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RMA CONTAMINATION CLEANUP

U.S. ARMY
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— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

Final Implementation Document
for the Interim Response Action for
Building 1727 Sump
at the Rocky Mountain Arsenal

May 1989

Rocky Mountain Arsenal
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PRESENTED IN THIS REPORT ARE THE OPERATION AND MAINTENANCE PROCEDURES (VOLUME I) AND THE HEALTH AND SAFETY PLAN (VOLUME II) FOR THE ACTIVATED ALUMINA/GRANULATED ACTIVATED CARBON WASTEWATER TREATMENT SYSTEM THAT WAS INSTALLED ADJACENT TO SUMP 1727 DURING OCTOBER AND NOVEMBER 1987.

THE SYSTEM TRAIN CONSISTS OF 1) AN UNTREATED WASTEWATER HOLDING TANK, 2) A PH ADJUSTMENT SYSTEM, AND 3) PARALLEL AA/GAC TREATMENT TRAINS. THE TOTAL SYSTEM PRESENTLY TREATS FOUR TO FIVE GALLONS OF WATER PER MINUTE.

INFORMATION GIVEN IN THE REPORT INCLUDES:

1. WATER STANDARDS
2. TREATMENT SYSTEM DESCRIPTION
3. TREATMENT SYSTEM OPERATION PROCEDURES
4. MAINTENANCE PROCEDURES
5. LABORATORY ANALYSES
6. HEALTH AND SAFETY PLAN SPECIFIC TO THE OPERATION OF THE SUMP.

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May 1989

Prepared for:

U.S. Army Program Manager's Office For
Rocky Mountain Arsenal Contamination Cleanup

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VOLUME I - OPERATION AND MAINTENANCE MANUAL

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Presented in this document are the operation and maintenance procedures (Volume I), and the health and safety plan (Volume II) for the activated alumina/granulated activated carbon (AA/GAC) wastewater treatment system (in Building 1713) that was installed adjacent to Sump 1727 during October and November of 1987.

VOLUME I

OPERATION AND MAINTENANCE MANUAL FOR THE INTERIM RESPONSE ACTION FOR BUILDING 1727 SUMP

1.0 OPERATION AND MAINTENANCE MANUAL

Presented in this document are the operation and maintenance procedures for the activated alumina/granulated activated carbon (AA/GAC) wastewater treatment system (in Building 1713) that was installed adjacent to Sump 1727 during October and November of 1987. The system train consists of an untreated wastewater holding tank, a pH adjustment system, and parallel AA/GAC treatment trains (each containing a pump, three filters, two AA treatment units and two GAC units). The total system presently treats four to five gallons of water per minute. Treated wastewater is discharged to the Rocky Mountain Arsenal (RMA) sanitary sewage treatment system.

The toxicity, mobility, and volume of both the contaminants and wastewater are reduced by the AA/GAC treatment system. Toxicity is reduced by the removal of arsenic (As), fluoride (F), isopropylmethylphosphonate (IMPA), and other organics from wastewater which collects in 1727 Sump. Cadmium (Cd) and lead (Pb) are also removed by the filtration system. The treatment system removes contaminants from the wastewater, thus reducing the mobility of contaminants and the volume of contaminated water.

2.0 RESPONSIBILITY

Efficient and economical wastewater treatment system operation and maintenance is a function of the managers and operators. The responsibility confronting each group must be fully understood by both parties. In general, the manager is responsible for the administrative operations of the wastewater treatment system, while the operator is responsible for the direct mechanical and technical operation of the wastewater treatment system.

2.1 MANAGER RESPONSIBILITY

The following is a list of the manager's responsibilities:

- Maintain efficient plant operations schedules.
- Maintain efficient plant maintenance schedules.
- Maintain adequate records.
- Develop standard operating procedures.
- Provide good working conditions.
- Establish operator training program.
- Provide incentives for employees.
- Prepare budgets and reports.
- Plan for future facility needs.
- Properly manage operating funds.

2.2 OPERATOR RESPONSIBILITY

Below is a brief list of operator's responsibilities:

- Know proper operational procedures.
- Know proper maintenance procedures.
- Keep accurate records.
- Keep supervisors informed.
- Keep informed of current operational practices.
- Keep informed of current maintenance practices.

3.0 STANDARDS

Standards relative to the operation of 1727 Sump are covered in Section 8 of the report entitled "Final Decision Document for the Interim Response Action for Building 1727 Sump at Rocky Mountain Arsenal, December 1988".

Summarized in the following subsections are the basic standards which apply to this interim action.

3.1 WATER

Arsenic

- Groundwater IRA Standard: 50 ug/l. (Source: 40 C.F.R. 141.11(b) (NPDW -- MCL) and 40 C.F.R. 264.94(a)(2) (RCRA).)
- Surfacewater IRA Standard: 50 ug/l. (Source: 40 C.F.R. 141.11(b) (NPDW -- MCL) and 40 C.F.R. 264.94(a)(2) (RCRA).)

Cadmium

- Groundwater IRA Standard: 10 ug/l. (Source: 40 C.F.R. 141.11(b) (NPDW -- MCL) and 40 C.F.R. 264.94(a)(2) (RCRA).)
- Surfacewater IRA Standard: 10 ug/l. (Source: 40 C.F.R. 141.11(b) (NPDW -- MCL) and 40 C.F.R. 264.94(a)(2) (RCRA).)

Lead

- Groundwater IRA Standard: 50 ug/l. (Source: 40 C.F.R. 141.11(b) (NPDW -- MCL) and 40 C.F.R. 264.94(a)(2) (RCRA).)
- Surfacewater IRA Standard: 50 ug/l. (Source: 40 C.F.R. 141.11(b) (NPDW -- MCL) and 40 C.F.R. 264.94(a)(2) (RCRA).)

ISOPROPYLMETHYLPHOSPHONATE (IMPA)

There are no promulgated standards concerning IMPA. The Army has determined that, in the absence of any such standard which could be either applicable or relevant and appropriate, it will apply a health-based standard based upon the best available current data. The selected IMPA standard, considered relevant and appropriate to apply to this IRA, is 16.8 ppm.

3.2 AIR EMISSIONS

There are, at present, no national or State ambient air quality standards currently applicable or relevant and appropriate to any of the volatile or semi-volatile chemicals in the liquid found in the 1727 Sump. Air emissions during the course of the operation of the 1727 Sump interim treatment system are unlikely.

3.3 NOISE

The Colorado Noise Abatement Statute (C.R.S. Section 25-12-103) states that every activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of twenty-five feet or more therefrom in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)

Light industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

In the hours between 7:00 a.m. and 7:00 p.m., the noise levels permitted above may be increased by ten db(A) for a period of not to exceed fifteen minutes in any one-hour period.

Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of five db(A) less than those listed above.

4.0 TREATMENT SYSTEM DESCRIPTION

The AA/GAC wastewater treatment system is manually operated on an as needed basis. Figure 4-1 is a schematic diagram of this system.

The system is comprised of AA and GAC drums with interconnecting hoses and/or PVC plastic piping and valving. Change out of the drums is performed by removing the spent drum and installing a new drum. The spent drums liquid will be drained to a storage tank for treatment in the system. The spent drums will be relocated to the Waste Management Area for storage.

The filters are replaceable cartridge-type filters that are replaced as required. The spent filters will be stored in drums. Final disposition of the filters will depend on whether they are determined to be hazardous or non-hazardous. The influent filters are 75 micron rating, and the filters downstream of the pH tank are 20 micron.

The system as shown on Figure 4-1 depicts a dual set of treatment barrels of AA and GAC. Each treatment line has a treating capacity of 2.5 GPM or a total of 5.0 GPM when both lines are used.

Process through the treatment train is as follows. The operator visually checks the water level in the sump. A manually operated submersible pump in the sump is used to lift the water to the surface to a second submersible pump which lifts the water to a 20,000 gallon or a 1,500 gallon (winter operation) storage tank. Water from the storage tank flows by gravity to a centrifugal pump which discharges the wastewater, through one or two filters, to the pH adjustment tank. The pH of the water is automatically maintained between 5.3 and 5.7 by a pH sensor probe and an automatic sulfuric acid feed pump. Gravity feeds the pH

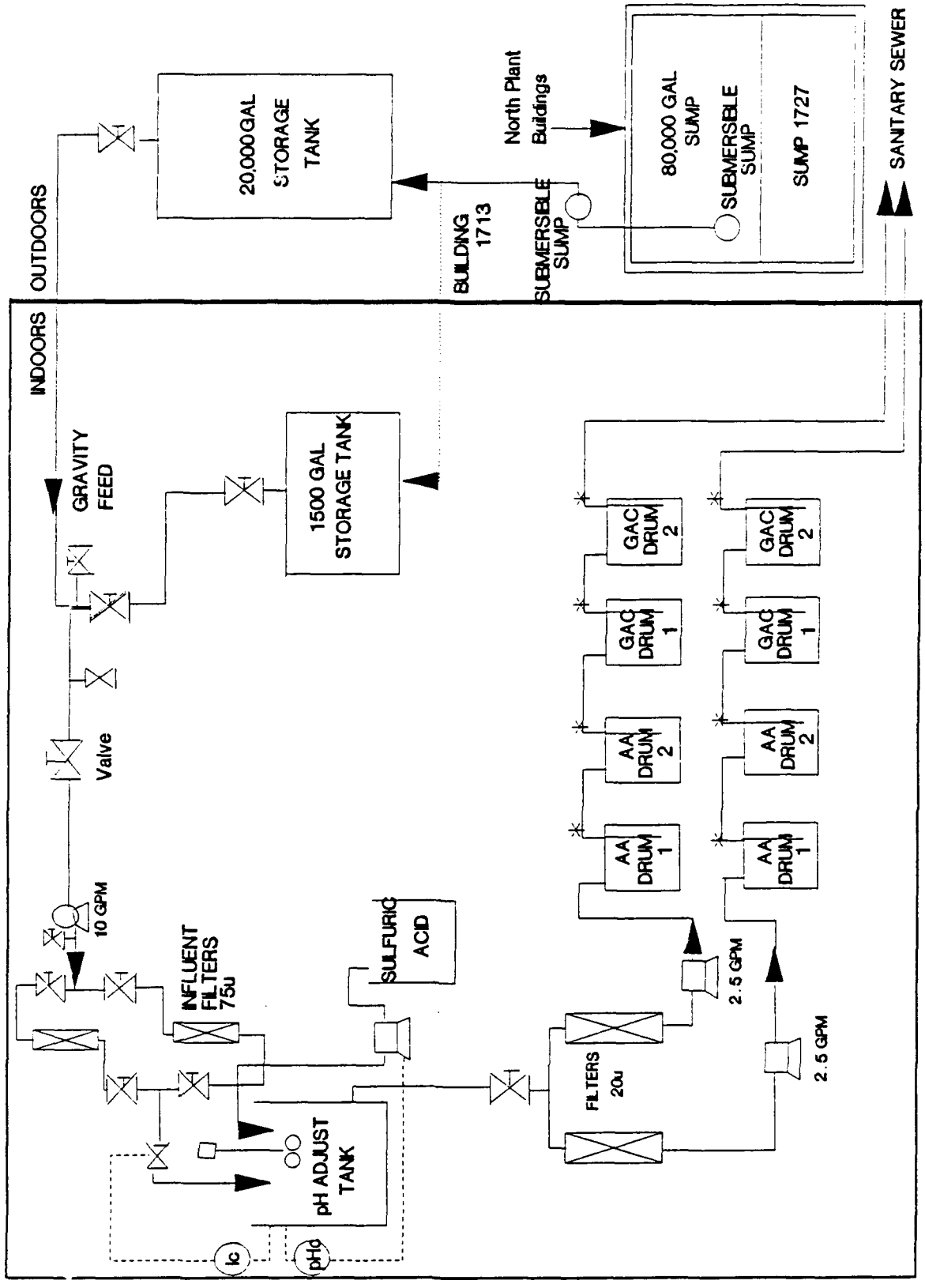

FIGURE 4-1
AA/GAC TREATMENT SYSTEM FOR SUMP 1727

adjusted wastewater through one or two filters to parallel positive displacement pumps. Wastewater is discharged from the pumps to the AA/GAC treatment drums. The wastewater enters each drum through a center inlet which discharges the wastewater at the top of each drum. The wastewater flows downward through the AA drums then through the GAC drums to the effluent pipe. Effluent is discharged to the RMA sanitary sewage treatment system.

Described in the following sub-sections are specific equipment of the AA/GAC treatment system.

4.1 SUMP 1727

Sump 1727 is a miscellaneous structure consisting of a 22.5' x 32.5' in-ground, reinforced concrete sump pit covered by steel checkered plates. The sump receives wastewater from North Plant's buildings with chemical sewer drains or sumps. The electrical supply (a metal frame with a 480 - 240/120 volt dry transformer) and controls for operating lighting and two sump pumps are mounted at the south end of the pit on top of a 5.0' x 9.0' concrete slab. A remote, pad mounted transformer provides 480 volt service to the dry transformer. Effluent from the sump is lifted to the surface by a submersible pump, where a second submersible pump lifts the effluent to the above-ground storage tank or the in-house storage tank.

4.2 STORAGE TANKS

Effluent from the sump is stored in an outside, above-ground tank or in an inside, above-ground tank. The outside tank is constructed of steel and has a capacity of 20,000 gallons. It is adjacent to the north side of Building 1727. During cold weather operation, the wastewater from the sump is discharged to a

polyethylene storage tank located inside of Building 1713. It has a capacity of 1,500 gallons.

4.3 FILTERS

Two sets of filters are used in the treatment train as shown in Figure 4-1. The first set consists of two filters (75 micron rating) prior to the influent of the pH adjustment tank. The second set of filters (20 micron rating) are located after the pH adjustment tank.

4.4 pH ADJUSTMENT SYSTEM

The pH adjustment system consists of a mixing tank, a mixer, a chemical feed pump, a pH probe, and an acid storage drum. The mixing tank has a holding capacity of 250 gallons and is made of polyethylene. A level control sensor ("lc" in Figure 4-1) monitors the fluid level in the tank to prevent the system from overflowing. The mixer and chemical feed pumps are manufactured by Lightnin and Liquid Metronics, respectively. Signet Scientific is the manufacturer of the pH probe ("pHc" in Figure 4-1). It is a submersible probe with a built-in temperature sensor. Sulfuric acid is shipped to the site in drums.

4.5 ACTIVATED ALUMINA DRUMS

Two sets of two drums (total of four drums) are operated in parallel. Each drum is constructed from a 55-gallon steel drum. Figure 4-2 shows that each drum has an inlet and an outlet fitting in the cover. The center fitting is the influent connection and the fitting close to the edge is the effluent connection. Each drum has a removal lid for adding adsorbent and a spent adsorbent removal. The drum has 3 to 4 inches of nominal 1/2 inch gravel and is filled to within 6 inches of the top of the drum with AA.

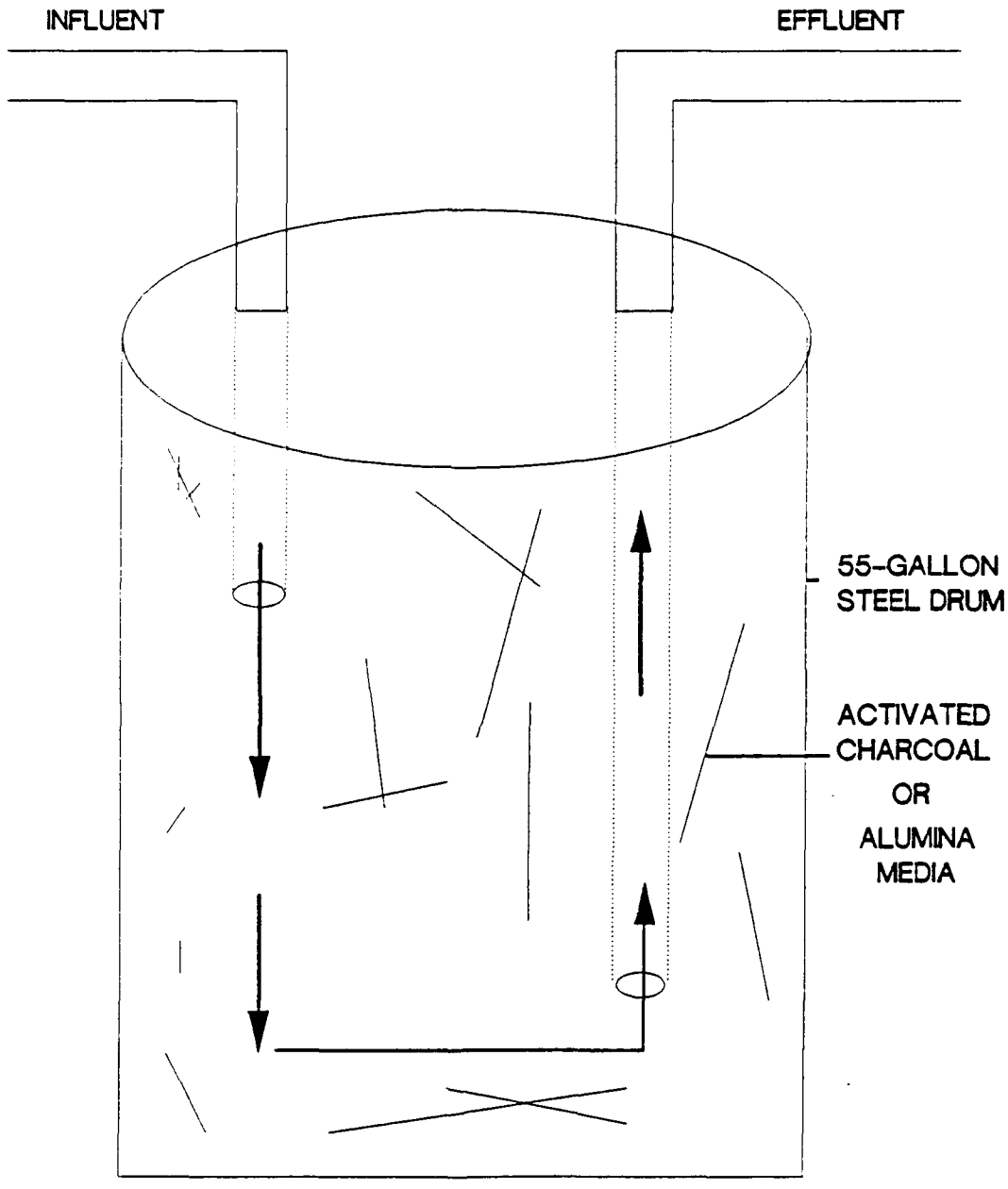

FIGURE 4-2
TREATMENT DRUM

4.6 GRANULATED ACTIVATED CHARCOAL DRUMS

Two sets of two drums (total of four drums) are operated in parallel. Each drum is constructed from a 55-gallon steel drum. Figure 4-2 shows that each drum has an inlet and an outlet fitting in the cover. The center fitting is the influent connection and the fitting close to the edge is the effluent connection. Each drum has a removable lid for adding new adsorbent and removing spent adsorbent. The drum has 3 to 4 inches of nominal 1/2 inch gravel and is filled to within 6 inches of the top of the drum with GAC.

4.7 PUMPS

Little Giant and CAT are the manufacturers of pumps installed at Building 1727. Little Giant pump, model number TE-4-MD-HC (10 GPM @ 15' head), is installed after the feed storage tank and prior to the pH adjustment tank. Two parallel, positive displacement piston pumps (CAT, model number 10.002, 2 GPM @ 500 psi) are set after the pH adjustment tank and prior to the AA/GAC drums.

The Little Giant HC pump handles highly corrosive chemicals at elevated temperatures because of the unique materials used in its construction. The pump is glass filled Ryton. A stationary spindle shaft and the captive thrust washers (front and rear) are alumina ceramic. O-ring seals are made of Viton. The pump utilizes a pure carbon bushing in the impeller to enable the pump to run dry for periods up to 8 hours at a time.

Various submersible pumps are used to lift the wastewater from the internal and external sumps to the storage tanks. Frequent replacement of these pumps prevents description of a specific pump.

4.8 PIPES

The majority of the piping, fittings, and valves consist of polyvinyl chloride 40 (PVC 40) pipe. Diameter sizes range from 3/4" to 1" in diameter.

5.0 TREATMENT SYSTEM OPERATION PROCEDURES

The purpose of this section is to present to the operator the operation procedures of the treatment process. This section provides guidance on operating and controlling the treatment system. During an emergency, this chapter should be consulted. New personnel will study this section to learn about the treatment system.

5.1 TREATMENT SYSTEM PROCEDURES

5.1.1 START-UP PROCEDURES

1. Check water level in sump and storage tanks.
2. Turn on pH adjustment tank mixer.
3. Inspect filter cartridges, replace if necessary.
4. Open all valves between feed storage tank and pH adjustment tank. Open bleed valve on pH adjustment tank. Allow air to escape.
5. Close valves between feed storage tank and pH adjustment tank and bleed valve on pH adjustment tank, after air in piping has been escaped.
6. Turn on (plug pump electrical cord into receptacle marked "LC" or level controller) pump which feeds the pH adjustment tank.
7. Check pH of water in pH adjustment tank with pH indicator paper. Compare with pH value displayed on the pH controller. If the two readings disagree by more than 0.5 pH units, follow maintenance procedures in section 6.4
8. Check to insure that an adequate supply of sulfuric acid is present in the acid feed drum for operations to continue.

9. Turn on (plug pump electric cord into standard 110V receptacle) acid metering pump which adds sulfuric acid to the pH adjustment tank.
10. Check to insure that the pH controller is maintaining the pH between 5.3 and 5.7. The pH needs to be maintained between 5.3 and 5.7 to enhance removal of fluoride and arsenic by the activated alumina.
11. Check to insure that the valve between the pH adjustment tank and the AA/GAC feed pumps are open.
12. Turn on one or both AA/GAC feed pumps.
13. Open bleed valves on top of treatment drums to allow air to be removed. Close bleed valves when water begins to be discharged from the bleed valves.
14. Check again to insure that the pH controller is maintaining the pH between 5.3 and 5.7.

5.1.2 SYSTEM SHUT-DOWN PROCEDURES

1. Check to insure that the pH controller is maintaining the pH between 5.3 and 5.7.
2. Turn off one or both AA/GAC feed pumps.
3. Open bleed valves on the last drum of each treatment train to break the siphon. Open bleed valves on the first drum of each treatment train if you want to relieve the pressure on the first drum.
4. Unplug the acid metering pump. Do not unplug the pH controller.
5. Unplug the pump which feeds the pH adjustment tank.
6. Close the feed storage tank valve.
7. Run a hose from the discharge valve of the drum to a storage tank. Siphon the water in the drum to the storage tank. After the water has been removed from the drum disconnect the drain hose and re-install the drum seal plugs. Remove the spent drum from the treatment system and relocate to the Waste Management

Area for storage. Transfer the water to the 1500 gallon storage tank for treatment.

8. Install a new drum AA or GAC. Add water to the drum using the AA/GAC feed pumps, through the discharge piping. This allows air to escape from the bottom (up-flow mode) from the absorbent bed as the drum is filled with the liquid. Reconnect the tank to the treatment system in the down-flow mode ready for treatment operations.
9. Turn off the pH adjustment tank mixer.
10. Replace filter cartridges, if necessary.
11. Install fresh sulfuric acid drum, if necessary.

5.1.3 ADDITIONAL PROCEDURES DURING COLD/FREEZING WEATHER

1. Insure that the space heaters inside Building 1713 are operable, and set to maintain the temperature in the building at a minimum of 50 degrees at a height of 4 to 5 feet in the center of the building. If water inside the piping, storage or treatment tanks or drums, or pumps is allowed to freeze, damage to the equipment and a subsequent spill of contaminated liquid is likely.
2. Install one or two floating stock tank heaters in outdoor water storage vessels. The stock tank heaters are rated at 1000 - 1500 watts, and draw up to 15 amps of 110 voltage electricity. Use a single heavy gauge extension cord for each heater and use only GFCI receptacles to avoid electric shock or electrocution. Check the GFCI receptacle (push the trip button and listen for an audible click, then push the reset button) before plugging in the electrical cord.
3. If using the valve of the outdoor feed tank, insure that the valve is heated (i.e., heat tape) to avoid freezing of the valve. Insure that the outdoor feed

piping is insulated, and that it is drained during non-operational periods to prevent freezing.

4. If the outdoor feed tank valve is not used, the feed should be pumped into the 1,500 gallon storage tank using a submersible pump and hose. Use a single heavy gauge extension cord for the submersible pump. Check the GFCI receptacle (push the trip button and listen for an audible click, then push the reset button) before plugging in the electrical cord.

5.2 EQUIPMENT OPERATION PROCEDURES

5.2.1 PORTABLE MIXER (Lightnin)

Variable speed drives sometimes have critical ranges where the unit should not be operated during drawoff or in air. These ranges are indicated on a warning decal at the speed control. It is nct good practice to operate mixer continuously when extreme vortexing or surging occurs.

1. Turn mixer on.
2. Allow mixing pattern to be established.
3. Adjust blade position.
4. Turn mixer off before mixing tank is emptied.

5.2.2 PUMP - MODEL 10.002 (CAT Pumps Corporation)

1. Check lubricant level of the pump. Replace piston cups immediately if lubricant level rises rapidly above the inspection plug.
3. Open all valves in the piping system.
4. Start pump. If pump does not prime, remove the nozzle until the pump delivers full outlet flow.
6. Maintain vacuum less than 5 inches of mercury by keeping the vertical lift distance less than 5.5 feet.

7. Liquid temperature must be less than 180°.
8. Limit pressure to 500 PSI measured at the pump and limit operating speed to 1800 RPM.

5.2.3 PUMP - MODEL TE-4MD-HC (Little Giant Pump Company)

1. Check pipe fittings.
2. Pump head (volute) must be flooded prior to start-up.
3. Turn pump on.

5.2.4 FILTERS

1. Replace filter housing if leaks occur.
2. Replace filter cartridge, when excessive pressure drops or fouling occurs, with 30 micron filter cartridges.
3. Turn on pumps.

5.2.5 ACTIVATED CARBON ADSORPTION

Open all valves leading to and from the treatment drums. The GAC drums must have all air removed prior to the start-up of the treatment train. If the drums must be replaced, follow the GAC treatment drum operation procedures in section 6.5.

5.2.6 ACTIVATED ALUMINA

Open all valves leading to and from the treatment drums. The AA drums must have all air removed prior to the start-up of the treatment train. If the drums must be replaced, follow the AA treatment drum operation procedures in section 6.5.

6.0 MAINTENANCE PROCEDURES

This system is operated on an as-needed basis. Maintenance checks and required maintenance should be performed prior to each start-up and following each shut-down. Maintenance procedures are summarized in each subsection.

6.1 SUMP 1727

The sump walls and floor should be visually inspected for cracks and other defects. This should be performed when the wastewater level in the sump is low.

6.2 STORAGE TANKS

Wastewater levels in the storage tanks should be visually checked prior to receiving wastewater from the sump. In addition, the visual check should be maintained on the water level while the tank is being filled. External inspection of the tank should be performed prior to the start-up of the wastewater treatment system.

6.3 FILTERS

A maintenance record of operation hours is to be kept for each filter. Filters will be changed approximately every 100 hours of operation. Filters will be changed sooner if excessive pressure drop or fouling occur.

6.4 pH ADJUSTMENT TANK

6.4.1 pH ELECTRODE CLEANING

Electrodes require routine cleaning

Because this treatment system is operated as a batch system (when necessary), electrodes should be cleaned after each operation of the system. Inorganic scale deposits should be dissolved by immersing the electrode tip in dilute hydrochloric acid for a few minutes, followed by a thorough rinse in tap water. Organic oil or grease films should be removed by washing the electrode tip with detergent and water. If the film has a known organic solvent, use it. Rinse the electrode tip in tap water.

6.4.2 pH ELECTRODE TROUBLESHOOTING GUIDE

Electrode pegs meter at 14 pH or drifts off scale high.

Possible reason for this is an open circuit in either glass electrode or reference electrode.

1. Inspect bulb making sure it is filled with solution. If not, holding electrode in hand, swing in a downward arc to displace air in pH bulb; retest.
2. Visually inspect bulb for a coating. If coated use an appropriate solvent or a high quality detergent with a Q-tip to wipe bulb clean. Rinse well with distilled water; retest. If electrode now responds but erratically, soak in 10% HCL solution for five minutes, rinse well with distilled water; retest.
3. Visually inspect reference junction, if clogged, clean with suitable brush and rinse well; retest. If electrode still reads open, place electrode in 3.5

molar KCL, or water if KCl is not available, and heat to approximately 80° C for 15 minutes; retest.

Slow response and/or noisy erratic readings.

Possible reason for a slow response is caused by a very high impedance in either glass or reference electrode. If electrode is high impedance sensor, i.e., ruggedized bulb configuration, high temperature glass or high pH glass, then improper shielding will yield noisy erratic readings.

1. Visually inspect pH bulb and reference junction for coating or clogging. If coated, clean as listed above in the electrode cleaning section.
2. Allowing a pH electrode to dry out raises the impedance dramatically. Soaking the electrode in 0.1 normal HCl for one-half hour and rinsing with distilled water should speed response.
3. Chemical degradation of pH glass can occur rapidly in a high temperature or high pH environment. This also increases impedance yielding sluggish response.
4. Low temperature environments also increase impedance, with impedance doubling every 8° C temperature drop from 25° C.
5. A high impedance sensor is extremely sensitive to electrical noise, i.e., oscillating electrical fields generated by motors, generators, or discharges from electrical thermostats. A free hanging cable swinging due to air currents will also generate erratic signals.
6. Test connector for intermittent connections by moving cable and connector at meter interface, replace connector if necessary. This is a common source of erratic signals.

No response to pH change.

Probable cause is from a cracked glass membrane, a short circuit, or high impedance bridge.

1. If electrode reads between 5.8 and 6.2 pH in all solutions, visually inspect glass bulb for cracks, discard probe.
2. If electrode reads 7.0 pH or 0.0 mV when connected to meter, visually inspect cable for damage. If there is no visible damage, remove connector and test electrode.
3. Visually inspect connector for signs of moisture or corrosion. If wet, rinse well with distilled water and dry thoroughly. A wet connector will form a battery of dissimilar metals yielding a stray interfering potential.

6.4.3 pH ELECTRODE REPLACEMENT

1. Remove the pH sensor from service.
2. Unscrew the bell reducer cap.
3. Loosen and remove the liquid-tight connector cap on top of the bell reducer and unscrew the sensor's bell reducer.
4. Remove the BNC connector from its mate on the electrode top by rotating the connector counterclockwise and lifting up.
5. Carefully unscrew the 3/8-inch hex nut (the head of the electrode) until the entire electrode body can be removed from the electrode cavity in the sensor housing.
6. Carefully place a new electrode in the electrode cavity and screw it down in place until the electrode tip is fully exposed and the O-ring is seated. Use a small hand wrench to hand-tighten the electrode.

CAUTION: OVER TIGHTENING CAN DAMAGE ELECTRODE.
DO NOT USE A TORQUE WRENCH.

7. Install the BNC connector to its mate on the electrode top.
8. Put Teflon tape on the male threads of the sensor housing top. Then install the bell reducer and hand-tighten until snug.
9. Install the liquid-tight connector cap back on top of the bell reducer.
10. Put Teflon tape on the male threads of the bell reducer. Install the bell reducer cap and hand-tighten until snug.
11. Calibrate the new electrode.
12. Return the sensor to service.

6.4.4 pH PREAMP REPLACEMENT WITH REMOTE PREAMP

1. Remove the cover of the remote junction box. Disconnect all six wires from their respective terminal blocks on the preamp board (two wires from the sensor side and four wires from the Controller side of the preamp).
2. Remove the BNC connector from its mate on the preamp board by rotating it counterclockwise and lifting away.
3. Install the new preamp board inplace.
4. Install the BNC connector to the new board and reconnect all wires to their respective terminal blocks.
5. Replace and cover on the remote junction box.
6. Calibrate the sensor.

6.4.5 CALIBRATION OF pH METER

Thoroughly wet the glass electrode and the calomel electrode. Standardize the instrument against a buffer solution

with a pH approaching that of the sample, and then check the linearity of electrode response against at least one additional buffer of a different pH.

6.5 AA AND GAC TREATMENT DRUM CHANGEOUT

Prior to start-up of the wastewater treatment system, the exterior of the AA and GAC drums are to be checked for visible signs of deterioration (i.e., rust). Verify that all pipe fittings to the drums are secure and show no signs of leakage or deterioration.

Check to determine if treatment drum changeout is warranted. Collect a sample of effluent from the treatment drum. Analyze the sample for fluoride as described in section 7.3. If changeout is necessary, then the following procedures are to be used.

1. Run a hose from the discharge valve of the drum to a storage tank. Siphon the water in the drum to the storage tank. After the water has been removed from the drum, disconnect the drain hose and re-install the drum seal plugs. Remove the spent drum from the treatment system and relocate to the Waste Management Area for storage. Transfer the water to the 1500 gallon storage tank for treatment.

2. Install a new drum AA or GAC. Add water to the drum using the AA/GAC feed pumps, through the discharge piping. This allows air to escape from the bottom (up-flow mode) from the absorbent bed as the drum is filled with the liquid. Reconnect the tank to the treatment system in the down-flow mode ready for treatment operations.

6.6 PUMPS

1. Clean strainer often enough to prevent starving pump inlet. Restricted inlet flow will result in cavitation damage to pump.
2. Check lube level of pump before operation and every 100 hours of operation. Change lubricant when warm.
3. After operation with chemicals, thoroughly rinse pump with clear water.

6.7 PIPES

Prior to start-up of the wastewater treatment system, the exterior of the PVC pipes are to be checked for visible signs of deterioration (i.e., leaking joints). Verify that all pipe fittings are secure and show no signs of leakage or deterioration.

7.0 LABORATORY ANALYSIS

7.1 PROCESS CONTROL SAMPLES

Process control samples are collected and analyzed by the operator to determine fluoride levels in the feed and the effluent, and to predict when arsenic breakthrough will occur. The activated alumina (AA) preferentially adsorbs arsenic over fluoride, so fluoride will be displaced from the AA by the arsenic, signalling that arsenic breakthrough may be imminent. The fluoride analyzer (Orion Autoanalyzer Model 901 with fluoride electrode and single reference electrode) is located at the North Boundary System.

Sample points are the feed sample tap before the pH adjustment tank, and the sample tap at the final treatment drum. Sampling after the first drum of AA can also be performed if changeout of the first drum alone is planned. Sample quantity required is less than 8 ounces, or one cup.

Process control samples should be collected and analyzed after every 16 - 24 hours of operation. Changeout of the AA drums should occur when the fluoride level reaches 3 ppm or 80% of the feed concentration, whichever is less. As levels of feed contaminant concentrations change, these guidelines need to be reassessed. Changeout of the GAC drums should occur when the AA drums are changed; however, process control samples should be collected and analyzed for organics with a GC/MS scan on at least a quarterly basis.

7.2 COMPLIANCE DOCUMENTATION SAMPLES

Compliance documentation samples are taken to provide a record of feed and effluent contaminant levels, and to reveal any changes in feed contaminant levels or changes in system

performance. Compliance documentation samples are collected by the operator and sent to a laboratory (RMA or contractor) for analysis. Minimal analytes are cadmium, lead, arsenic, fluoride, and isopropylmethylphosphonate (IMPA). A GC/MS analysis will be performed during operational periods on a quarterly basis.

Sampling points are the feed sample tap before the pH adjustment tank, and the sample tap at the final treatment drum. Sampling after the first drum of AA or GAC can also be performed if performance of a single drum is being studied. Sampling between the AA/GAC feed pumps and the first treatment drum can be performed to demonstrate the contaminant removal efficiency of the cartridge filters independent of the AA/GAC adsorption system. Sample quantity is dictated by the laboratory performing the analysis. Fill all the sample bottles provided by the laboratory. If no sample bottles are available from a laboratory, and a compliance documentation sample is warranted, collect 64 ounces, or one half gallon, at each sample point.

Compliance documentation samples should always be collected before the changeout of AA or GAC drums to provide a record of what most likely is the highest levels of contaminants in the effluent. Compliance documentation samples can also be taken prior to a lengthy system shutdown (more than two months, or whatever the analysis turnaround time is), or for every batch of feed, if the system is being operated in a batch mode.

7.3 FLUORIDE ANALYSIS USING ORION EA 940

1. Check to see that the instrument display indicates that it is programmed for fluoride analysis, not for pH or some other analyte. If not, obtain help or follow directions in the ORION EA 940 operations manual for placing the instrument in the fluoride mode.
2. Check to see that the fluoride electrode and the single

reference electrode are filled with fluid. If not, obtain help or follow instructions for filling the electrodes with fluid in the ORION EA 940 operations manual.

3. Follow these procedures to check the calibration of the instrument:

   - o Rinse the electrodes and a beaker with distilled, deionized water.
   - o Fill the clean beaker halfway full of 1.0 ppm fluoride standard/TISAB buffer solution and immerse the electrodes in the solution. Set the instrument in the "measure F-" mode.
   - o If the instrument reads between 0.9 and 1.1 ppm fluoride, calibration is not needed.

4. If the instrument needs to be calibrated, the following procedures should be followed:

   - o Set the instrument in the "calibrate" mode.
   - o Using the 1.0 ppm fluoride standard/TISAB buffer solution. Immerse the electrodes in the solution and adjust to 1.0 ppm (if necessary) using the numeric keys on front panel.
   - o Using the 10.0 ppm fluoride standard/TISAB buffer solution. Immerse the electrodes in the solution and adjust to 10.0 ppm (if necessary) using the numeric keys on front panel.

5. When the instrument is calibrated, analysis of the process control samples may begin:

   - o Set the instrument in the "measure F-" mode.
   - o Using the effluent samples first, mix up solutions of 50% effluent and 50% TISAB buffer solution. Immerse the rinsed electrodes in the solution and wait for the instrument to stabilize. Record the

results.

- Using the feed samples last, mix up solutions of 50% feed and 50% TISAB buffer solution. Immerse the rinsed electrodes in the solution and wait for the instrument to stabilize. Record the results.

6. After analysis is complete, place the instrument in standby mode:
   - Enter "speed 8".
   - When the instrument asks "Enter Standby Mode?", enter "Yes".

8.0 RECORDS

An important factor in any efficient wastewater treatment system is the keeping of accurate records. Accurate records permit operating personnel and management to control their facility. The principal records which should be kept are:

- o Operation Log - Record kept during operation of system
- o Operation Report - Monthly operating reports
- o Maintenance Logs
- o Laboratory sampling and analytical results

Logbooks should be bound, paginated notebooks to prevent the destruction or alteration of these important records.

8.1 OPERATION LOG - DAILY

A daily logbook is to be maintained during the operation of the treatment system. Information to be kept in the logbook includes the following: 1) routine operational duties, 2) unusual conditions (operational and maintenance), 3) accidents to personnel, and 4) site visitors. If information cannot be directly imputed to the logbook, then operator's worksheets can be maintained. At the end of each day, a summary of the day's operation should be made. The summary forms a basic data source for each day's entry on the monthly operating report.

8.2 OPERATION REPORTS - MONTHLY

The monthly operation report is an executive summary of the daily operational logbooks. The daily operational logbook's summaries are the source of data for the monthly operation report. This report is distributed to pertinent project managers.

8.3 MAINTENANCE LOGS

All equipment is checked and maintained on a daily basis, unless otherwise noted in the operation of equipment section, during the operation of the equipment. A note should be made in the daily operation logbook of equipment checked and any maintenance conducted on the equipment.

8.4 LABORATORY SAMPLING AND ANALYTICAL RESULTS

A logbook of laboratory sampling and analytical work should be maintained. Information to be kept should include the following:

- Type of sample - process control or compliance.
- Time sample was taken.
- Location where sample was taken.
- Analytical results.

VOLUME II

HEALTH AND SAFETY PLAN
FOR THE INTERIM RESPONSE ACTION FOR
BUILDING 1727 SUMP

1.0 SCOPE AND INTENT

Presented here is a health and safety plan specific to the operation and maintenance of the activated alumina/granulated activated carbon (AA/GAC) treatment system at Sump 1727. This plan presents methods to protect the health and safety of personnel at Sump 1727.

The Occupational Safety and Health Administration Standards and Regulations (OSHA-29 CFR Part 1910.120), and applicable standards and guidelines developed by the United States Environmental Protection Agency are the basis of this health and safety plan. The plan addresses health and safety requirements for contractors and RMA personnel. Compliance with this plan is compulsory; contractors and employees are responsible for self-enforcement and compliance. The health and safety plan was developed with consideration of potential hazards.

2.0 HAZARD ASSESSMENT

Discussed below are the chemical and physical hazards associated with the operation and maintenance of Sump 1727's Interim Response Action. In order for chemical compounds to be a hazard to site workers, there must first be physical contact through inhalation, absorption, or ingestion at a concentration high enough to cause health effects. Reduction or avoidance of a chemical hazard is the primary method to protect personnel from chemical exposure. A physical hazard has the potential to cause injury to a person. The most likely cause of a physical hazard would result from broken or misused equipment. Properly maintaining and operating equipment are the primary methods to protect personnel from physical hazards.

2.1 CHEMICAL HAZARDS

Sump 1727 treatment train operator or visitor may be exposed to arsenic, fluoride, cadmium, lead, isopropylmethyl-phosphonate, and sulfuric acid. Except for sulfuric acid which is used to control the pH of wastewater, these chemicals are present in the wastewater and in the treatment residues in low concentrations.

Exposure to contaminated wastewater is possible at the sump or from the treatment train. Contact with contaminated wastewater may be from submersible pumps, leaking valves or joints, or sample collection. Routes of chemical exposure are ingestion or skin absorption.

Residuals are the result of spilled fluids drying, leaving a residue on the floor or equipment surfaces. Contact with the contaminated residual may be from house cleaning procedures or direct skin contact with equipment. House cleaning procedures (ex., sweeping the floor) will stir the residue into the air,

resulting in the residue being inhaled by the worker. Working around or on equipment may result in direct skin contact. Improper personal hygiene may cause the contaminants on the skin to be ingested or absorbed.

Discussed below are possible medical problems that could result from excessive exposure to contaminants at Sump 1727.

ARSENIC

Exposure to arsenic may increase the probability of developing lung cancer, skin cancer, or tumors. Chronic toxic effects of exposure to arsenic involve thickening of the skin, liver damage, neurological disturbances, and gangrenous condition of the extremities. In addition, chronic arsenic exposure may increase the possibility of developing fatal cardiovascular diseases.

FLUORIDE

Fluoride in the form of dust causes irritation of the eyes and respiratory tract. Absorption of excessive amounts of fluoride over a long period of time may increase bone density. Repeated exposure can cause fluorosis of the skeleton and dermatitis of the skin. Mottled appearance and altered form of teeth are produced when excessive amounts of fluoride are ingested during teeth formation and calcification.

CADMIUM

Cadmium exposure may increase the occurrence of prostate cancer. Chronic exposure to cadmium can cause emphysema, renal damage, and softening of the bone.

LEAD

The more serious health effects of chronic lead exposure are neurological damage, irreversible kidney damage, and adverse reproductive effects observed at higher levels of lead exposures. The cells which produce red blood cells are the most sensitive target organ for lead.

ISOPROPYLMETHYLPHOSPHONATE

There has been no data found to support any adverse impacts to humans from isopropylmethylphosphonate. However, some research has shown acute dermal toxicity in rabbits and skin sensitization in guinea pigs (Dacre, 1984).

SULFURIC ACID

Sulfuric acid has a dermal toxicity rating of extremely hazardous which may result in tissue death or destruction. The skin penetration rate of sulfuric acid is ranked from moderate to high.

2.2 PHYSICAL HAZARDS

Physical hazards at the site are posed by 55-gallon drums, tools and equipment, and the electrical system. Improper movement of 55-gallon drums may cause strained or pulled muscles. Carelessly or improperly used tools (ex., wrenches) or equipment (ex., motors) may cause crushed or broken bones. Contact with exposed wires or improperly maintained electrical equipment may result in electrocution or electric shock.

3.0 SITE CONTROL, PROTECTIVE CLOTHING, AND DECONTAMINATION

3.1 SITE CONTROL

Primary entry to the sump site is controlled at the RMA's main gate. Only authorized personnel or visitors are allowed to enter the arsenal and/or enter the area where the sump is located. The sump is surrounded by a chain-linked fence with a locked gate. Secondary entry to the sump site is controlled by the operator. Personnel and visitors entering the sump site will be approved and accompanied by the operator. Persons entering the site are required to wear the protective clothing outlined in Section 3.2.1 of this report.

3.2 PROTECTIVE EQUIPMENT

3.2.1 PERSONAL PROTECTIVE CLOTHING

The probability of direct contact with contaminants at Sump 1727 is minimal. It was determined; based on the contaminant type, permeability, and probable contact time; that Level E (as defined in the RMA Health and Safety Plan) personal protective clothing is appropriate. Level E protective clothing includes the following:

- Cotton coveralls or fatigues,
- Cotton socks and underwear,
- Steel-toed work shoes or boots,
- Safety glasses (Tight fitting safety goggles or a full-face shield will be worn when connecting the sulfuric acid to the pH adjustment tank).
- Surgical gloves will be worn whenever handling sample containers or any material coming in contact with contaminated wastewater.

- o Acid resistant safety gloves will be worn when handling sulfuric acid.

3.2.2 RESPIRATORY PROTECTION

Building 1713 is equipped with a forced air ventilation system. The ventilation system is to be turned on when entering the building and allowed to ventilate for 5 to 10 minutes before work in the building starts. The ventilation system will remain on while the building is occupied.

Operational procedures which generate airborne particulates are cleaning up area, sweeping, and house cleaning. Workers are required to wear respirators equipped with dust filters while changing treatment drums and house cleaning.

3.3 DECONTAMINATION

Decontamination before leaving the work zone is required of all persons (and equipment). Decontamination procedures prevent the transfer of chemical contaminants from protective clothing to the skin or other surfaces. Water and commercially available detergents are used to decontaminate reusable clothing and equipment. Wastewater generated by decontamination will be recycled into the treatment train. Surgical gloves are removed and discarded as non-hazardous solid waste. However, if gloves or any clothing become grossly contaminated they will be treated as a hazardous waste. A 55-gallon drum, marked "Contaminated Discarded Clothing", will be available on-site at all times.

4.0 PERSONNEL TRAINING REQUIREMENTS

Personnel training requirements as stated in the Occupational Safety and Health Administration (OSHA) Standards and Regulations (OSHA-29 CFR Part 1910.120), and the United States Environmental Protection Agency applicable standards and guidelines are in effect at RMA. OSHA guidelines state that hazardous material workers have the right-to-know the potential chemical and physical hazards associated with the materials they work with. Each worker will be instructed in the proper handling procedures of hazardous materials in a 40-hour OSHA hazardous material safety training course. A yearly, 8-hour, refresher course is required by OSHA to maintain the worker's certification.

5.0 MEDICAL SURVEILLANCE

Personnel working with hazardous materials must participate in a medical surveillance program, in accordance with OSHA regulations. The medical surveillance is a physical examination which includes urine and blood analysis (i.e., metal screening) taken at an approved medical center. It is taken annually (at a minimum) and upon termination of employment. Examinations serve to verify that an individual is physically fit and establishes a baseline of an employees health. A record of medical test results will be maintained in each employee's personnel file. These records will be used to verify that every person assigned to the site has an up-to-date medical file. Participation in the medical program will be confirmed by the RMA health officer before an employee can begin on-site activities.

6.0 SITE SPECIFIC SAFETY PRECAUTIONS

All employees are to be familiar with the following site specific safety precautions:

- Discharge valves on chemical feed pumps are to be double checked to insure they are open before pump start-up and to protect against rupturing pipelines.
- Chemical delivery systems are to be routinely inspected for leaks. If a leak is detected the system is to be immediately shutdown until repairs are made.
- Before chemical feed pipelines are dismantled for cleaning modifications, or repair; pressure is relieved through pressure relief valves.
- Floors are to be washed after the repairs are made. The water is drained to the floor sump which discharges into the treatment train.

6.1 ACIDIC CHEMICALS SAFETY PRECAUTIONS

Contact with acidic chemicals pose the following potential hazards: 1) chemical burns, 2) irritation of contacted area, 3) removal of natural skin oils, and 4) metal corrosion. Persons handling acidic chemicals are to use the following precautionary measures:

- Use with adequate ventilation. Avoid breathing vapor or mist.
- <u>DO NOT ADD WATER TO ACID</u>. Slowly add acid to cool water.
- Store acid in a cool place.

6.2 ELECTRICAL SAFETY PROCEDURES

Electrical hazards are defined as potential risks or dangers

which can cause or contribute to bodily injury or death. Potential hazards are always present where electrical equipment is used.

Two basic electrical hazards are electrical shock and fire. Both types of hazards can result in permanent injury or death. Carelessness. improper maintenance procedures, and lack of training are the contributing causes of most accidents involving electricity.

Implementing the following basic safety precautions will eliminate much of the risk associated with electrical equipment:

- Remove all rings, watches and other jewelry before starting work.
- Disconnect equipment from power source before servicing, lock the circuit breaker open, if possible, and tag the breaker **"DO NOT OPERATE"**.
- Always test with a voltmeter or other appropriate test equipment to make certain that power has been shut-off. Never assume that the power is off just because the circuit breaker is open. The wrong breaker may have been opened.
- Work as though the power is still on (i.e., never stand on a wet surface).
- Do not bypass safety devices.
- Avoid direct contact with metallic parts of the equipment.
- Use only class "C" fire extinguisher on electrical fires.
- Never leave the cover off electrical enclosures. Always replace the cover before leaving the work area.

6.3 TANK HANDLING SAFETY PROCEDURES

Implementing the following basic safety precautions will eliminate much of the risk associated with 55-gallon drums filled with hazardous materials:

- All employees should know basic chemical handling safety procedures to prevent leaks and spills.
- Chemical off-loading from trucks should be carefully monitored to prevent spills.
- Appropriate personal safety equipment, as described in personal protective equipment section, should be worn.
- Safety shower and eye wash station are available for decontamination of individuals.
- Forced ventilation is required during use of the building.

7.0 EMERGENCY PROCEDURES

All personnel should know the following steps in case of an emergency:

- If the accident is serious (life threatening) call the fire department at extension 223 (telephone is located in Building 1710).
- If emergency medical aid has been called, they should be met at the entrance and directed to the location of the injured person.
- While waiting for emergency medical aid, first aid should be administered to the injured person. All personnel should be routinely trained in administering first aid.
- In the advent that clothing becomes grossly contaminated with chemicals it should be removed immediately and the skin thoroughly washed.
- Skin which has come in contact with chemicals should have the area washed with large amounts of water for at least 5 minutes by using a water hose or the emergency shower. Remove the victim's clothing from the areas involved. If the contacted area begins to redden or shows excessive irritation, seek medical attention.
- If chemicals contact the eyes, the eyes should be flushed with water for at least 5 minutes. Positions the victim at the emergency eye wash station and pull the plugs to activate the water flow. Cover the victim's eyes with a dry, clean, protective dressing (do not use cotton) and bandage in place. Get medical help immediately.
- If contaminants or chemicals are ingested, rinse the mouth thoroughly with water. Give several glasses of water to drink, followed by milk of magnesia. Contact a physician at once.

- If residues or particulates are inhaled, remove the person from the area to reduce additional exposure. In case of severe over-exposure, get medical attention at once.

REFERENCES

Dacre, Jack, C., Ph.D., D.Sc. October 1984. Recommended Interim Criteria for Three Environmental Polluting Compounds of Rocky Mountain Arsenal, Technical Report 8302. Prepared for U.S. Army Toxic and Hazardous Materials Agency.

Department of the Army, Rocky Mountain Arsenal, Commerce City, Colorado. 4 January 1988. Safety - Chemical Safety Program Requirements Control Procedures for Access to Agent Contaminated Buildings, RMA Regulation Number 385-31.

RIC 88244R01
Environmental Sciences and Engineering, Inc. July 1987. Draft Final Treatability Study, Sump 1727 Interim Response Action Assessment. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal.

RIC 88243R01
Environmental Sciences and Engineering, Inc. July 1988. Final Report, Sump 1727, Interim Response Action Alternatives Assessment, Version 3.2. Prepared for U.S. Army Program Manager's Office for Rocky Mountain Arsenal.

Morrison-Knudsen Engineers, Inc. July 1988. Draft Implementation Plan for IRA to Improve the North Boundary System Via Construction of Groundwater Recharge Trenches. Prepared by Shell Oil Company.

Occupational, Safety and Health Administration. 1988. General Industry Standards, 29 CFR Part 1910.

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Hazardous Response Support Division. November 1984. Standard Operating Safety Guides.

RIC 83326R01
Witt, M., D. Campbell, U.S. Army Toxic and Hazardous Materials Agency, Rocky Mountain Arsenal Contamination Cleanup, Aberdeen Proving Ground, Maryland. September 1983. Selection of Contamination Control Strategy for Rocky Mountain Arsenal.

APPENDIX

COMMENTS AND RESPONSES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

MAR 30 1989

Ref: 8HWM-SR

Mr. Donald L. Campbell
Office of the Program Manager
Rocky Mountain Arsenal
ATTN: AMXRM-PM
Commerce City, Colorado 80022-2180

Re: Rocky Mountain Arsenal (RMA)
Draft Implementation Document for
the Interim Response Action for the
Building 1727 Sump, February 1989.

Dear Mr. Campbell:

We have reviewed the above referenced document and have the enclosed comments. Please contact Linda Grimes at (303) 293-1262, if you have questions on this matter.

Sincerely,

Connally Mears

Connally Mears
EPA Coordinator
for Rocky Mountain Arsenal Cleanup

Enclosure

cc: Jeff Edson, CDH
David Shelton, CDH
Jackie Beradini, CAGO
Lt. Col. Scott P. Isaacson
Chris Hahn, Shell
R. D. Lundahl, Shell
David Anderson, DOJ

COMMENTS ON THE DRAFT IMPLEMENTATION DOCUMENT
FOR THE INTERIM RESPONSE ACTION FOR THE
1727 SUMP

GENERAL COMMENTS

1. The title of the document needs to be consistent. On the cover it is the "final"; on the internal cover sheet, it is the "draft"; but, it has a brown cover, indicating a "draft final" document. Please correct this inconsistency.

2. What testing was done to establish the integrity of the sump? As stated on page 14 of the Decision Document, a detailed evaluation of the sump was to be performed and the IRA modified if deficiencies detected required such modification. What measures will be necessary for this tank to be in compliance with the current tank regulations established by EPA and on which the Army has been copied? Please provide a section in the report detailing the measures taken to assess the integrity of the sump.

3. Since this is a currently operating system, it is assumed that no detailed design document will be prepared for this IRA. EPA, therefore, requests that this document specify flow rates, pressures attained, materials of construction, and frequency of inspection of the pumps, feed lines, etc. Does a separate O&M document exist for this system or is the information here inclusive of that; if so, please expand the text to more fully detail O&M.

SPECIFIC COMMENTS

1. Page 9, Section 4.3. The text should indicate what the mesh size of the filters are.

2. Page 13, Section 5.1.1, and page 18, Section 6.3, the text should state how the spent filters will be disposed of, and whether the filters will be considered a hazardous or non-hazardous waste. As stated on pages 30 and 31 of the Decision Document, "excess contaminated material determined to be hazardous waste which may be generated during this IRA" must meet the substantive RCRA requirements listed on page 31.

3. Page 23, the system should be designed to achieve a more modular approach for changeout of the GAC and AA. EPA suggests usage of drums to breakthrough and disposal of the drum and replacement, rather than the existing method of drum contents emptying to better ensure worker protection and safety.

4. Page 23, Section 6.5. How long will the spent adsorbent disposal drums be stored in Buildings 1713 or 758? What will be the ultimate fate of the spent AA and spent GAC material? Refer to Comment 2 above: the storage, handling, and disposal of

material determined to be contaminated must meet substantive RCRA requirements.

5. Page 26, Section 7.1, third paragraph, the effluent should be sampled for organics to verify that fluoride is the first compound to reach breakthrough and to assure that all ARARs are being met. Otherwise, revise the sampling scheme to sample for IMPA at the point of discharge from the treatment system.

6. What will be the monitoring frequency for the selected indicator compounds? Once a baseline is established, 1 to 2 times per month might be adequate for the metals because of the regular monitoring for fluorides. Until there is adequate information on the effective life of the activated carbon columns, more frequent monitoring for IMPA may be required. What is going to be the turnaround time for the samples? Quick turnaround (one week or less) is needed to insure that adequate treatment is being provided.

7. During the treatment ~~tank~~ changeout, mention is made of draining the liquids to the sump in Building 1713. Will the liquids in the sump be pumped back to the treatment system? If that is not correct, where do the liquids go?

8. How long is this treatment system likely to be in operation? If it will be more than a few months, what is the likelihood of the concentration of other pollutants in Sump 1727 increasing in concentration to the point of being of concern? Sufficient monitoring to provide adequate control over the situation is needed. On page 27, first paragraph, it is mentioned that GC/MS analysis will be done each year, or every 500 hours of operation, or for every batch if the system is operated in a batch mode. A review should be made of the sources and potential sources of pollutants going into Sump 1727 to allow proper evaluation of the adequacy of the monitoring.

9. EPA prefers monitoring for fluorides between the two AA tanks (presented as an option on page 26), which would provide a better chance of catching the breakthrough before it becomes extensive, in that the system would lose some exchange capacity in the second tank.

10. For the fluoride test procedure, the daily calibration of the instrument should be checked with two standards bracketing the expected concentration of the samples (e.g., 1 and 10 mg/l).

RESPONSE TO U.S. EPA REVIEW COMMENTS ON
THE DRAFT IMPLEMENTATION DOCUMENT FOR THE
INTERIM RESPONSE ACTION FOR BUILDING 1727 SUMP

GENERAL COMMENTS

1. (Comment)

Response: Comment noted and final Implementation Document white cover will be consistent with internal cover sheet.

2. (Comment)

Response: At present, there is no hazardous water in the sump. The Army has awarded a contract to evaluate the 1727 Sump's integrity. The assessment report with recommendations for improvement if required should be available under separate cover by the end of September 1989.

3. (Comment)

Response: Since this document represents the O&M Manual for the treatment system, Section 4.0 Treatment System Description has been expanded to more fully detail O&M and specify additional information regarding components of the system.

SPECIFIC COMMENTS

1. (Comment)

Response: Comment noted and text revised accordingly.

2. (Comment)

Response: The spent filters will be removed and stored in drums in the waste storage facilities on-post. Final disposition of the filters will depend on whether they are determined to be hazardous or non-hazardous. Section 4.0 has been expanded to address this approach.

3. (Comment)

Response: Concur. Section 6.5 has been revised to address this approach. The system is designed with a modular approach of using both GAC and AA drums that will be procured and disposed of in the filled condition. The GAC and AA drums will not be emptied of filter material and refilled during

plant operations as originally planned.

4. (Comment)

Response: As noted in response to Specific Comment 3 above, the plan is to use the modular approach which will minimize storage time in the plant and will not require storage on-post. Spent drums will be returned to the vendor when new fresh drums are delivered.

5. (Comment)

Response: Process control samples (influent and effluent) for fluoride are performed on a weekly basis during operations with an immediate turnaround time through use of ORION EA940 by operator personnel. Process control samples for cadmium, lead, arsenic, mercury and pH are performed on a monthly basis during operations. The turn-around time for sample analysis is 30 to 60 days by contract. A GC/MS scan will be performed during operations on a quarterly basis for influent and effluent. IMPA will be analyzed on a monthly basis with a turn-around time of about 2 weeks using the RMA Laboratory.

6. (Comment)

Response: In addition to monitoring indicated in response to Specific Comment 5 above, samples will be taken between GAC and AA drums for process control and determination of breakthrough. This sampling will assure that effluent meets the required limits.

7. (Comment)

Response: Since the treatment tank changeout will not include emptying drums, the drum liquor will be transferred from drums to the influent holding tanks. From these tanks, the liquor will be processed through the treatment system. No liquid will be drained to a floor sump. The text has been revised to address this approach.

8. (Comment)

Response: The treatment system will be required to treat water from the GB plant (1501 basement, 1506 underground storage vaults and sump, and underground exhaust ventilation system) as long as the water contains compounds requiring treatment, as long as water infiltrates into these buildings and exhaust ducts from the groundwater, or as long

as the plant is in existence. The Army is required by the Department of Defense Explosive Safety Board finding of October 1987 to keep the plant's basements and underground vaults dry. Allowing water to remain in these areas would cause deterioration of the buildings' walls, floors and equipment which could lead to safety problems. The water in the buildings will be sampled prior to any treatment to determine the concentrations of compounds present. GC/MS scans will be performed on a periodic basis on water that collects in the GB plant underground areas.

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH
4210 East 11th Avenue
Denver, Colorado 80220
Phone (303) 320-8333

Roy Romer
Governor

Thomas M. Vernon, M.D.
Executive Director

March 30, 1989

Mr. Donald Campbell
Deputy Program Manager
Contamination Cleanup
AMXRM-PM, Building 111
Rocky Mountain Arsenal
Commerce City, CO 80022-2180

Re: State Comments on the Draft Implementation Document for the Interim Response Action for Building 1727 Sump

Dear Mr. Campbell:

Enclosed are the State's comments on the Draft Implementation Document for the Building 1727 Interim Action.

Building 1727 Sump is a RCRA regulated hazardous waste management unit, and therefore, must be closed in accordance with the Colorado Hazardous Waste Management Act (CHWMA). Specifically, the unit must be closed in accordance with 6 CCR 1007-3, Subpart G, Sections 265.110 et. seq. Any treatment, storage, or disposal facility constructed, or presently located on-site, used to manage Building 1727 Sump wastes, including Buildings 1607, 1713, and/or 738, and the liquid treatment unit, must be permitted under CHWMA by the Colorado Department of Health. Because the sludges removed from the sump meet the definition of a hazardous waste, these wastes must also be managed in accordance with all applicable Colorado Hazardous Waste Regulations.

Furthermore, the State does not believe their September 28, 1988 comments to the Proposed Decision Document were adequately addressed. As stated in the July 1988 1727 Sump Alternatives Assessment Final Report, Pages 1-5 and 1-6, "The internal walls appeared to be in good condition, but were not entirely assessable.... Therefore, the integrity of the entire sump was not determined. If the sump is cracked below ground level, it is possible that water could be seeping through the concrete into the surrounding soil."

Yet in response to the State's second comment in its September 28, 1988 letter, the Army states that it "has no reason to believe that the sump presents a threat to release contaminants to the environment, except from overflow, and [the sump] can safely contain liquid prior to treatment by the system contemplated by this interim response action." This appears to be a case of "if we don't look for leaks, they don't exist." The State remains unsatisfied that storing contaminated liquids in the 1727 Sump will alleviate the potential for exfiltration and infiltration of contaminated water. A new sump must be constructed, or the original sump retrofitted, to eliminate the potential for releasing hazardous waste into the environment.

The State also rejects the Army's decision to discharge the treated 1727 Sump liquids to the RMA sanitary sewer. The response to the State's September 28, 1988 comment, as stated on Page 48 of the Draft Final Decision Document, is "The Army believes no NPDES permit modification is necessary for this interim action. The treated water does not constitute a hazardous waste or any threat to the treatment plant or sanitary sewer."

The State does not believe it to be the responsibility of the U. S. Army to decide whether modification of their own NPDES permit is required. That responsibility belongs to the U. S. EPA with input from the Colorado Department of Health, Water Quality Control Division. The State requests a meeting be scheduled in the near future to discuss the Army's misuse of the RMA sanitary sewer, and modifications needed to the currently-expired permit.

The State questions how the Army can imply that the treated water does not constitute a hazardous waste, and that the treated water will meet drinking water standards. In a letter dated March 15, 1989 from Mr. Donald Campbell to Mr. Jeff Edson, a chart is attached listing contaminants found in the sludges of the 1727 Sump. The objective of this interim action, as described on Page 10 of the Draft Final Decision Document, is that "Toxicity will be reduced by the removal of As, F, IMPA, and other organics from sump water. Cadmium and lead will also be removed by the system." Included in the March 15th chart are chromium, copper, mercury, zinc, semi-volatile compounds ranging from 377 to 720 parts per million, TCE, MIBK, and up to 73.5 parts per million of unknown volatile compounds. It is essential that the Army make every attempt to identify the semi-volatile and volatile unknown compounds found in the sludges since they probably will be contaminants in the liquids. Identification of the unknowns may also change the Army's determination that no air standards exist for any chemical found in the 1727 Sump.

The State does not believe that treatment of all of the existing compounds, including the contaminants present in the sludges, will be achieved using the proposed system. This is especially true with the presence of a significant quantity of unknown compounds. Before this system is implemented and 1727 liquids discharged to the sanitary sewer, and ultimately to First Creek, the Army must reanalyze the 1727 Sump liquids, reevaluate the system to assure that it is capable of treating all existing and potential contaminants, and modify their NPDES permit.

The State's concern regarding effluent compliance monitoring has not been addresed by the Army. Comment No. 2 on Page 48 of the Draft Final Decision Document states Colorado's concern regarding effluent discharge limits from the treatment system, and the frequency of sampling. The Army responded that, "The final proposed monitoring plan for this interim action will be presented in greater detail in the Implementation Document." The Compliance Documentation Samples section of the Implementation Document, Pages 26 and 27, does <u>not</u> provide any detail regarding the monitoring plan. The section does not give the frequency of sampling, what analytes will be investigated, what frequency of sample will be run by GC/MS, or whether the system will be operated in a batch mode.

The State also did not receive an adequate response to the proposed IMPA treatment level. Before the level of 16.8 ppm is approved, all MOA parties must be presented with all available data that the Army used to conclude that 16.8 ppm is an adequate IMPA standard.

If you have any questions, please contact Mr. Jeff Edson with this Division.

Sincerely,

David C. Shelton
Director
Hazardous Materials and
Waste Management Division

DCS/JE/cf

cc: Michael Hope
David L. Anderson
Chris Hahn
Edward J. McGrath
Connally Mears
Mike Gaydosh
Lt. Col. Scott Isaacson
Tony Truschel

RESPONSE TO STATE OF COLORADO REVIEW COMMENTS
ON THE DRAFT IMPLEMENTATION DOCUMENT FOR THE
INTERIM RESPONSE ACTION FOR BUILDING 1727 SUMP

Paragraph 1 (Comment)

Response: None required

Paragraph 2 (Comment)

Response: The relationship between CERCLA and RCRA is an area of disagreement between the State and the United States. The Army will complete this interim action pursuant to CERCLA. No permit is required from the State in order to proceed with the planned interim action.

Paragraph 3 (Comment)

Response: At present there is no hazardous water in the 1727 Sump. The Army has awarded a contract to evaluate the 1727 Sump's integrity. The assessment report, with recommendations for improvement, if required, should be available under separate cover by the end of September 1989.

Paragraph 4 (Comment)

Response: See response to State's Paragraph 3 Comment above.

Paragraph 5 (Comment)

Response: The treated water will be normal influent discharged into the sanitary sewer system. The anticipated low flow rate of treated water and its good quality will not require any modification to the NPDES permit, the sanitary sewer, or the sewage treatment plant.

Paragraph 6 (Comment)

Response: As noted above, there is no need to amend the RMA's NPDES permit.

Paragraph 7 (Comment)

Response: As stated in the March 15, 1989, letter from Mr. Donald L. Campbell to Mr. Jeff Edson, it appears based on results of sludge analysis that the sludge was the primary source of contamination for the water that had collected in the sump.

Consequently, the 1727 sump water that is now to be treated by the treatment system is much less toxic and contaminated. The treatment system is designed to also adsorb organic compounds readily, and will effectively remove any other volatile and semi-volatile organic compounds. Section 7-2 has been revised to indicate that a GC/MS analysis will be performed during operations on a quarterly basis. This analysis and other more frequent analyses would provide a record of feed (influent) and effluent contaminant levels, and reveal any changes in feed contaminant levels or system performance.

Paragraph 8 (Comment)

Response: As stated in our response to State's Paragraph 7 Comment above, the Army plans to perform GC/MS analysis of the treatment plant effluent. While the 1727 Sump treatment system should effectively remove all organic compounds, additional treatment is provided by the carbon adsorption system at the sewage treatment plant prior to discharge to First Creek. The effluent from the sewage treatment plant is monitored on a monthly basis for contaminants of concern, and a GC/MS scan is performed to identify any other compounds.

Paragraph 9 (Comment)

Response: Process control samples (influent and effluent) for fluoride are performed on a weekly basis during operations. Process control samples (influent and effluent) for cadmium, lead, arsenic, mercury, IMPA and pH are monitored on a monthly basis during operations. The treatment plant influent and effluent will be monitored on a quarterly basis during operations for other organic compounds.

Paragraph 10 (Comment)

Response: Since there is not an ARAR which pertains to IMPA, the Army identified the best data available which evaluated the impacts of IMPA. The approach taken by the Army is technically sound and is protective of health and the environment.

Shell Oil Company

One Shell Plaza
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Houston, Texas 77210

March 17, 1989

Office of the Program Manager for Rocky Mountain Arsenal
ATTN: AMXRM-PM: Mr. Donald L. Campbell
Rocky Mountain Arsenal, Building 111
Commerce City, Colorado 80022-2180

Dear Mr. Campbell:

Shell Oil has reviewed the Draft Implementation Document for the Interim Response Action for Building 1727 Sump and has only the following comment on this document:

> At page 4 in the second paragraph, it is stated that the standards (ARAR's) "apply to discharges from the sump." In fact, the water quality standards (Subsection 3.1) apply to discharges from the treatment plant. Also, the noise standards (Subsection 3.3) apply to all activities associated with this IRA which are subject to the standards.

Sincerely,

R. D. Lundahl
Manager Technical
Denver Site Project

/ajg

Enclosure

cc: (w/enclosure)
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EPA Coordinator for Rocky Mountain Arsenal
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Denver, CO 80202-2405

cc: Mr. Thomas P. Looby
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Denver, CO 80220

RESPONSE TO SHELL OIL COMPANY REVIEW
COMMENTS ON THE DRAFT IMPLEMENTATION DOCUMENT
FOR THE INTERIM RESPONSE ACTION FOR BUILDING 1727 SUMP

(Comment)

Response: Comment noted. See text change on Page 4.