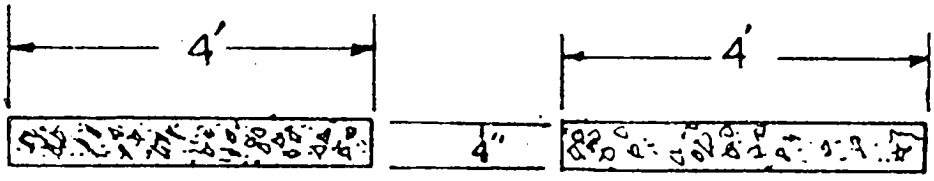
   B. It is inexplicable why one experimental set-up yields a large amount of gas while the other, although identically similar fails to do so (Pers. comm. with Dr. Paul Smith, Chairman, Department of Microbiology, University of Florida, Gainesville, Florida). This may be due to the fact that



NOTE

TANK CONSTRUCTED FROM 20 GA. BLACK IRON STEEL RESTING ON A 4" CONCRETE SLAB.

UNIT WT. APPOX. 315 LBS



ELEV VIEW SIDE ELEV

PREPARED FOR ALCORN STATE UNIVERSITY	2 TANKS	DRAWN BY J C WASHINGTON
DESIGNED BY R L BUTLER	SCALE ½"=1'-0"	DATE 1/10/75

FIGURE 14. CONSTRUCTION DESIGN OF BTU GAS TANKS

methanogenic bacteria are highly sensitive to presence of oxygen.

2. Replications on a large scale are needed to obtain meaningful data from these experiments.

Addendum to Methodology

A bio-gas digester was constructed as described in Figure 14. It also did not produce any methane, probably because of air-leakage in the system.

_A_C_K_N_O_W_L_E_D_G_M_E_N_T_S_

The authors are sincerely indebted to Dr. Norris A. Edney, Director, Division of Arts & Sciences & Graduate Studies, for his constant inspiration during the entire period of our work. We also wish to thank Dr. Paul Smith, Chairman, Department of Microbiology, University of Florida, Gainesville, Florida, for his expert advice concerning anaerobic fermentation of alligator weeds and culturing techniques of methanogenic bacteria. Last but not least, we are sincerely appreciative to Mr. William Wolverton, N.S.T.L. Bay St. Louis, Mississippi, for providing us facilities to conduct field experiment at the NASA site and analyses of methane. Above all, he has been our greatest advisor in all matters pertaining to this research project.

We are extremely grateful to NASA authorities for providing this research grant, which enabled us and our students to learn about ammonium perchlorate and its long-term effects on the environment.

ATTACHMENT 20

LOU ITEM 59

STORM SEWER SYESTEM

KERR-McGEE CHEMICAL CORPORATION
POST OFFICE BOX 55 • HENDERSON, NEVADA 89009

July 23, 1996

Ms. Shannon R. Bell
State of Nevada
Division of Environmental Protection
Bureau of Water Permits & Compliance
333 W. Nye Lane
Carson City, Nevada 89710

Dear Ms. Bell:

SUBJECT: Second Quarter 1996 Discharge Monitoring Report (DMR)
Henderson Facility - NPDES #NV0000078

This report is required by and prepared specifically for the State of Nevada DEP. It presents the observed results of measurements required to be performed by the State of Nevada DEP. It is not intended as an assertion of the accuracy of any instrument, readings, or analytical results, nor is it an endorsement of the suitability of any analytical measurement procedure.

The attached Discharge Monitoring Reports (DMR's) (Attachment 1) reflect discharge from the Kerr-McGee Chemical Corporation (KMCC) Henderson facility as monitored by NPDES equipment. KMCC monitored no (0) storm events and two (2) stabilized water flows. One (1) stabilized water flow discharged through Outfall 001 and one (1) through Outfall 002, both continuing through the month. The stabilized water flow through Outfall 001 was attributed to small intermittent water leaks. A small stabilized water leak on the east side of the plant has resulted in a small but continual discharge from Outfall 002. No discharge exceeded permit limitations.

The KMCC Henderson facility ponds were inspected in the second quarter 1996. All single lined ponds have been removed from service. Double-lined AP-4 pond was repaired during the second quarter. Evaluation of the leak detection system between the top and bottom liner indicates that the top liner is now intact. AP-4 pond has been returned to service. Minor damage to the top liner of double-lined AP-6 pond was discovered during early 1996. Pond liquor was transferred out of AP-6 during the second quarter in preparation for repair. AP-6 pond liquor will continue to be transferred until repair of the top liner can be accomplished. P-2 pond was decommissioned during the second quarter. The P-2 pond liquor was returned to the sodium chlorate process. The P-2 pond solids were removed to

USPCI, Utah. The pond was replaced by two tanks located near the sodium chlorate process. Inspection of all other double lined ponds indicates no leakage from these ponds.

Should you have any questions concerning this report, please contact Susan M. Crowley at (702) 651-2234.

Sincerely,

Patrick S. Corbett
Plant Manager

Attachment

cc: SMCrowley
PBDizikes
RANapier
MJPorterfield
Mr. Carey Houk (W-5-3)/U.S. EPA Region

C:\WPDOCS\SMC\962NDHDN.WPD

ATTACHMENT 1

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-19)
NV0000078	001 A
PERMIT NUMBER	DISCHARGE NUMBER

DISCHARGE 001
Form Approved. 12345
E - FINAL
OMB No. 2040-0004
MACCR
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	04	01	TO	96	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE | | ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (38-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-53) QUALITY OR CONCENTRATION (54-61) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (70-71)
TEMPERATURE, WATER DEG. CENTIGRADE 00010 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	14.4	16.7	(04)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	33 30DA AVG	37 DAILY MX	DEG.C		CONTINUOUS	RECORDR
PH 00400 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.1	******	7.7	(12)	0		
	PERMIT REQUIREMENT	******	******	**** ****	6.5 MINIMUM	******	9.0 MAXIMUM	SU		CNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	<0.01	0.02	(03)	******	******	******		0		
	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTINUOUS	RECORDR
SOLIDS, TOTAL DISSOLVED 70295 > 0 0 INCREASE (NOT END OF PIPE)	SAMPLE MEASUREMENT	2.2	11.1	(26)	******	77	144	(19)	0		
	PERMIT REQUIREMENT	1000 30DA AVG	REPORT DAILY MX	LBS/DY	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 0 0 0 INTAKE	SAMPLE MEASUREMENT	******	******		******	666	700	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	740	772	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P. S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and a maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
AREA CODE	NUMBER	YEAR	MO	DAY
702	651-2200	96	07	25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name Location if different)
NAME ALPHA-AGGEG CHEMICAL CORP
ADDRESS P.O. BOX 55
MANCHESTER NY 14504
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NY0000078 PERMIT NUMBER
(17-19) 001 S DISCHARGE NUMBER

001 STORMWATER MONITORING
Form Approved. 12345
E - FINAL OMB No. 2040-0004
MAJOR Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	04	01	TO	90	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (70-71)
PH	SAMPLE MEASUREMENT	*******	*******			*******		(12)			
00400 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	REPORT MINIMUM	*******	REPORT MAXIMUM	SU		CNCE/ DISCHG	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00530 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	GRAB
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00610 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	GRAB
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00630 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	GRAB
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00665 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00552 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	*******	*******	*******				
50050 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	*******	*******	*******	**** ****		CONTIN UOUS	RECORDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
P.S. CORBETT PLANT MANAGER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	702	651-2200	96	07	25
TYPED OR PRINTED		AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
RAILROAD NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER
(17-19) 001 E DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	04	01	TO	90	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

001 EFFLUENT MONITORING
E - FINAL
Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94
*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	MAXIMUM (54-61)	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	NO. EX (62)	FREQUENCY OF ANALYSIS (63-68)	SAMPLE TYPE (69-70)
SOLIDS, TOTAL DISSOLVED 70295 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*******	******		*******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
CHEMICAL OXYGEN DEMAND (COD) 00017 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		*******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702, NUMBER 651-2200

DATE: YEAR 96, MO 07, DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER
(17-19) 002 A DISCHARGE NUMBER

DISCHARGE 002
F - FINAL
MACCA

Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	04	01	TO	96	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE | | ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. CENTIGRADE	SAMPLE MEASUREMENT	******	******		******	15.0	16.1	(04)	0		
00010 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	33 30DA AVG	37 DAILY MX	DEG.C		CONTIN UOUS	RCORDR
PH	SAMPLE MEASUREMENT	******	******		7.6	******	8.0	(12)	0		
00400 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	6.5 MINIMUM	******	9.0 MAXIMUM	SU		CNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	<0.01	<0.01	(03)	******	******	******		0		
50050 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTIN UOUS	RCORDR
SOLIDS, TOTAL DISSOLVED 70295 > C 0 INCREASE (NOT AND OR TYPE)	SAMPLE MEASUREMENT	1.2	3.6	(26)	******	152	101	(19)	0		
	PERMIT REQUIREMENT	1000 30DA AVG	REPORT DAILY MX	LBS/DY	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 C C 0 ANNUAL	SAMPLE MEASUREMENT	******	******		******	639	665	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	715	740	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319 (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 NUMBER 651-2200

DATE: YEAR 96 MO 07 DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-19)
NV0000078	002 B
PERMIT NUMBER	DISCHARGE NUMBER

002 STORMWATER MONITORING
Form Approved. 12345
F - FINAL
MAGCA
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	95	04	01	TO	96	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE (54-61)	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (70-71)
PH	SAMPLE MEASUREMENT	*******	*******			*******		(12)			
00400 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	***** *****	REPORT MINIMUM	*******	REPORT MAXIMUM	SU		ONCE/ DISCHG	DISCRT
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00530 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00610 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00630 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00665 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
OIL AND GREASE	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
03582 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	*******	*******	*******				
50050 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	*******	*******	*******	***** *****		CONTIN UOUS	RCRDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE			DATE		
P.S. CORBETT PLANT MANAGER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10000 and or maximum imprisonment of between 6 months and 5 years.)	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	702	651-2200	96	07	25
TYPED OR PRINTED		AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (*Include Facility Name/Location if different*)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (*NPDES*)
DISCHARGE MONITORING REPORT (*DMR*)

(2-16) NV0000078 PERMIT NUMBER
(17-19) 002 E DISCHARGE NUMBER

002 STORMWATER MONITORING
F - FINAL
RADCH

Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	04	01	TO	96	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
SOLIDS, TOTAL DISSOLVED 70295 1 C C EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
CHEMICAL OXYGEN DEMAND (COD) 81017 1 C C EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319 (*Penalties under these statutes may include fines up to $10000 and/or maximum imprisonment of between 6 months and 5 years.*)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (*Reference all attachments here*)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER
(17-19) 003 B DISCHARGE NUMBER

MONITORING PERIOD
FROM YEAR 96 MO 04 DAY 01 (20-21) (22-23) (24-25)
TO YEAR 96 MO 04 DAY 30 (26-27) (28-29) (30-31)

003 STORMWATER MONITORING
Form Approved. 12345
F - FINAL
MAJOR
OMB No. 2040-0004
Approval expires 10-31-94

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	QUANTITY OR LOADING (54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	QUALITY OR CONCENTRATION (46-53) AVERAGE	QUALITY OR CONCENTRATION (54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
PH	SAMPLE MEASUREMENT	*******	*******			*******		(12)			
00400 1 C 0	PERMIT REQUIREMENT	*******	*******	***** *****	REPORT MINIMUM	*******	REPORT MAXIMUM	SU		CNCE/ DISCHG	DISCRT
SULFATE, TOTAL (AS SO4)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00945 1 C 0	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
01055 1 C 0	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
70295 1 C 0	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 NUMBER 651-2200
DATE: YEAR 96 MO 07 DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME MARS-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
DESLARSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-10) PERMIT NUMBER	(11-19) DISCHARGE NUMBER
NV0000078	001 A

DISCHARGE 001
Form Approved. 12345
P - FINAL OMB No. 2040-0004
CAUSA Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	05	01	TO	96	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE | | ***
NOTE: Read instructions before completing this form.

PARAMETER (25-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	MAXIMUM (54-61)	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	NO. EX (62)	FREQUENCY OF ANALYSIS (63-69)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. CENTIGRADE 00010 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	16.7	18.9	(04)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	33 30DA AVG	37 DAILY MX	DEG.C		CONTINUOUS	RCORDR
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		8.0	******	8.1	(12)	0		
	PERMIT REQUIREMENT	******	******	**** ****	6.5 MINIMUM	******	9.0 MAXIMUM	SU		CNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.30	5.1	(03)	******	******	******		0		
	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTINUOUS	RCORDR
SOLIDS, TOTAL DISSOLVED 70295 > 0 0 0 INCREASE (NOT END OF PIPE)	SAMPLE MEASUREMENT	577	5278	(26)	******	978	3075	(19)	0		
	PERMIT REQUIREMENT	1000 30DA AVG	REPORT DAILY MX	LBS/DY	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 0 0 0 INLAKE	SAMPLE MEASUREMENT	******	******		******	689	745	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	1225	3511	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME ATLANTIC RICHFIELD CHEMICAL CORP

ADDRESS P.O. BOX 55

HENDERSON NV 89015

FACILITY

LOCATION

ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER

(17-19) 001 3 DISCHARGE NUMBER

001 STORMWATER MONITORING

Form Approved. 12345

OMB No. 2040-0004

Approval expires 10-31-94

T - FINAL

MAJOR

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	05	01	TO	90	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (70-71)
FLOW	SAMPLE MEASUREMENT	******	******			******		(12)			
50050 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	REPORT MINIMUM	******	REPORT MAXIMUM	SU		ONCE/ DISCHG	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	******		******			(19)			
00530 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	******	******		******			(19)			
00610 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N)	SAMPLE MEASUREMENT	******	******		******			(19)			
00630 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	******	******		******			(19)			
00665 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	******	******		******			(19)			
00552 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	******	******	******				
50050 1 C 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTIN UOUS	RECORDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

P.S. CORBETT

PLANT MANAGER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702, NUMBER 651-2200

DATE: YEAR 96, MO 07, DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME ALPHA-ACCESS CHEMICAL CORP

ADDRESS P.O. BOX 55

HENDERSON NV 89015

FACILITY

LOCATION

ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER

(17-19) 001 E DISCHARGE NUMBER

001 STORMWATER MONITORING

Form Approved. 12345

E - FINAL

MAJOR

OMB No. 2040-0004

Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	05	01	TO	96	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (38-53) AVERAGE	MAXIMUM (54-61)	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (69-70)
SOLIDS, TOTAL DISSOLVED 70295 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
CHEMICAL OXYGEN DEMAND (COD) 81017 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

P.S. CORBETT
PLANT MANAGER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE

AREA CODE 702 NUMBER 651-2200

DATE

YEAR	MO	DAY
96	07	25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (*Include Facility Name/Location if different*)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (*NPDES*)
DISCHARGE MONITORING REPORT (*DMR*)

(2-16) NV0000078 PERMIT NUMBER

(17-19) 002 A DISCHARGE NUMBER

DISCHARGE 002

F - FINAL

MAGCA

Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	05	01	TO	96	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE | | ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. CENTIGRADE 00010 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	19.4	31.1	(04)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	33 30DA AVG	37 DAILY MX	DEG.C		CONTIN UOUS	RCORDR
PH 00400 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		6.7	******	7.0	(12)	0		
	PERMIT REQUIREMENT	******	******	**** ****	6.5 MINIMUM	******	9.0 MAXIMUM	SU		NCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.01	0.19	(03)	******	******	******		0		
	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTIN UOUS	RCORDR
SOLIDS, TOTAL DISSOLVED 70295 > C 0 INCREASE (NET END OF PIPE)	SAMPLE MEASUREMENT	331	1341	(26)	******	4637	7885	(19)	0		
	PERMIT REQUIREMENT	1000 30DA AVG	REPORT DAILY MX	LBS/DY	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		NCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 0 C 0 INTAKE	SAMPLE MEASUREMENT	******	******		******	689	745	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		NCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	5338	8630	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		NCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

P.S. CORBETT
PLANT MANAGER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (*Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.*)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (*Reference all attachments here*)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: NV0000078
(17-19) DISCHARGE NUMBER: 002 B

MONITORING PERIOD
FROM YEAR 96 MO 05 DAY 01 (20-21) (22-23) (24-25)
TO YEAR 96 MO 05 DAY 31 (26-27) (28-29) (30-31)

002 STORMWATER MONITORING
Form Approved. 12345
F - FINAL
MAJOR
OMB No. 2040-0004
Approval expires 10-31-94

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (69-70)
pH	SAMPLE MEASUREMENT	******	******			******		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	REPORT MINIMUM	******	REPORT MAXIMUM	SU		ONCE/ DISCHG	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	******		******			(19)			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	******	******		******			(19)			
00610 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N)	SAMPLE MEASUREMENT	******	******		******			(19)			
00630 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	******	******		******			(19)			
00665 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
OIL AND GREASE	SAMPLE MEASUREMENT	******	******		******			(19)			
03582 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	******	******	******				
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTINUOUS	RECORDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P. S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME, ADDRESS (Include Facility Name/Location if different)
NAME Kerr-McGee Chemical Corp
ADDRESS P.O. Box 55
Henderson NV 89015
FACILITY
LOCATION
ATTN: Patrick S. Corbett

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NV0000078	002 B

002 STORMWATER MONITORING
P - FINAL
MAJOR

Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR (20-21)	MO (22-23)	DAY (24-25)		YEAR (26-27)	MO (28-29)	DAY (30-31)
FROM	96	05	01	TO	96	05	31

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
SOLIDS, TOTAL DISSOLVED 70295 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
CHEMICAL OXYGEN DEMAND (COD) 81017 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P. S. Corbett
Plant Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (*Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.*)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (*Reference all attachments here*)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: NV0000078
(17-19) DISCHARGE NUMBER: 003 B

003 STORMWATER MONITORING
F - FINAL
MAJOR

Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	05	01	TO	96	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
pH	SAMPLE MEASUREMENT	******	******			******		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	REPORT MINIMUM	******	REPORT MAXIMUM	SU		CNCE/ DISCHG	DISCRT
SULFATE, TOTAL (AS SO4)	SAMPLE MEASUREMENT	******	******		******			(19)			
00945 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	******	******		******			(19)			
01055 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED	SAMPLE MEASUREMENT	******	******		******			(19)			
70295 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
MINERAL
AV 86023
FACILITY
LOCATION
NAME: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) AV0000678 PERMIT NUMBER
(17-19) 001 A DISCHARGE NUMBER

DISCHARGE 001
Form Approved. 12345
F - FINAL
MGCa
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	95	06	01	TO	95	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE | | ***
NOTE: Read instructions before completing this form.

PARAMETER (1-15)		(3 Card Only) QUANTITY OR LOADING (16-37) AVERAGE	MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SAMPLE TYPE (70-71)
TEMPERATURE, WATER DEG. CENTIGRADE 00010 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*******	*******		*******	18.3	20.6	(4)	0		
	PERMIT REQUIREMENT	*******	*******	**** ****	*******	33 30DA AVG	37 DAILY MX	DEG.C		CONTIN UOUS	RCORDR
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*******	*******		8.2	*******	8.4	(12)	0		
	PERMIT REQUIREMENT	*******	*******	**** ****	6.5 MINIMUM	*******	9.0 MAXIMUM	SU		LNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.11	0.86	(03)	*******	*******	*******		0		
	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	*******	*******	*******	**** ****		CONTIN UOUS	RCORDR
SOLIDS, TOTAL DISSOLVED 70295 > 0 0 INCREASE (NET ANY CA TYPE)	SAMPLE MEASUREMENT	900	6226	(26)	*******	1084	1220	(19)	0		
	PERMIT REQUIREMENT	1000 30DA AVG	REPORT DAILY MX	LBS/D	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		LNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 0 0 0 INTAKE	SAMPLE MEASUREMENT	*******	*******		*******	685	687	(19)	0		
	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		LNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*******	*******		*******	1768	1907	(19)	0		
	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		LNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P. S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 702 | NUMBER 651-2200
DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name, Location if different)
NAME KERR-MCGEE CHEMICAL CORP
ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: NV0000078
(17-19) DISCHARGE NUMBER: 001 B

001 STORMWATER MONITORING
12345
F - FINAL
MAJOR

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	96	06	01	TO	96	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (36-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (65-68)	SAMPLE TYPE (69-70)
PH	SAMPLE MEASUREMENT	******	******			******		(12)			
00400 1 0 0	PERMIT REQUIREMENT	******	******	**** ****	REPORT MINIMUM	******	REPORT MAXIMUM	SU		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	******		******			(19)			
00530 1 0 0	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	******	******		******			(19)			
00610 1 0 0	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N)	SAMPLE MEASUREMENT	******	******		******			(19)			
00630 1 0 0	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	******	******		******			(19)			
00665 1 0 0	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
OIL AND GREASE	SAMPLE MEASUREMENT	******	******		******			(19)			
03582 1 0 0	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	******	******	******				
50050 1 0 0	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTIN UOUS	ACCRDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P. S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

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TELEPHONE: AREA CODE 702 | NUMBER 651-2200

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LOCATION
ATTN: PATRICK S. CORBETT

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DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER
(17-19) 001 8 DISCHARGE NUMBER

001 STORMWATER MONITORING
Form Approved. 12345
F - FINAL
MAJOR
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

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	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

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SOLIDS, TOTAL DISSOLVED 70295 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	***** *****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
CHEMICAL OXYGEN DEMAND (COD) 00617 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	***** *****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	GRAB
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
P.S. CORBETT
PLANT MANAGER
TYPED OR PRINTED

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DATE: YEAR 96 | MO 07 | DAY 25

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PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
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ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-19)
NV0000078	002 A
PERMIT NUMBER	DISCHARGE NUMBER

DISCHARGE 002
Form Approved. 12345
F - FINAL
MAJOR
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE | | ***
NOTE: Read instructions before completing this form.

PARAMETER (codes)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. CENTIGRADE 00010 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	18.3	19.4	(04)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	33 30DA AVG	37 DAILY MX	DEG.C		CONTIN UOUS	RCORDR
pH 00400 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		8.0	******	8.2	(12)	0		
	PERMIT REQUIREMENT	******	******	**** ****	6.5 MINIMUM	******	9.0 MAXIMUM	SU		CNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	<0.01	0.01	(03)	******	******	******		0		
	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	******	******	****** ****	****		CONTIN UOUS	RCORDR
SOLIDS, TOTAL DISSOLVED 70295 > C 0 INCREASE (NOT AND CAUSE)	SAMPLE MEASUREMENT	<0.5	3.7	(26)	******	30	43	(19)	0		
	PERMIT REQUIREMENT	1000 30DA AVG	REPORT DAILY MX	LBS/DY	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 C C 0 INTAKE	SAMPLE MEASUREMENT	******	******		******	685	687	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED 70295 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	714	730	(19)	0		
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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PLANT MANAGER
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TELEPHONE: AREA CODE 702 | NUMBER 651-2200

DATE: YEAR 96 | MO 07 | DAY 26

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ADDRESS P.O. BOX 55
HENDERSON NV 89015
FACILITY
LOCATION
ATTN: PATRICK S. CORBETT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NV0000078 PERMIT NUMBER

(17-19) 002 S DISCHARGE NUMBER

002 STORMWATER MONITORING

Form Approved. 12345
OMB No. 2040-0004
Approval expires 10-31-94

E - FINAL
MAJOR

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
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PH	SAMPLE MEASUREMENT	*******	*******			*******		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	REPORT MINIMUM	*******	REPORT MAXIMUM	SU		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00610 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00630 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
PHOSPHORUS, TOTAL (AS P)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00665 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
OIL AND GREASE	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00552 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT			(03)	*******	*******	*******				
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT 30DA AVG	REPORT DAILY MX	MGD	*******	*******	*******	**** ****		CONTINUOUS	ACCRDR

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

P.S. CORBETT
PLANT MANAGER

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DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: NV0000078
(17-19) DISCHARGE NUMBER: 002 S

002 STORMWATER MONITORING
12345
F - FINAL
MAJOR

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
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SOLIDS, TOTAL DISSOLVED 70295 1 C 0 EFFLUENT GROSS VALU	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
CHEMICAL OXYGEN DEMAND (COD) 00017 1 C 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******			(19)			
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		ONCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
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LOCATION
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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)
(2-16) (17-19)

NV0000078	003
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

003 STORMWATER MONITORING
Form Approved. 12345
6 - FINAL
MAJOR
OMB No. 2040-0004
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FLOW	SAMPLE MEASUREMENT	*******	*******			*******		(12)			
50050 1 C 0	PERMIT REQUIREMENT	******	******	***** *****	REPORT MINIMUM	******	REPORT MAXIMUM	SU		CNCE/ DISCHG	DISCRT
SULFATE, TOTAL (AS SO4)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
00945 1 C 0	PERMIT REQUIREMENT	*******	*******	***** *****	*******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
01055 1 C 0	PERMIT REQUIREMENT	******	******	***** *****	******	REPORT 30DA AVG	REPORT DAILY MX	UG/L		CNCE/ DISCHG	DISCRT
SOLIDS, TOTAL DISSOLVED	SAMPLE MEASUREMENT	*******	*******		*******			(19)			
70295 1 C 0	PERMIT REQUIREMENT	******	******	***** *****	******	REPORT 30DA AVG	REPORT DAILY MX	MG/L		CNCE/ DISCHG	DISCRT
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

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DATE: YEAR 96 | MO 07 | DAY 25

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

ATTACHMENT 21

LOU ITEM 63

J.B. KELLEY INC. TRUCKING SITE

CLARK COUNTY HEALTH DISTRICT
P.O. BOX 4426 • 625 SHADOW LANE • LAS VEGAS, NEVADA 89127 • 702-385-1291 • FAX 702-384-534

May 12, 1992

Jack B. Kelly, Inc.
6000 W. Lake Mead Dr.
Henderson, NV 89015

Dear Sir:

The Clark County Health District has received notification relating to the closure of an underground storage tank(s) located at BMI Complex, 8000 W. Lake Mead Dr., Henderson.

In accordance with 40 CFR Part 280.72, the required site assessment has been evaluated and determined to have been conducted satisfactorily.

Accordingly, based on the information provided by Met-Chem West, dated May 1, 1992, the Health District will not require further remediation at this time.

Should you have questions or if we can be of any assistance, please do not hesitate to contact us at (702) 383-1274.

Sincerely,

CLARK COUNTY HEALTH DISTRICT

Steve Henke, R.E.H.S., R.H.S.P.
Acting Supervisor
Environmental Health Division

SH/js

cc: Horn Environmental Consulting Group

Horn
Environmental Consulting Group, Inc.

P. O. Box 50886 • Amarillo, Texas 79159-0886 • Phone 806/358-3107 • Wats 1-800-594-0008

May 4, 1992

Mr. Steve Henke
Clark County Health District
P. O. Box 4426
Las Vegas, Nevada 89127

Re: Jack B. Kelley, Inc. Facility
BMI Complex

Dear Steve:

Enclosed please find analytical results per your request for BTEX and TPH from H-38 Monitoring Well at BMI Complex.

As you are aware, the Jack B. Kelley, Inc. tank never contained gasoline, but rather was used exclusively for truck fueling (utilizing diesel).

I hope the enclosed information will be sufficient to close out the tank removal project.

If I can answer any questions or provide additional information, please contact me at 1/800-594-0008.

Sincerely,

Marc S. Horn

MSH:nm

NOTE: I have enclosed some contaminant plume maps to better define the facility.

20410

MET-CHEM WEST
DIVISION OF MET-CHEM TESTING LABORATORIES, INC.
4875 BELL DRIVE #4 • LAS VEGAS, NEVADA 89118 • (702) 368-1082 • FAX (702) 875-6811

Jack B. Kelley, Incorporated
Route 1
Box 400
Amarillo, Texas 79159

Attn: Mr. Marc Horn

DATE: May 1, 1992
REPORT NO.: 02054
P.O. NO.: Verbal
INVOICE NO.: 3153

WORK REQUESTED:

Chemical Analysis per CFR 40, Part 136, Methods 602 and 624 for Benzene, Toluene, Ethylbenzene and Xylene (BTEX) and High Temperature Modified California Modified 8015 for Total Petroleum Hydrocarbons (TPH)

DESCRIPTION OF SAMPLE:

Two (2) samples reported to be "Well Water" and identified as:

(1) M-38 BMI Complex, Grab, Cool, 4°C, 4 Drops of HCl, 4-21-92, 1:25 PM/1:30 PM (BTEX)

(2) M-38 BMI Complex, Grab, Cool, 4°C, 4-21-92, 1:20 PM (TPH)

CHEMICAL ANALYSIS (CFR 40, PART 136, METHODS 602 AND 624/HIGH TEMPERATURE MODIFIED CALIFORNIA MODIFIED 8015)

BTXX

Parameter	Found (mg/l) Sample	Field Blank	EPA Detection Limit
Benzene	0.048	<0.009	0.009
Toluene	<0.005	<0.005	0.005
Ethyl Benzene	0.114	<0.010	0.010
Xylene	<0.020	<0.020	0.020

Date of Analysis: 4-29-92

204fw

MET-CHEM WEST
DIVISION OF MET-CHEM TESTING LABORATORIES INCORPORATED

Report 02054

CHEMICAL ANALYSIS (CFR 40, PART 136, METHODS 602 AND 624/HIGH TEMPERATURE MODIFIED CALIFORNIA MODIFIED 8015), CONTINUED

	Found (mg/l)	EPA Detection Limit
TPH		
C4-C10	<5.0	5.0
C11-C21	<10.0	10.0

Date of Analysis: 4-28-92

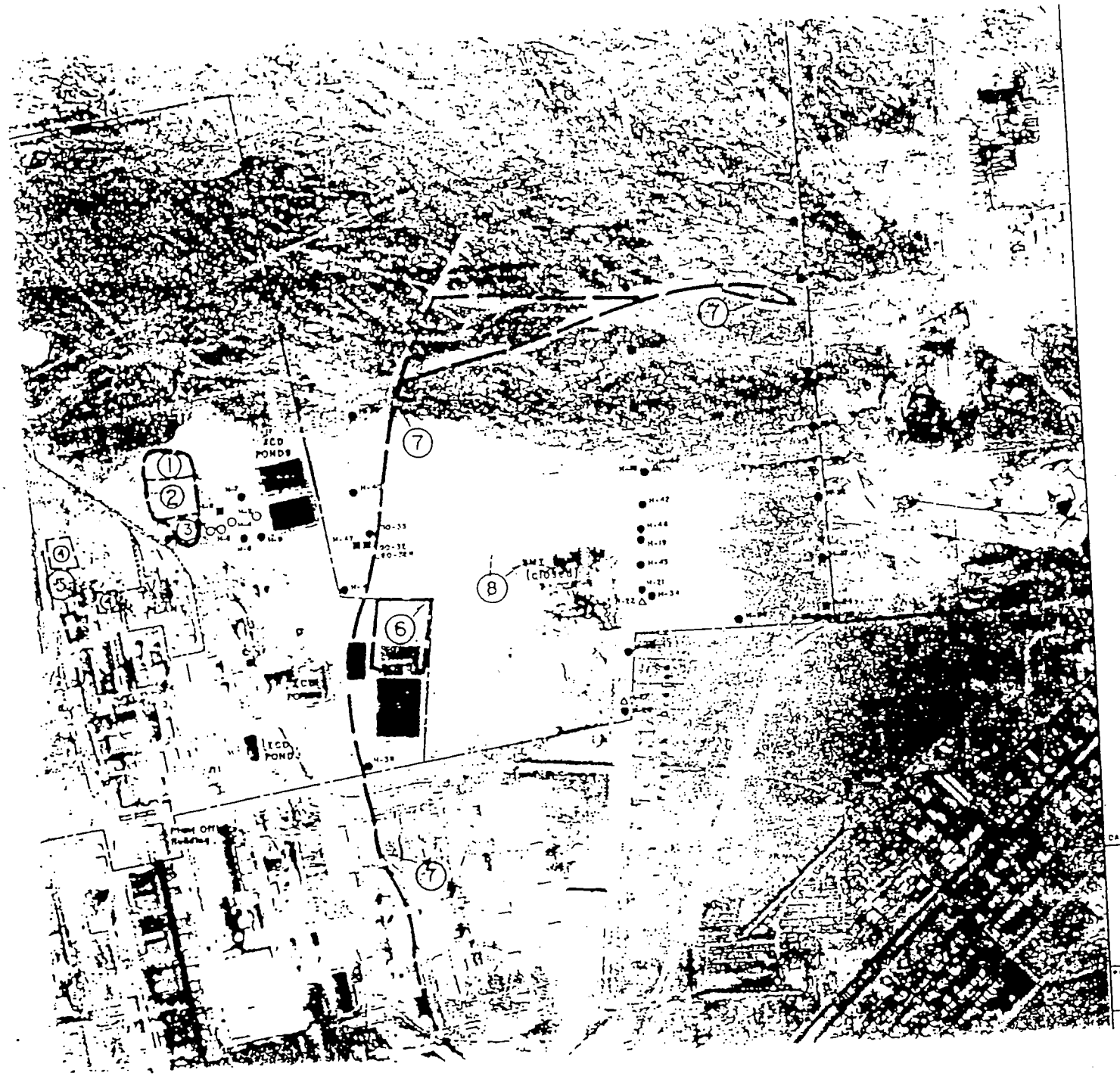
REMARKS:

Chain of Custody document enclosed.

MET-CHEM WEST TESTING LABORATORIES, INC.

Charles I. Robins
President

CIR/rmf



Well identification number

Abandoned or destroyed well

Water-table test well

Second water-bearing zone test well

Abandoned deep exploration test hole

(1) BHC Pits

(2) Buried Drums

(3) Leach Pits

(4) Location of old BHC Piles (Moved to Location (1))

(5) Reported 30,000 gallon loss of benzene from underground storage tank.

(6) Historical discharge of ACD wastes to leaking ponds and buried residual wastes present in western portion of area

(7) Historical wastes discharged to ditches and washes en route to upper BMI ponds

(8) Waste materials buried in the BMI dump

SCALE FEET

DATE OF PHOTO

POSSIBLE SOURCES OF ORGANIC CHEMICALS

PREPARED FOR STAUFFER CHEMICAL COMPANY

Henderson Works

Geographic COMPILED BY W. W. HARPER SCALE

EXPLANATION

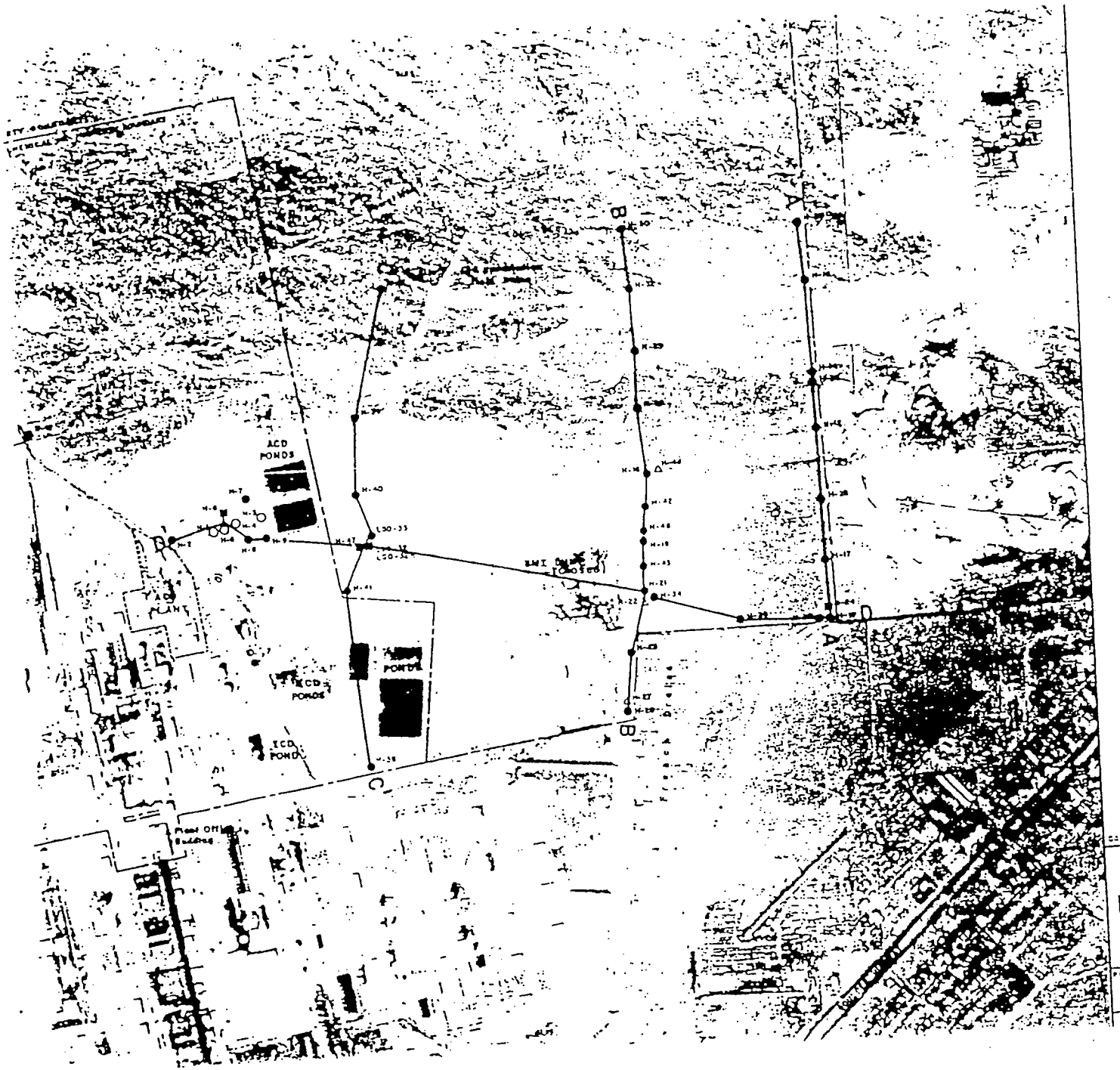
- Well identification number
- Abandoned or destroyed well
- Water-table test well
- Second water-bearing zone test well
- Abandoned deep exploration test hole
- 40 — Total organic carbon (mg/l)
- (31) — Parentheses indicate samples from lower water-bearing zones
- —50— Isoline indicating total organic carbon concentration - dashed where inferred

0 500 1000 2000
SCALE FEET

DATE OF PHOTO AUGUST 1979

CONTOUR MAP OF TOTAL ORGANIC CARBON CONCENTRATIONS (mg/l) IN GROUND WATER

PREPARED FOR STAUFFER CHEMICAL COMPANY



Well identification number

Abandoned or destroyed well

Water table test well

Second water bearing zone test well

Abandoned deep exploration test hole

A—A' Line of cross section

LOCATIONS OF CROSS SECTION

PREPARED FOR STAUFFER CHEMICAL COMPANY

Horn
Environmental Consulting Group, Inc.

P. O. Box 50886 • Amarillo, Texas 79159-0886 • Phone 806/358-3107 • Wats 1-800-594-0008

April 13, 1992

Mr. Steve Henke
Clark County Health District
P. O. Box 4426
Las Vegas, Nevada 89127

Dear Steve:

Per your request, enclosed please find a map of the location of all the February 4, 1992 sample analysis results, as well as a location map of the H-38 monitoring well.

I am making arrangements to resample Well H-38 to comply with your request for BTEX by Method 624 and TPH by 8015 Modified. I anticipate having this sampling event completed no later than April 24, 1992, with the results returned ten (10) working days later.

Thank you for your cooperation in this matter. If I can answer any questions or address any areas of concern, please feel free to contact me at any time.

Sincerely,

Marc S. Horn

MSH:nm

Enclosure

Sampling Narrative

All samples were collected utilizing zero head space. Sampling, as well as complete equipment decontamination between sample collections. Samples were transferred to Met Chem West Analytical utilizing customary Chain of Custody. Drilling was conducted by Western Technologies, Inc.

A Grab Soil Sample was collected at 15, 25 and 35 feet and groundwater interface (37 feet), and examined for TPH utilizing California Modified 8015 methodology.

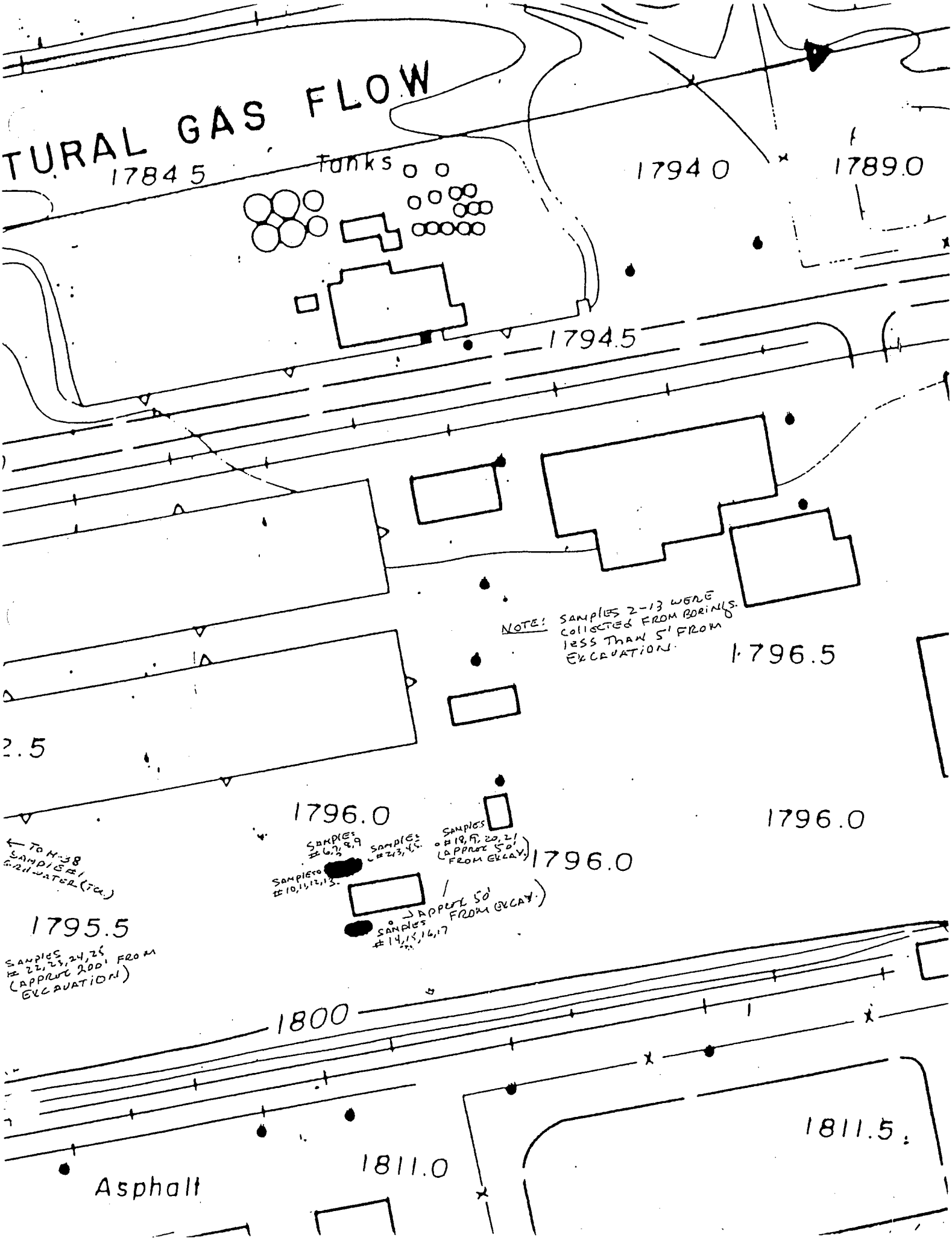
A sample was collected from existing Groundwater Monitoring Well H-38 to establish any potential plume migration. (TOC was used to compare results with previous TOC Analysis accomplished at this location.) Note: The well was bailed three volumes to insure proper results.

Conclusion

The H-38 Well showed a reduction in contamination from previous analytical results.

Since none of the 24 samples collected from the February 4, 1992 soil boring event revealed any contamination above the detection limit, we concluded that a contaminant plume associated with the underground storage tank in question did not exist.

Pursuant with the request of Clark County, an additional sample will be collected from existing Well H-38 and examined for BTEX utilizing Method 624 and TPH utilizing 8015 Modified.


TURAL GAS FLOW
1784.5
Tanks
1794.0
1789.0
1794.5
NOTE: SAMPLES 2-13 WERE COLLECTED FROM BORINGS LESS THAN 5' FROM EXCAVATION.
1796.5
2.5
1796.0
1796.0
1796.0
SAMPLES #6,7,8,9
SAMPLES #2,3,4,5
SAMPLES #10,11,12,13
SAMPLES #18,19,20,21 (APPROX 50' FROM EXCAV.)
← TO M-38
SAMPLE #1
SMALL WATER (TK.)
1795.5
SAMPLES #22,23,24,25 (APPROX 200' FROM EXCAVATION)
APPROX 50' FROM EXCAV.
SAMPLES #14,15,16,17
1800
1811.5
1811.0
Asphalt

MET-CHEM WEST
DIVISION OF MET-CHEM TESTING LABORATORIES, INC.

4275 BELL DRIVE #4 • LAS VEGAS, NEVADA 89118 • (702) 368-1082 • FAX (702) 876-6811

Jack B. Kelley, Inc.
Route 1, Box 400
Amarillo, Texas 79159

Attn: Mr. Marc Horn

DATE: February 4, 1992

REPORT NO.: 01902

P.O. NO.: H 1009

INVOICE NO.: 3015

WORK REQUESTED:

Chemical Analysis per EPA 600/4-79-020 and High Temperature Modified, California Modified 8015 for:

(1) Total Organic Carbon (TOC), EPA 600/4-79-020, Method 415.1
(2) Total Petroleum Hydrocarbon (TPH) California Modified 8015

DESCRIPTION OF SAMPLE:

Twenty Five (25) Samples (1 Ground Water/24 Soils), identified as:

Sample #1, 001GW, Grab, Cool, 4°C, 1-09-92, 9:30 AM (Ground Water)
Sample #2, 101-15', Grab, Cool, 4°C, 1-08-92, 11:30 AM (Soil)
Sample #3, 102-25', Grab, Cool, 4°C, 1-08-92, 1:10 PM (Soil)
Sample #4, 103-35', Grab, Cool, 4°C, 1-08-92, 1:45 PM (Soil)
Sample #5, 104-37', Grab, Cool, 4°C, 1-08-92, 2:25 PM (Soil)
Sample #6, 201-15', Grab, Cool, 4°C, 1-08-92, 3:45 PM (Soil)
Sample #7, 202-25', Grab, Cool, 4°C, 1-09-92, 8:00 AM (Soil)
Sample #8, 203-35', Grab, Cool, 4°C, 1-09-92, 8:30 AM (Soil)
Sample #9, 204-37', Grab, Cool, 4°C, 1-09-92, 8:50 AM (Soil)
Sample #10, 301-15', Grab, Cool, 4°C, 1-09-92, 10:00 AM (Soil)
Sample #11, 302-25', Grab, Cool, 4°C, 1-09-92, 10:30 AM (Soil)
Sample #12, 303-35', Grab, Cool, 4°C, 1-09-92, 11:00 AM (Soil)
Sample #13, 304-37', Grab, Cool, 4°C, 1-09-92, 11:15 AM (Soil)
Sample #14, 401-15', Grab, Cool, 4°C, 1-09-92, 1:45 PM (Soil)
Sample #15, 402-25', Grab, Cool, 4°C, 1-09-92, 2:30 PM (Soil)
Sample #16, 403-35', Grab, Cool, 4°C, 1-09-92, 3:00 PM (Soil)
Sample #17, 404-37', Grab, Cool, 4°C, 1-09-92, 3:15 PM (Soil)
Sample #18, 501-15', Grab, Cool, 4°C, 1-09-92, 4:15 PM (Soil)
Sample #19, 502-25', Grab, Cool, 4°C, 1-10-92, 7:45 AM (Soil)
Sample #20, 503-35', Grab, Cool, 4°C, 1-10-92, 8:10 AM (Soil)
Sample #21, 504-37', Grab, Cool, 4°C, 1-10-92, 8:25 AM (Soil)
Sample #22, 601-15', Grab, Cool, 4°C, 1-10-92, 9:40 AM (Soil)
Sample #23, 602-25', Grab, Cool, 4°C, 1-10-92, 11:10 AM (Soil)
Sample #24, 603-35', Grab, Cool, 4°C, 1-10-92, 11:25 AM (Soil)
Sample #25, 604-37', Grab, Cool, 4°C, 1-10-92, 11:40 AM (Soil)

MET-CHEM WEST
DIVISION OF MET-CHEM TESTING LABORATORIES
INCORPORATED

CHEMICAL ANALYSIS (EPA 600/4-79-020/CALIFORNIA MODIFIED 8015)

Sample	TOC (mg/l)	Found TPH (mg/kg) C4 - C10	C11 - C24	Date of Analysis
#1	3.3	-	-	2-04-92
#2	-	<10	<10	1-16-92
#3	-	<10	<10	1-16-92
#4	-	<10	<10	1-16-92
#5	-	<10	<10	1-16-92
#6	-	<10	<10	1-16-92
#7	-	<10	<10	1-16-92
#8	-	<10	<10	1-16-92
#9	-	<10	<10	1-16-92
#10	-	<10	<10	1-16-92
#11	-	<10	<10	1-17-92
#12	-	<10	<10	1-17-92
#13	-	<10	<10	1-17-92
#14	-	<10	<10	1-17-92
#15	-	<10	<10	1-17-92
#16	-	<10	<10	1-17-92
#17	-	<10	<10	1-17-92
#18	-	<10	<10	1-17-92
#19	-	<10	<10	1-17-92
#20	-	<10	<10	1-20-92
#21	-	<10	<10	1-20-92
#22	-	<10	<10	1-20-92
#23	-	<10	<10	1-20-92
#24	-	<10	<10	1-20-92
#25	-	<10	<10	1-20-92

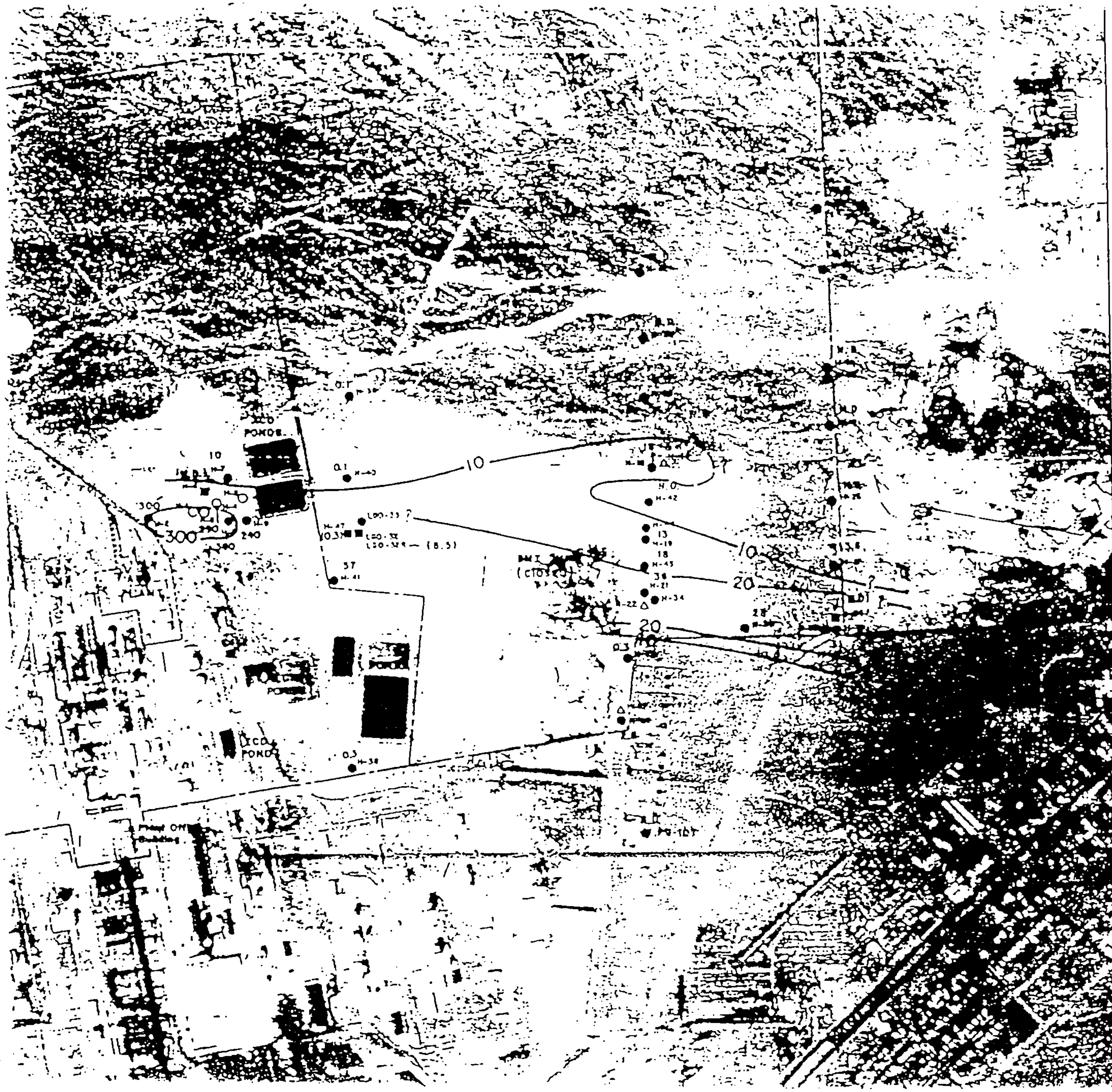
REMARKS:

Chain of Custody document enclosed.

MET-CHEM WEST TESTING LABORATORY, INC.

Charles I. Robins
President

CIR/dkm



Well identification number

Abandoned or destroyed well

● Water-table test well

■ Second water-bearing zone test well

Abandoned seep exploration test hole

● 350 Benzene concentration (mg/l)

N.D. None detected

(300) Parenthesis indicate samples from lower water-bearing zones

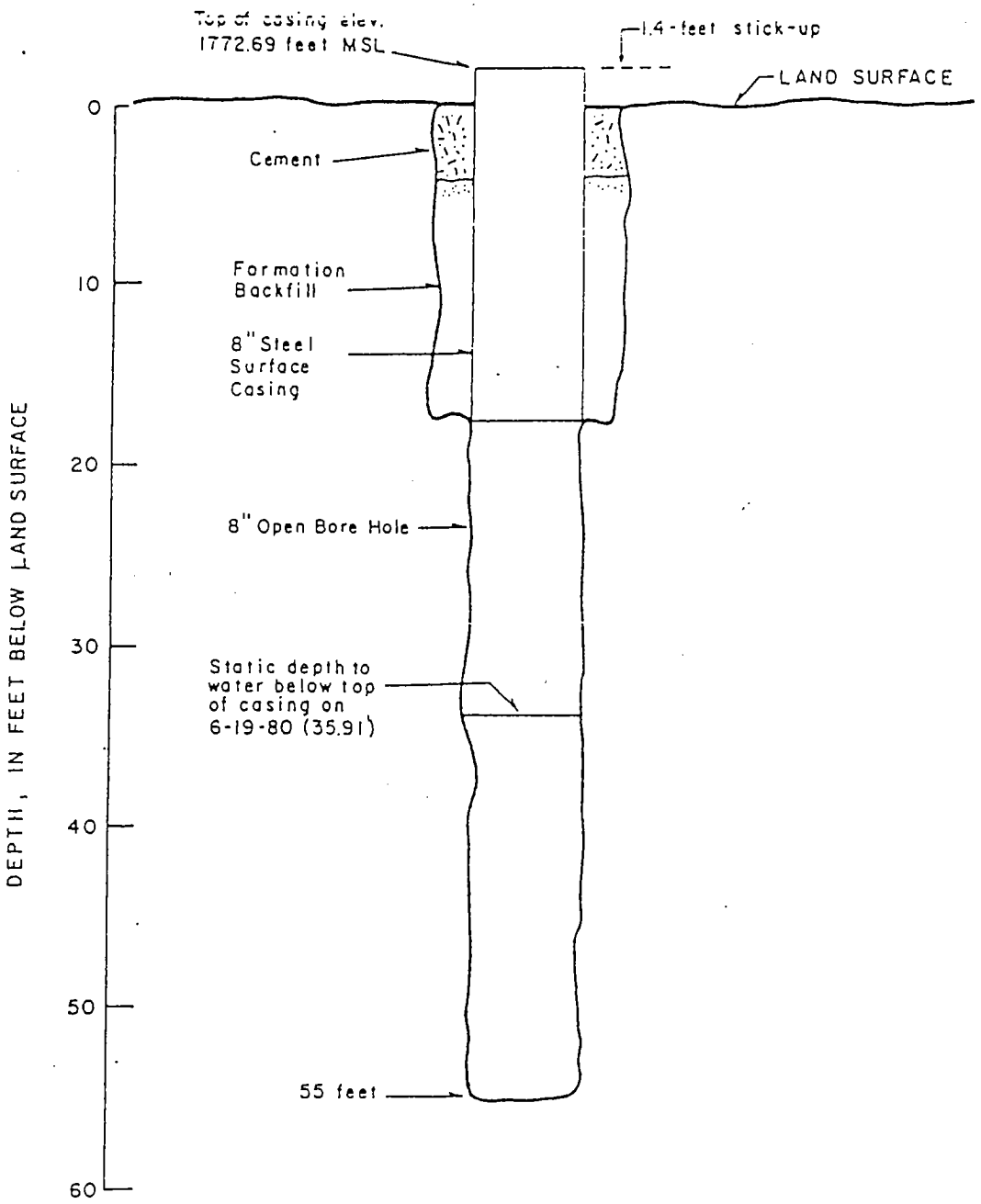
-10- Isoline indicating benzene concentration - dashed where inferred

CONTOUR MAP OF BENZENE CONCENTRATIONS (mg/l) IN GROUND WATER

Prepared for STAUFFER CHEMICAL COMPANY
Henderson, Nevada

Geraghty | Figure 10

WELL H-38



TITLE

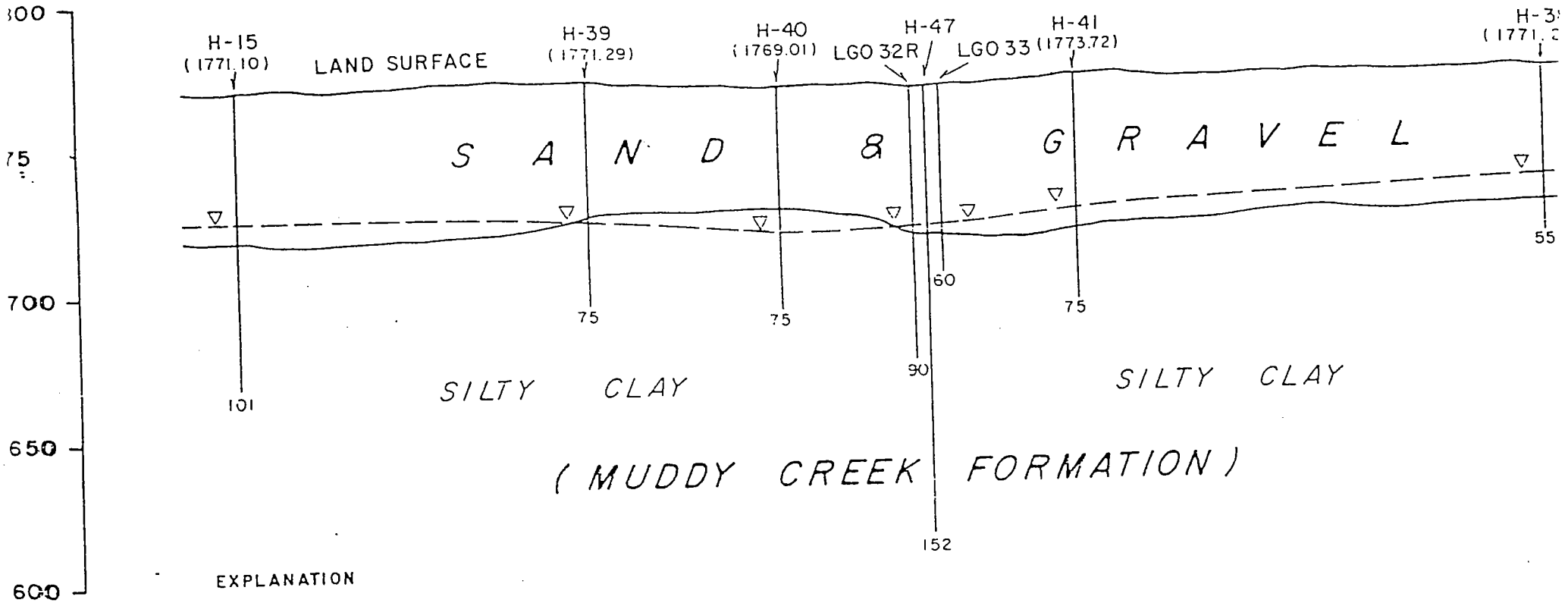
CONSTRUCTION DIAGRAM OF A TYPICAL TEST WELL

PREPARED FOR
STAUFFER CHEMICAL COMPANY
Henderson Nevada

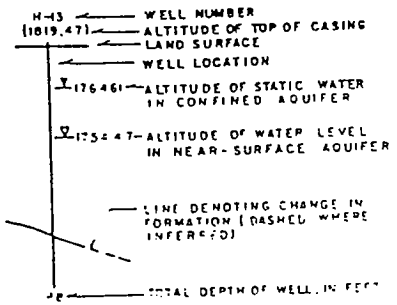
Geraghty & Miller, Inc.	COMPILED BY W. M. WARREN	SCALE SHOWN	FIGURE No.
	PREPARED BY		
	PROJECT MGR. JOHN ISBISTER	DATE JULY 1980	

WEST

C



EXPLANATION



HORIZONTAL SCALE 1"=500'

VERTICAL SCALE 1"= 50'

CROSS SEC

Stauffer Ch

enderson

ATTACHMENT 22

LOU ITEM 68

TENENT INFORMATION

TWR , RHJ , RAN

Henderson ENV 20.

KOCH

KOCH MATERIALS COMPANY

This is information from KOCH on Henderson leased area. I have not gone through it yet, but will try to get us together on teleconference to discuss in the near future.

Sue 5-24-96

Via First Class Mail

Ms. Susan Crowley
Kerr-McGee Chemical Corporation
P.O. Box 55
Henderson, NV 89009

Re: Koch Materials Lease - Release Request

Dear Ms. Crowley:

Kerr-McGee Chemical Corporation's (KMCC) requested in a letter dated July 7, 1995, that Koch Materials Company (Koch) investigate and clean hydrocarbon-contaminated soils at the Koch-leased site in Henderson, NV. The property is owned by KMCC and is located in the BMI Industrial Complex. In response to this request Koch retained the services of Western Technologies, Inc. (WT) to perform both remediation and confirmatory sampling activities.

Enclosed are summaries and results from the activities devised by Koch and KMCC, and performed by WT to remediate residual contamination from past Koch operations at the facility. On March 18, 1996, WT performed excavation oversight for the removal of asphalt and oil impacted soils. Limits of excavation were based on visual indications and/or hydrocarbon odors. Excavated soils were stockpiled on-site until confirmatory sampling could confirm additional excavation was not needed.

On March 29, 1996, WT advanced ten (10) soil borings in the project area to obtain post-excavation, confirmatory samples. The samples were analyzed for TPH using EPA method 8015-modified. All but one sample showed levels below the Nevada enforcement standard of 100 mg/kg TPH. This sample, collected under the northeast corner of the concrete slab, indicated 190 mg/kg TPH concentration. WT returned to the sight on April 15, 1996, to excavate additional material in this area. Approximately 150 square feet of the concrete was removed in order to excavate impacted soils. One additional sample was collected to confirm removal activities in this area. Test results showed a level of 32 mg/kg TPH, and therefore, below Nevada DEP soil action levels.

At this point, the stockpiled soils were characterized and removed from the site. Approximately 511 tons of soil were disposed of by Las Vegas Paving. Type II fill material was brought in to fill excavation holes return the site to grade.

(con't)

P.O. Box 2256 ▪ Wichita, Kansas 67201 ▪ 316/828-8584 ▪ FAX 316/828-8000

Please review the analytical results provided in the WT reports to confirm the removal of hydrocarbon impacted soils at the site. Based on the results of the activities performed at the Henderson facility and completion of tasks outlined in the July 7, 1995, letter and associated follow-up correspondences, Koch Materials respectfully requests closure of the environmental concerns at this site, and thus, a release from the current lease with KMCC.

Koch Materials Company appreciates your consideration and cooperation in this matter. Please contact me with any additional questions or comments at (316) 828-8451.

Sincerely,
Koch Materials Company

Kevin E. Koerner

Kevin E. Koerner
Project Engineer

Enclosures
cc: Joe Platt
Rebecca Work

Western Technologies Inc.
The Quality People
Since 1955

3611 West Tompkins Avenue
Las Vegas, Nevada 89103-5618
(702) 798-8050 • fax 798-7664

April 25, 1996

Koch Materials
1429 Slover Avenue
Fontana, California 92355

Attn: Mr. Joe Platt

Ref: Subsurface Soil Exploration
Former Koch Materials Facility
BMI Industrial Complex
Henderson, Nevada

Project No. 4186JL080

Dear Mr. Platt:

Western Technologies, Inc. (WT) is pleased to provide Koch Materials with this letter report for the completion of 10 soil borings at the former Koch Materials asphalt emulsion facility located within the Basic Management Inc. (BMI) Industrial complex in Henderson, Nevada. WT performed the soil boring and soil sampling service pursuant to the Scope of Work described in WT's Proposal No. 4186PT115A dated February 2, 1996 and an Intermittent Service Agreement No. HEND-96-1.

Scope of Work

The scope of work for this project included the completion of 10 shallow soil borings. A soil sample was collected from 1 to 2 feet blow the ground surface (bgs) in all ten of the borings, and from 5 to 6 feet bgs in six of the ten borings. Sixteen total soil samples were collected for submittal to a Nevada Certified laboratory for analysis by EPA method 8015 for Total Petroleum Hydrocarbons.

Sample Locations

Eight of the ten soil boring locations had been selected by Mr. Kevin Koerner of the Koch Materials Kansas City office. Mr. Koerner designated the proposed boring locations on a site plan that had been separated into 8 distinct "areas" (numbered 4 through 11). In a March 26, 1996 telephone conversation, Mr. Koerner indicated that Areas 6, 7, 9, 10, and 11 on the site plan required two soil samples from each boring (i.e. both at 1 to 2 and 5 to 6 feet bgs). Since only 8 of the proposed 10 borings were identified on the site plan, Mr. Koerner asked WT to use it's discretion in the selection of the two remaining boring locations.

Field Activities

On March 29, 1996 WT completed the 10 shallow subsurface soil borings (numbers KM-1 through KM-10) at the subject property. WT personnel were greeted by Mr. Mark Nielsen, Plant Manager for the Koch Materials Phoenix, Arizona office, observed WT's field activities. Based on the 8 soil sample locations specified by Mr. Koerner, and Mr. Nielsen's recollection of the former facility, the two remaining soil boring locations (numbers KM-9 and KM-10) were located on the concrete slab in the area of the former above ground storage tanks. The sample locations for the 10 borings are shown on Figure 1.

Six borings were completed to 5 to 6 feet bgs and four borings were completed to 1 to 2 feet bgs using a solid stem auger rig. Ssplit soil samples were obtained from each of the 16 soil sample locations. Collected soil samples were also placed in a ziploc bag and the headspace was screened in the field for the presence of volatile organic compounds (VOCs) using an Organic Vapor Meter (OVM). No detectable VOCs were noted during screening activities. Subsurface soil samples were recovered from the decontaminated split spoon sampler and sealed in specifically cleaned class jars, sealed with Teflon liners and plastic caps, labeled and preserved on ice. The soil samples were sent under proper chain-of-custody protocol to Alpha Analytical, Inc. for analysis for TPH by EPA method 8015 (modified).

Findings

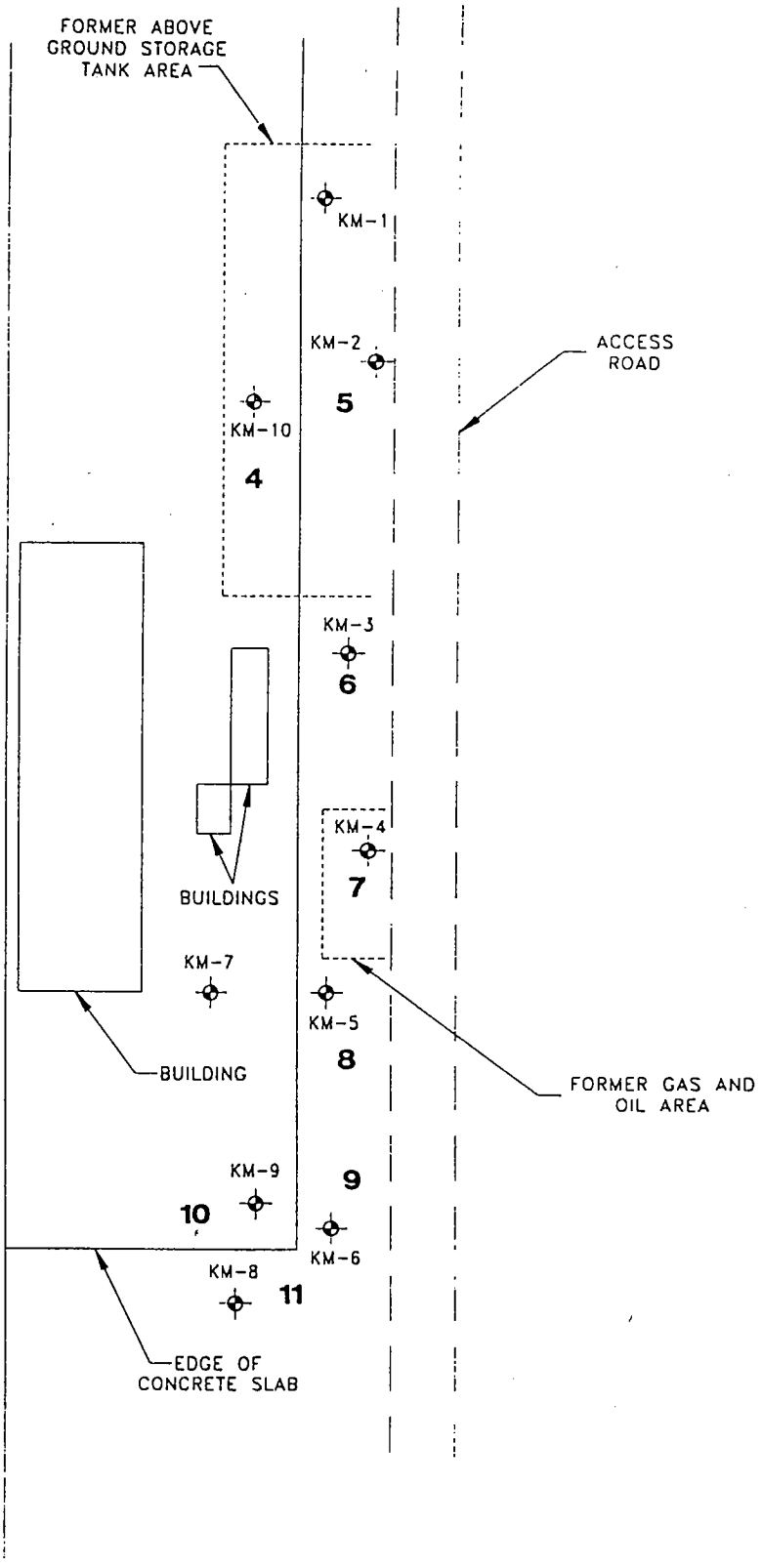
Total Petroleum Hydrocarbon (TPH) concentrations were found in 6 of the 16 soil samples. Only one soil sample, KM-9-1' at 190 mg/Kg, contained TPH concentrations greater than the State of Nevada regulatory action limit of 100 mg/Kg. This sample was collected from the eastern portion of concrete slab. Laboratory data and chain of custody forms are included in Attachment A.

WT appreciates the opportunity to be of service to Koch Materials on this project. If you have any questions, please do not hesitate to call.

Sincerely,

WESTERN TECHNOLOGIES, INC.

Peter K. Gloven, C.E.M.
Senior Project Manager



LEGEND:

KM-2 ⊕ APPROXIMATE BORING LOCATION AND NUMBER

NOT TO SCALE

Project:	FORMER KOCH MATERIALS
Diagram:	SITE PLAN
	Western Technologies Inc.
Job No. 4186JL080	Figure 1

Sta 2
C:\4186JL080

APPENDIX A

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21
Sparks, Nevada 89431
(702) 355-1044
FAX: 702-355-0406
1-800-283-1183

Boise, Idaho
(208) 336-4145

2505 Chandler Avenue, Suite 1
Las Vegas, Nevada 89120
(702) 498-3312
FAX: 702-736-7523
1-800-283-1183

ANALYTICAL REPORT

Western Technologies
3611 West Tompkins Avenue
Las Vegas, NV 89103

P.O.#: 4186JL080
Project: Koch Materials
Phone: 702 798-8050
Attn: Peter Cloven

Sampled: 03/29/96 Received: 04/01/96 Analyzed: 04/02/96

Matrix: [X] Soil [ ] Water [ ] Waste

Analysis Requested: TPH - Total Petroleum Hydrocarbons-Extractable Quantitated As Diesel

Methodology: TPH - Modified 8015/DHS LUFT Manual/BLS-191

Results:

Client ID/ Lab ID	Parameter	Concentration mg/Kg	Detection Limit mg/Kg
KM-1 /WTI040196-01LV	TPH *	92	10
KM-2 /WTI040196-02LV	TPH *	19	10
KM-3-1' /WTI040196-03LV	TPH	ND	10
KM-3-5' /WTI040196-04LV	TPH	ND	10
KM-4-1' /WTI040196-05LV	TPH	ND	10
KM-4-5' /WTI040196-06LV	TPH	ND	10
KM-5 /WTI040196-07LV	TPH	ND	10
KM-6-1' /WTI040196-08LV	TPH	ND	10

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21
Sparks, Nevada 89431
(702) 355-1044
FAX: 702-355-0406
1-800-283-1183

Boise, Idaho
(208) 336-4145

2505 Chandler Avenue, Suite 1
Las Vegas, Nevada 89120
(702) 498-3312
FAX: 702-736-7523
1-800-283-1183

Continued:

Client ID/ Lab ID	Parameter	Concentration mg/Kg	Detection Limit mg/Kg
KM-6-5' /WTI040196-09LV	TPH	ND	10
KM-7-1' /WTI040196-10LV	TPH *	25	10
KM-7-5' /WTI040196-11LV	TPH	ND	10
KM-8-1' /WTI040196-12LV	TPH	ND	10
KM-8-5' /WTI040196-13LV	TPH *	18	10
KM-9-1' /WTI040196-14LV	TPH *	190	10
KM-9-5' /WTI040196-15LV	TPH	ND	10
KM-10 /WTI040196-16LV	TPH *	17	10

* - Components are in the range of light oil and motor oil.

Note: Hydrocarbons outside the range of diesel may have varying recoveries.

ND - Not Detected

Approved By: Roger L. Scholl Date: 4/3/96
Roger L. Scholl, Ph.D.
Laboratory Director

Western Tech.
3611 W. Tompkins Ave
Las Vegas, NV 89103
(702) 798-8050

CHAIN OF CUSTODY RECORD

JOB NO. 1186JL080 | SAMPLER D. Cloven

PROJECT NAME Koch Materials

SAMPLE IDENTIFICATION NUMBER	DATE	TIME	SAMPLE LOCATION (Depth)	NUMBER OF CONTAINERS	SAMPLE METHOD: VACSAM	SOIL SCOOP	SOIL AUGER	SPLIT-SPOON	BAILER	GRAB	REMARKS (Physical Appearance, Compositing Instructions, etc.)	LABORATORY IDENTIFICATION NUMBER
Km-1	3/29/16	8:50	1-2'	1				X			DRO range 8015 mod.	
Km-2	"	9:05	1-2'	1				X				
Km-3-1'	"	9:35	1-2'	1				X				
Km-3-5'	"	9:45	5-6'	1				X				
Km-4-1'	"	10:00	1-2'	1				X				
Km-4-5'	"	10:05	5-6'	1				X				
Km-5	"	10:45	1-2'	1				X				
Km-6-1'	"	10:47	1-2'	1				X				
Km-6-5'	"	10:55	5-6'	1				X				
Km-7-1'	"	11:30	1-2'	1				X				
Km-7-5'	"	11:39	5-6'	1				X				
Km-8-1'	"	11:05	1-2'	1				X				
Km-8-5'	"	11:13	5-6'	1				X				
Km-9-1'	"	10:30	1-2'	1				X				
Km-9-5'	"	10:36	5-6'	1				X				
Km-10	"	9:25	1-2'	1				X				

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
[signature]	3/31/16	3:30p	[signature]	[signature]			
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE	TIME	SHIPPING TEMPERATURE (°F) →	MINIMUM / MAXIMUM
			[signature]	4/4/16	0700		

COMMENTS

White – Testing Laboratory; Yellow – Department Job File; Pink – Field Sampler

151 (5/01)

Western Technologies Inc.

Billing Information:
Name We kn Technologies, Inc
Address 36 W. Tompkins Ave
City, State, Zip Las Vegas, NV 89103
Phone Number 798-8050

Alpha Analytical, Inc.
255 Glenda[illegible]enue, Suite 21
Sparks, Ne 39431
Phone (702) 355-1044
Fax (702) 355-0406

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Client Name
Project Name Koch Materials
Address
City, State, Zip
P.O. # 4186JL080
Phone #
Report Attention Peter Cloven

Sampled by Peter Cloven

Analyses Required: TPH 8015 M; LV

Time Sampled	Date Sampled	Type* See Key Below	Lab ID Number	Sample Description	Number of Containers	Remarks
8:50	3/29	SO	WTI040196-01LV	KM-1	1	NORMAL TAT 5 DAY
9:05			02LV	KM-2	1	
9:35			03LV	KM-3-1'	1	
9:45			04LV	KM-3-5'	1	
10:00			05LV	KM-4-1'	1	Due 4/5/96
10:05			06LV	KM-4-5'	1	
10:15			07LV	KM-5	1	
10:47			08LV	KM-6-1'	1	
10:55			09LV	KM-6-5'	1	
11:30			10LV	KM-7-1'	1	
11:39			11LV	KM-7-5'	1	
11:05			12LV	KM-8-1'	1	
11:13			13LV	KM-8-5'	1	
10:30			14LV	KM-9-1'	1	
10:38			15LV	KM-9-5'	1	
9:25	V	V	16LV	KM-10	1	

	Signature	Print Name	Company	Date	Time
Relinquished by					
Received by		Joni S. Hall	Alpha Analytical, Inc	3/29/96	3:30p
Relinquished by		Joni S. Hall	AAI	3/29/96	7:00p
Received by		Linda Bydalek	AAI	4/1/96	0800
Relinquished by					
Received by					

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other