ROCKY MOUNTAIN ARSENAL

FINAL
SANITARY SEWER REMEDIATION
INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT
VERSION 3.2

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EBASCO SERVICES INCORPORATED

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U.S.ARMY PROGRAM MANAGER'S OFFICE FOR
ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

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THE PRIMARY OBJECTIVE OF THIS INTERIM RESPONSE ACTION IS TO PREVENT THE POTENTIAL SPREAD OF CONTAMINATION VIA THE SANITARY SEWER SYSTEM. THE SOURCES OF THIS CONTAMINATION ARE 1) CONTAMINATED GROUND WATER THAT HAS INFILTRATED INTO THE SYSTEM OR 2) CONTAMINATED SURFACE WATER RUNOFF THAT HAS ENTERED THE SYSTEM AS INFLOW.

THE ALTERNATIVES ASSESSMENT DISCUSSES THE FOLLOWING:

1. OBJECTIVES AND ASSESSMENT CRITERIA FOR THE IRA ALTERNATIVES
2. CONFIGURATION OF THE SANITARY SEWER
3. PRIORITY SEGMENTS FOR REMEDIATION
4. IRA ALTERNATIVES
5. EVALUATION OF THE ALTERNATIVES
6. PREFERRED TECHNOLOGY FOR EACH AREA SERVED BY THE SEWER
7. ARAR'S.

COMMENTS AND RESPONSES ARE FOUND IN THE APPENDIX.

14. SUBJECT TERMS

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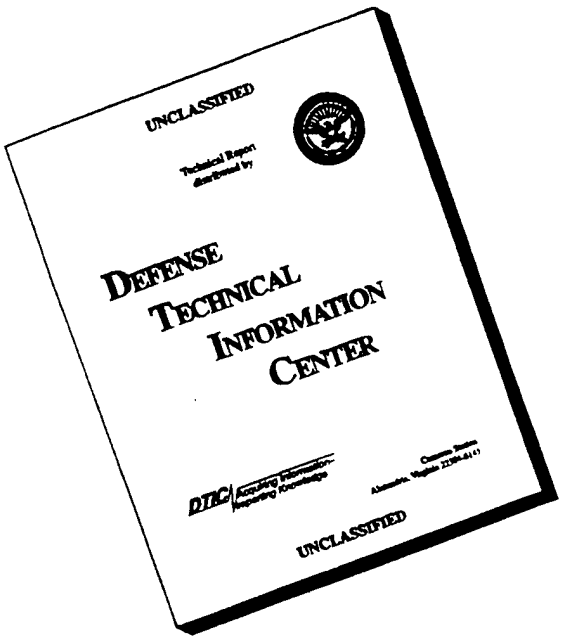

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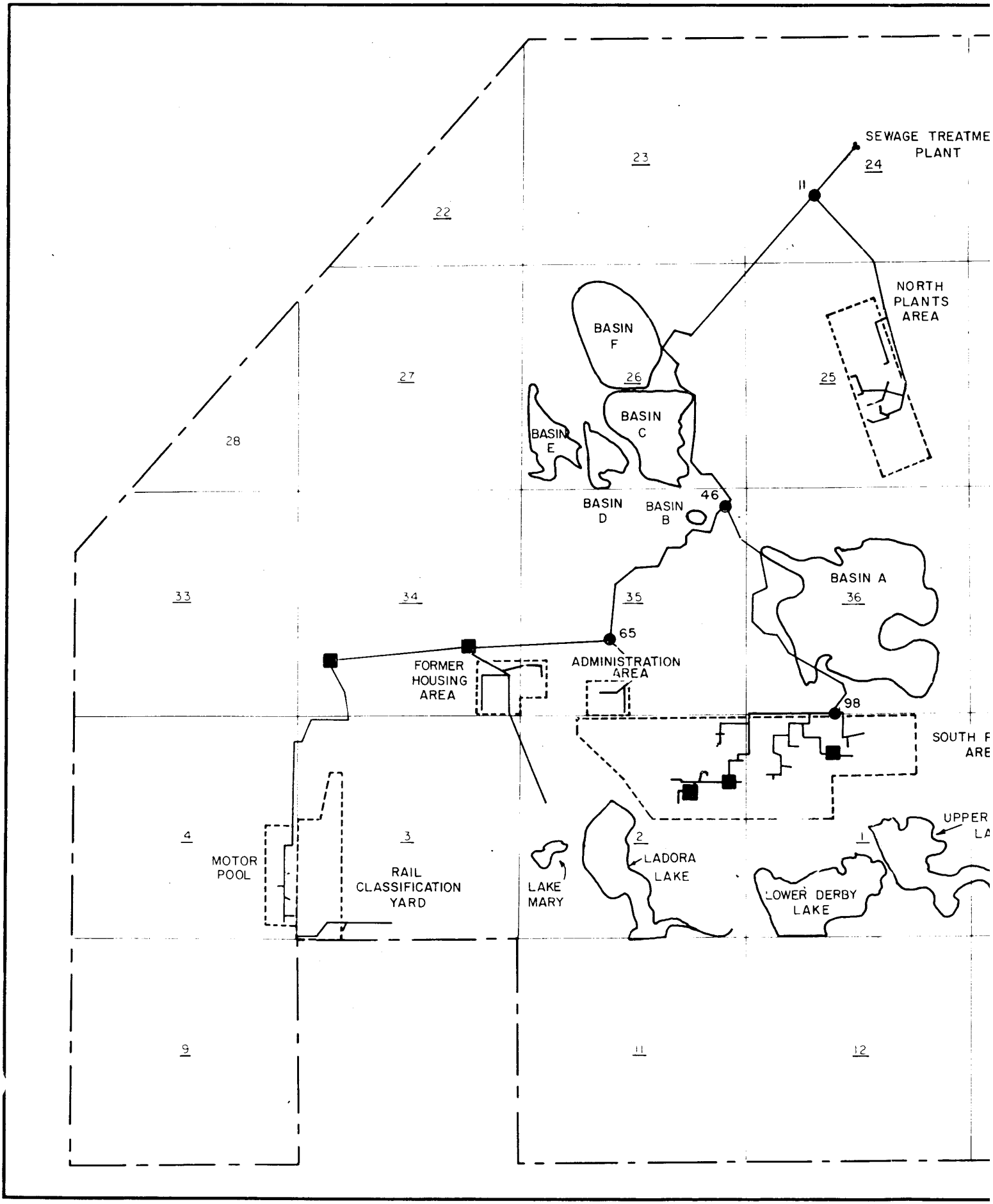
1.0 INTRODUCTION

The sanitary sewer system at Rocky Mountain Arsenal (RMA) serves the North Plants manufacturing complex, South Plants manufacturing complex, and the railyard and administration areas. Collection systems carry wastewater from these areas to the interceptor line, which in turn transports the wastes to the sewage treatment plant located in Section 24 (Figure 1). The sanitary sewer system is composed primarily of vitrified clay pipe (VCP) and has been in use since the Arsenal was constructed in 1942, with the exception of the North Plants collection system that was installed in the early 1950s. Previous studies have reported the sanitary sewer system to be in poor condition, with numerous cracks and broken pipes (Black & Veatch, 1979; 1980; USAEHA, 1985). The condition of the system is such that contaminated groundwater could enter the sewers and be transported to other areas of the Arsenal through the sewer (Stollar & Van der Leeden, 1981). Some segments of the sewer are currently in areas of high groundwater, where evidence of infiltration has been observed in the past.

One of the Interim Response Actions (IRAs) required as part of the proposed Consent Decree is the "remediation of certain priority portions of the sanitary sewer to minimize this potential pathway of contaminant flow" (paragraph 9.1 (j), Consent Decree, 1988). As stated in the proposed Consent Decree, this IRA project will "focus first upon those segments located below the groundwater table."

Priority locations have been identified and various alternatives have been evaluated based on technical feasibility, time to implement, and cost in order to select the most appropriate alternatives to meet the objectives of the IRA. Preliminary cost estimates have been developed for implementing the preferred alternative.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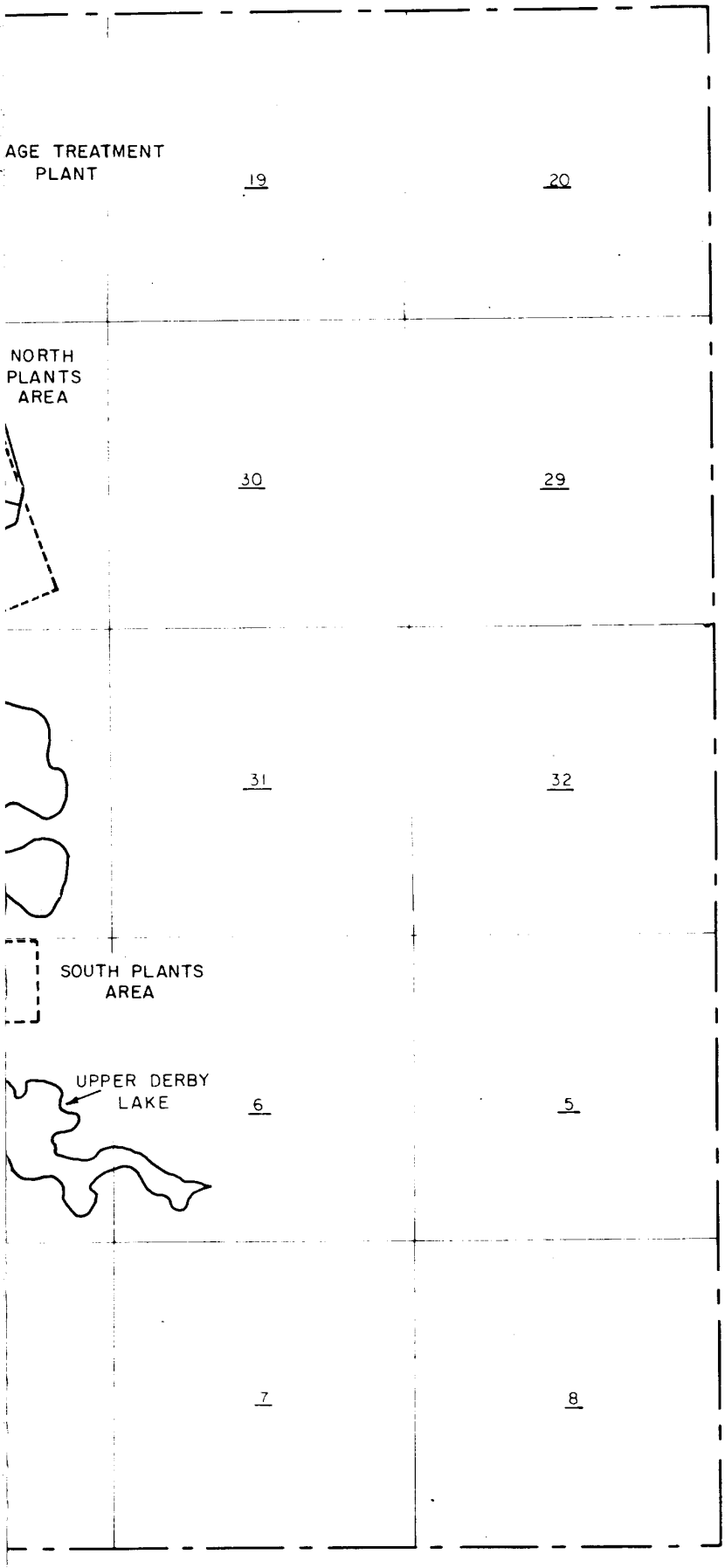

Legend

- Sanitary Sewer Main
- Lift Station
- 46 Manhole with Number
- 35 Section Number
- Area Boundary

N

0 2000 4000 6000

FEET

Prepared for :

Program Manager's Office for
Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

FIGURE 1

Location Map for the Sanitary Sewer System

Rocky Mountain Arsenal, Task 37

Prepared by: Ebasco Services Incorporated

2.0 RESPONSE ACTION OBJECTIVE

The primary objective of this IRA is to prevent the potential spread of contamination via the sanitary sewer system. The sources of this potential contamination are contaminated groundwater that has infiltrated into the system or contaminated surface water runoff that has entered the system as inflow.

3.0 ASSESSMENT CRITERIA

The proposed Consent Decree (1988) stipulates that all IRAs shall:

(1) "to the maximum extent practicable, be consistent with and contribute to the efficient performance of Final Response Actions" (paragraph 9.5);

(2) "evaluate appropriate alternatives" and "select the most cost-effective alternative for attaining the objective of the IRA" (paragraph 9.6); and

(3) "to the maximum extent practicable, attain ARARs" (applicable or relevant and appropriate requirements) (paragraph 9.7). A more complete definition of ARARs is contained in Section 9.1 of this document.

The assessment criteria used to evaluate various sewer system remediation alternatives are based on these guidelines.

Selection of the most effective alternative will be based on the following specific criteria: (1) timeliness; (2) effectiveness; (3) demonstrated performance; (4) availability; and (5) cost. The benefit to the Final Remedial Plan for RMA by implementing this response action as an IRA is dependent on an early implementation. Therefore, timeliness of implementation is a primary criteria in the screening and selection of alternatives.

ARARs are key criteria in the evaluation of alternatives. The establishment of ARARs for the sanitary sewer remediation IRA, to be completed as part of the total remedial action conducted at RMA under CERCLA 42 USC 9601 ET.SEQ., will identify legal standards for this IRA that are either applicable orrelevant and appropriate to the chemicals or procedures of concern. These ARARs are legal standards to be met to the maximum extent practicable by the IRA. ARARs are presented in Section 9.

4.0 SANITARY SEWER CONFIGURATION AND PRIORITY SEGMENTS FOR REMEDIATION

4.1 DESCRIPTION OF SANITARY SEWER SYSTEM

Information on the configuration of, condition of, and potential contamination associated with the sanitary sewer system has been presented in several reports, including results from the recent RMA remedial investigation (RI) efforts. Applicable information from these reports is included in the descriptions of the sanitary sewers to provide general background information and is subject to the methodologies employed, and to the limitations and qualifications in the sources cited.

North Plants

The collection system in North Plants consists of about 13,000 feet (ft) of 4, 6, 8, and 10 inch diameter vitrified clay pipe and connects to the interceptor line at Manhole 11. A previous investigation using smoke testing and visual and video inspection showed the sewer to be in poor condition (Black & Veatch, 1979; 1980). At least one break in the line was identified upstream of Manhole S34 and seven exposed connections to razed buildings were found. Slip-lining of the entire system was recommended but was not conducted due to declining activity at RMA.

Investigations of the sewer system as part of the RMA (RI) showed limited contamination contained within the sewer and none outside of the sewer (Ebasco, 1988a). Groundwater in this area is from 10 to 20 ft below the pipe, so infiltration of contaminated groundwater is not possible.

Railyard and Administration Areas

The sewer serving the railyard and administration areas consists of approximately 38,000 ft of 4, 6, 8, and 12 inch diameter VCP and steel pipe. This branch of the sanitary sewer connects into the interceptor line at Manhole 46 and is still being used, although far below design capacity. A study using smoke testing and visual inspection showed this part of the system to be in poor condition (Black & Veatch, 1979; 1980). Smoke tests indicated leakage in the administration area, and an open pit inspection between Manholes 60 and 61 revealed that the pipe was on the verge of collapse. Slip-lining was recommended but was never implemented because of declining activity at RMA.

The sewer system was also investigated by the U. S. Army Environmental Hygiene Agency (USAEHA, 1985). Flow measurements showed that as much as half the flow from the railyard area was being lost due to exfiltration. This was further proof that the sewer was not in good condition. Infiltration of groundwater does not occur because the water table is about 50 ft below the level of the sewer in the railyard area and about 30 ft below the level of the sewer in the administration area.

Studies performed as part of the RMA RI showed limited evidence of contamination contained within the sewer but none outside of the sewer, except at the lift station overflow ditches (Ebasco, 1988b).

South Plants

The sanitary sewer in the South Plants area consists of approximately 20,000 ft of primarily 4 to 12 inch diameter VCP, with small amounts of polyvinyl chloride, asbestos cement, and cast iron pipe also present. Wastewater from this area is transported to Manhole 98 at the extreme southern end of the interceptor line. The system in South Plants is partially in use at this time.

Black and Veatch used smoke testing, video cameras, and direct observation to determine the condition of the sanitary sewers in the South Plants area (Black & Veatch, 1979; 1980). Inspection showed line sags, offset and leaking

joints, broken joints and pipe sections, and crushed pipe. Chemical odors were noted in several manholes and many service connections were found that were not shown on drawings. Heavy infiltration was noted between Manholes 101 and 103, along December 7th Ave. Repairs were recommended but were never implemented.

The U. S. Army Environmental Hygiene Agency also found evidence of chemicals in the sanitary sewer in South Plants (USAEHA, 1985). Pesticides and solvents were found in water samples from the sanitary sewer, indicating either cross-contamination with the chemical sewer or infiltration of contaminated groundwater.

Samples collected from the sanitary sewer by Shell Chemical Company between 1977 and 1979 also showed the presence of pesticides, solvents, and process intermediates (Shell, 1977; 1979a-d). Again, this indicates either cross-contamination with the chemical sewer or infiltration of contaminated groundwater.

Investigations performed as part of the RMA RI showed contamination in soils surrounding the pipe (Ebasco, 1988c).

The configuration of the sanitary sewer in South Plants is shown in Plate 1. Areas of the sewer that are or have been below the water table and areas of possible cross-contamination with the chemical sewer are indicated. Segments of the line identified as being below the water table are the entire west-central branch and the pipe between Manholes 101 and 102 along December 7th Avenue (Black & Veatch, 1979; 1980). Possible cross-contamination points with the chemical sewer have been identified on the west branch at the connections to Buildings 313 and 314 (RMA, 1976); on the west-central branch between Manholes 117A and 117B (RMA, 1957) and near Buildings 522, 451, and 471 (ODE, 1944; Knaus, 1978a; 1978b); and along the east-central branch between Manholes SA-1 and SA-2 (Knaus, 1979). The probability of contaminated groundwater entering the system is high in the South Plants due to the proximity of the sewer to the water table and the history of contamination in the area.

Interceptor Line

The interceptor line consists of about 18,000 ft of primarily 12 inch VCP, with small amounts of asphalt coated, reinforced concrete pipe, and is from 2 to 12 ft below the ground surface. The configuration of the interceptor line is shown in Plate 2. The interceptor line is still in use, although far below design capacity.

The condition of the interceptor line was investigated by Black and Veatch using smoke testing, physical observations, and flow measurements (Black & Veatch, 1979; 1980). It was concluded that the line was generally in poor condition, with considerable infiltration and exfiltration occurring in Section 36. Flow measurements showed that 50 percent of the flow was being lost between Manholes 79 and 19.

A study by the U. S. Army Environmental Hygiene Agency also found that 50 percent of the flow in the interceptor line was being lost between Manhole 44 and the sewage treatment plant (USAEHA, 1985). Pesticides and solvents were found in water samples collected from the sewer. It was concluded that these chemicals had entered the interceptor line with infiltrating groundwater.

Investigations as part of the RMA RI found several compounds in soil samples collected near the interceptor line (Ebasco, 1988d). Of these, dieldrin and mercury were assumed to have originated from the interceptor line and may be evidence of exfiltration of contaminants from the sewer.

In the early 1950s, infiltration of liquid from Basin A reportedly killed bacteria at the sewage treatment plant (RLSA, 1985). At that time the section of the line near Basin A ran beneath the groundwater high caused by the basin. This section of the interceptor line was later relocated to the west of Basin A to avoid future incidences of contaminated water infiltration and transport (DOACC, 1952). The original sewer was plugged and abandoned in place. Despite these efforts, the interceptor line is currently very near the water table in the vicinity of Manholes 79, 80, and 81 and still may become a pathway for contaminant transport.

4.2 PRIORITY SEGMENTS FOR REMEDIATION

The purpose of this IRA is to prevent the potential spread of contamination via the sanitary sewer system. To prevent the spread of contamination the sources of the contamination must be controlled, which in the case of the sanitary sewer are areas of infiltration or inflow. Priority segments are those where infiltration of contaminated groundwater or inflow from contaminated surface water runoff is most likely. Areas of exfiltration are not priority segments because contamination in the sanitary sewer originates from infiltration or inflow. Once these sources are eliminated, the potential for contamination to enter the sanitary sewer will be greatly reduced and any exfiltration that does occur will not result in contaminant transport.

Areas of the sanitary sewer where infiltration has occurred and is likely to continue to occur are in the South Plants area, as shown on Plate 1, and along the interceptor line between Manholes 98 and 46, the exposed connections discovered in North Plants by Black & Veatch (Black & Veatch, 1979; 1980) are points where contaminated surface water runoff, rather than contaminated groundwater, could enter the system. Remediation of these segments in South Plants, North Plants and along the interceptor line will prevent the entry of contamination into the sanitary sewer system and thereby minimize possible contaminant transport through the sewer system.

5.0 REMEDIATION ALTERNATIVES

5.1 GENERAL REMEDIATION METHODS

Four general alternatives are available for remediation of segments of the sanitary sewer system: removal, abandonment in place, rehabilitation, and replacement. These alternatives could be implemented on the entire system or could apply to select segments of the system. More than one general alternative may be used to meet the IRA objectives.

5.1.1 Removal

Segments of the sewer system considered to be primary sources of infiltration and inflow, or potential contributors to the transport of contamination, would be excavated, removed, and transported to a temporary storage facility to be constructed on RMA. The excavated pipeline and soil would be remediated

during the RMA Remedial Action. This alternative is viable only for segments of the sewer that can be closed permanently.

5.1.2 Abandonment In Place

The IRA priority segments of the sewer line would be abandoned in place and strategic manholes would be filled with concrete to prevent migration of contaminated water through the system. The entire line could be grouted but this level of remediation is not necessary for an interim response activity. This alternative is only viable if the segment can be closed.

5.1.3 Rehabilitation

The IRA priority segments of the sewer system would be rehabilitated in place by either slip-lining or by in situ forming a new pipe inside the existing system. This option applies to those parts of the sewer that are still in use. During rehabilitation, wastewater in the line will either be pumped to the nearest operational manhole or trucked directly to the sewage treatment plant.

5.1.4 Replacement

The priority segments of the sewer system would be excavated, removed, and transported to a temporary storage facility to be constructed on RMA. A new system would be installed with basically the same alignment and purpose as the removed segments. The replacement line can be either a below ground gravity line like the current sewer system, or an above ground force main which would require insulation and heating to prevent freezing in the winter. This method applies to segments of the sewer that will remain in use. During replacement, wastewater in the line will either be pumped to the nearest operational manhole or trucked directly to the sewage treatment plant.

5.2 GENERAL CONSIDERATIONS FOR SOUTH PLANTS

Remediation alternatives for the priority segments of the sanitary sewer are contingent on the configuration of the South Plants complex. Actions are currently being taken to limit activities there, primarily by closing buildings and relocating activities out of the area. Sanitary waste handling facilities will be needed for buildings that are left in service.

The biggest factor influencing the configuration of the South Plants sewers is whether or not the RMA Laboratory, Buildings 743 and 741, will be relocated to the administration area. If it is moved, the new facility will include a laundry and a small waste treatment system, so that the current laundry and laboratory support buildings (313 and 314) can be closed. Numerous buildings and warehouses currently connected to the sewer could be relocated or switched to septic tanks and drain fields. These buildings include 213, 316, 316A, 238, 341, 342, 343, 344, 351, 354, 362, 543, 544, 728, 729, 731, 732, 751, and 752. Funding has already been made available to install a septic tank and drain field for the commissary building (362) if needed. Individual package treatment plants could be used in place of septic tanks, but are generally more costly to install and operate. For this assessment only septic tanks will be considered, however, during the design phase both treatment options should be evaluated.

The boiler house (Buildings 321, 325, and 311) supplies central heat to the laboratory, the commissary (Building 362), RMA maintenance and utility buildings (331, 332, 543, 543B, 751, and 752), the laundry (313 and 314), the calibration laboratory (213), a contractor warehouse (728), and the South Plants Liquid Treatment Facility (SPLTF) tank (556). If the laboratory is relocated, the remaining heated buildings in South Plants could be closed with the exception of the commissary and the SPLTF tank. The boiler house could then also be closed, and the commissary and SPLTF tank could be heated individually.

Relocation of the RMA laboratory would allow virtually all of South Plants to close with the exception of the new decontamination facility. This facility is planned to be located approximately 150 ft southeast of the SPLTF tank and will empty into the tank before treatment. The wastewater will then either enter the sanitary sewer system at Building 540, adjacent to Manhole SA-3, or be transported through a new line to the fire station. At least one active line will be needed out of South Plants to service the treatment plant. The interceptor line could still be used for this purpose or a new line could be established from the Fire Station to the administration area and connected to that part of the sanitary sewer.

If the RMA laboratory is not relocated, the boiler house and Buildings 313 and 314 will still be in use. Sanitary waste handling will be needed for all of these buildings, and the incentive for relocating support buildings and warehouses out of South Plants will be reduced. Plans are currently under way to relocate the contractor trailers to an area north of the administration area, but plans for other relocations have not yet been initiated.

A summary of possible sewer configurations in South Plants is presented in Table 1. The first two columns of the table describe the location of the RMA laboratory and whether or not the interceptor line from Manholes 98 to 46 is in use. The remaining four columns describe the resulting impact on the sewer line and options for remediation. The same information is presented as a flow chart in Figure 2.

Remediation in areas of heavy soil contamination, such as the South Plants area, require special considerations. Excavation should be avoided as much as possible. This may require that replacement lines be installed above ground and be weatherproofed to prevent freezing in the winter. Pumpout systems may be required to serve buildings on a temporary basis during conversion of the sewers to a new configuration.

5.3 ALTERNATIVES FOR THE INTERCEPTOR LINE

The interceptor line is in poor condition and has shown signs of infiltration in the segment between South Plants and the tie-in from the railyard/administration area (Manholes 98 to 46). If this part of the interceptor line is used in the future, it will need rehabilitation or replacement.

Another option is to close the segment of the line between Manholes 98 and 46 and direct flows in South Plants to the Fire Station. A new line could then be installed from the Fire Station to the sanitary sewer in the administration area. Lift stations and new piping in South Plants will be needed to transport sewage to the Fire Station if this option is chosen. The existing sewer along December 7th Avenue could then be closed since it flows to the east, toward the interceptor line, and would not be used. The number of new

Table 1
Possible Co[illegible]uration and Remediation Options for the Sanitary [illegible] Page 1 of 1.

Buildings in Use In The South Plants	Interceptor Line	West Branch	West Central Branch	East Central Branch	East Branch
Keep the laboratory buildings 741 and 743 in their present locations.	Rehabilitate and continue to use.	The boiler house will still be needed (Bldgs 321, 325 and 311). Buildings 313 and 314 will remain active. Rehabilitate sewer and continue to use. Rehabilitate sewer along December 7th Ave.	Close line if Shell Building 316 and 316A can be relocated. If 316 and 316A remain, this branch will require extensive rehabilitation.	Rehabilitate from Bldg 540 to the interceptor line. Close upstream of MH SA-3 if Bldgs 543, 751 and 752 are relocated. Rehabilitate upstream of MH SA-3 if Bldgs 543, 751 and 752 are not relocated.	Rehabilitate line to MH 98. Leave Bldgs 728 and 729 in service.
	Discontinue use between MH 98 and 46. Install new line from the Fire Station to the Administration area.	The boilerhouse will still be in use (Bldgs 321, 325 and 311). Buildings 313 and 314 will remain active. Install connecting line to Fire Station. Close sewer line along December 7th Ave.	Close line if Shell Building 316 and 316A can be relocated. If 316 and 316A remain, this branch will require extensive rehabilitation.	Rehabilitate from Bldg 540 to December 7th Ave and install lift station and pipe to Fire Station, or install lift station and new pipe or pressure line directly to Fire Station from Bldg 540.	Rehabilitate line to MH 98. Leave Bldgs 728 and 729 in service.
Relocate the laboratory buildings 741 and 743 out of South Plants.	Rehabilitate and continue to use.	Close boilerhouse and associated utility/maintenance buildings 321, 325, 311, 332 and 331. Close Bldgs 313, 314, and 213. Disconnect warehouses 347 344, 343, 342, 341, 351, 354, and 328. Install septic tanks and leach fields, if needed for these buildings. Close sewer line.	Relocate Bldgs 316 and 316A. Close sewer line. Close sewer line along December 7th Ave. from MH 104 to 100.	Rehabilitate line between Bldg 540 and the incerceptor line or install new gravity sewer or pressure line from Bldg 540 to the interceptor line. If RMA maintenance/utility buildings 543, 751 and 752 remain active, rehabilitate sewer upstream of Bldg 540. If not, close line upstream of Bldg 540.	Close sewer line. Relocate activities in Bldgs 728, 729, 731, and 732. Relocate contractor trailers.
	Discontinue use between MH 98 and 46. Install new line from the Fire Station to the Administration area.	Close boilerhouse and associated utility/maintenance buildings 321, 325, 311, 332 and 331. Close Bldgs 313, 314, and 213. Disconnect warehouses 347, 344, 343, 342, 341, 351, 354, and 328. Install septic tanks and leach fields, if needed for these buildings. Close sewer line.	Relocate Bldgs 316 and 316A. Close sewer line. Close entire sewer along December 7th Ave.	Rehabilitate line between Bldg 540 and MH 100 and install new line and lift station or pressure line to Fire Station, or install new line and lift station or pressure line from Bldg 540 to the Fire Station. If RMA maintenance/utility buildings 543, 751, and 752 remain active, rehabilitate sewer upstream of Bldg 540. If not, close line upstream of Bldg 540.	Close sewer line. Relocate Bldgs 728, 729, 731, and 732. Relocate contractor trailers.

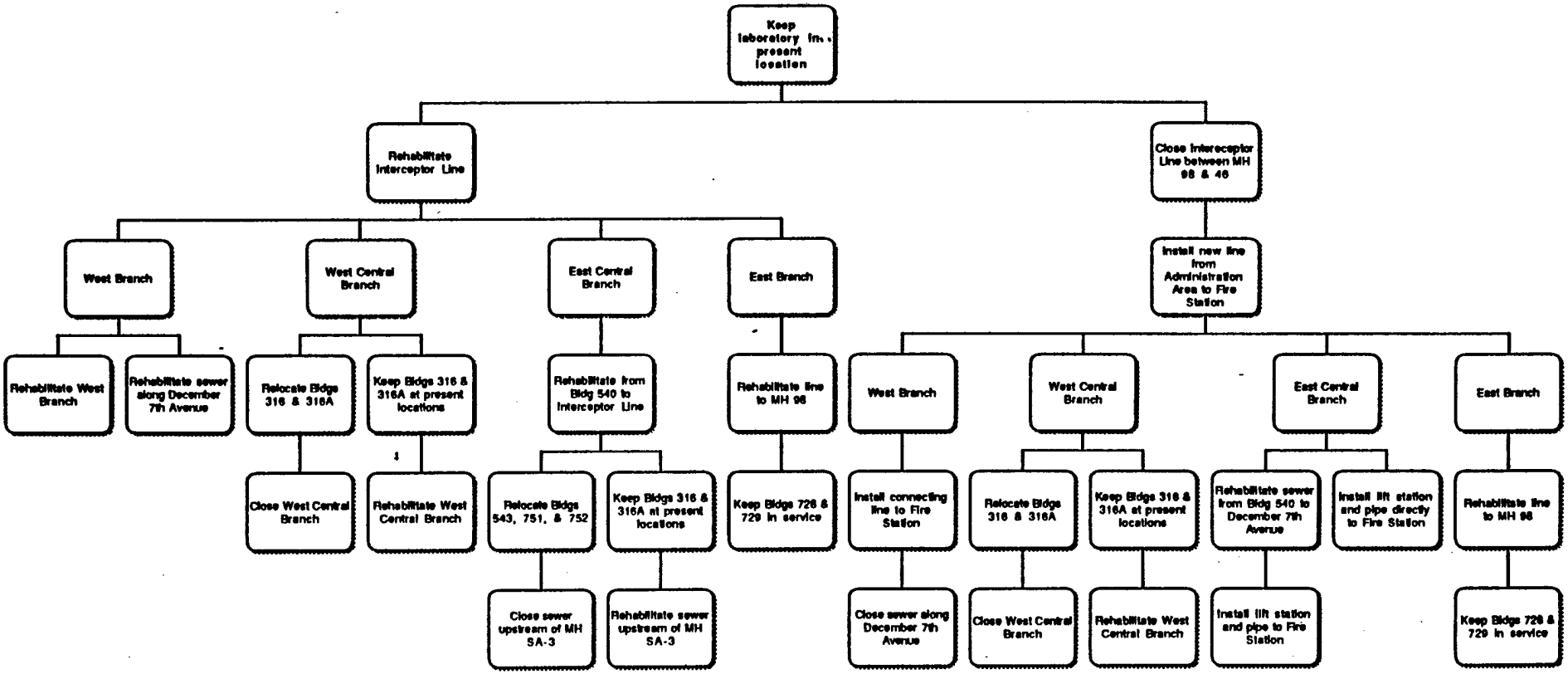

Figure 2. Remediation Options for the Sanitary Sewer Priority Segments. Page 1 of 2

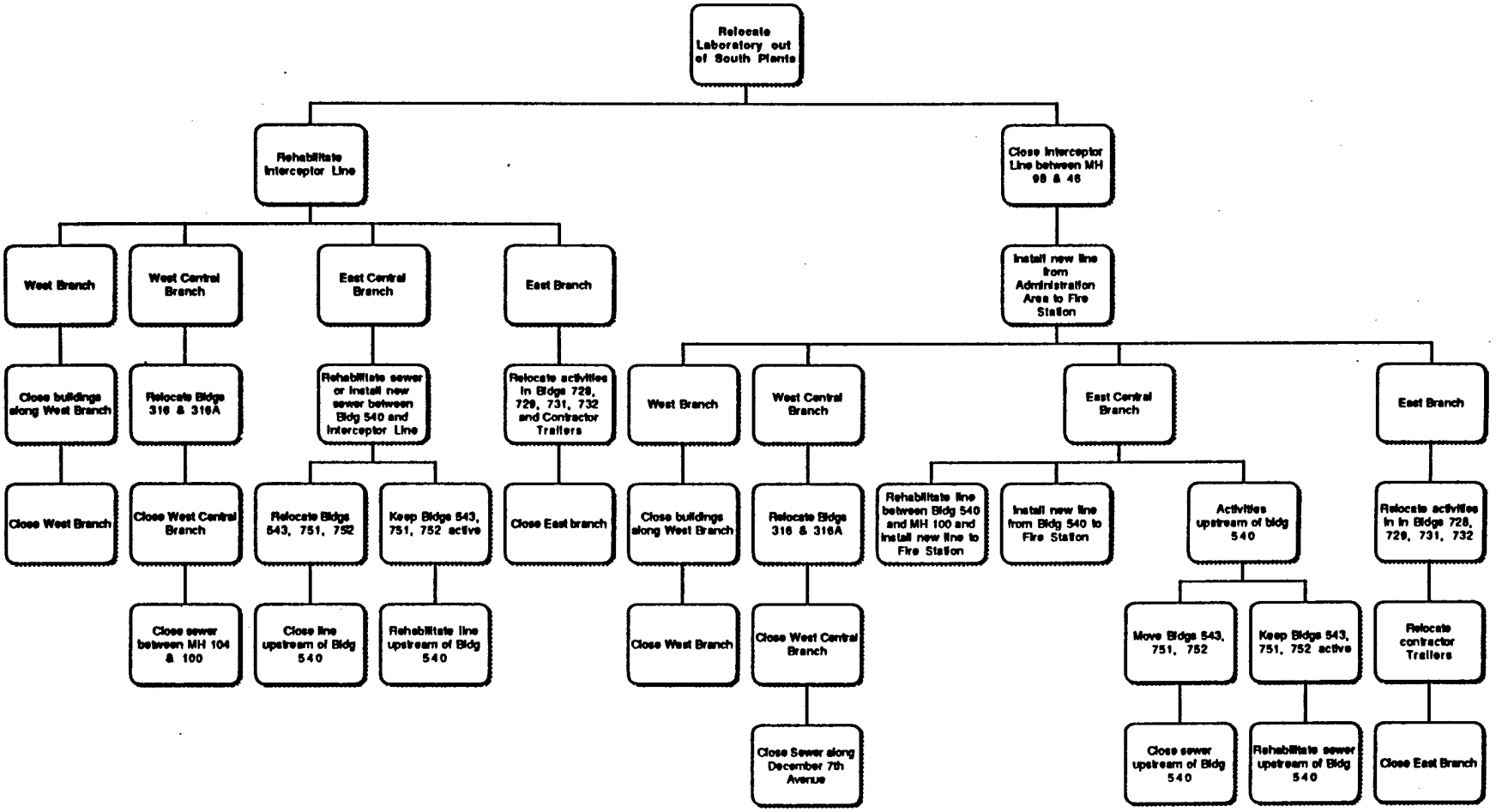

Figure 2. Remediation Options for the Sanitary Sewer Priority Segments. Page 2 of 2.

sewer lines required in South Plants will depend on which buildings remain in service.

5.4 ALTERNATIVES FOR SOUTH PLANTS WITH RMA LABORATORY

The presence of the laboratory in South Plants will require the laundry and laboratory support facilities (Buildings 313 and 314) to remain active. The west branch of the sewer will be needed to service these buildings, but will require rehabilitation or replacement due to its poor condition. If this branch of the sewer is upgraded, the incentive to close the boiler house, which is also serviced by the west branch, is eliminated and the boiler house will remain active.

The west-central branch of the sewer could be closed if Buildings 316 and 316A, are relocated. This is an area of high groundwater and much potential contamination. Closure of this part of the sewer is the single most effective step that can be taken to reduce the possibility of contamination being transported through the sanitary sewer system.

The east-central branch of the sewer will still be needed for the new decontamination facility. The line is in poor condition and needs to be rehabilitated or replaced. If the RMA maintenance and utilities buildings (543, 751, and 752) are relocated, the east-central line could be closed upstream of Manhole SA-3.

The laboratory is connected to the east branch of the sewer, which would still be needed for service. The line is in poor condition and would require rehabilitation or replacement.

5.5 ALTERNATIVES FOR SOUTH PLANTS WITHOUT RMA LABORATORY

If the laboratory is relocated out of South Plants, many buildings and warehouses can also be relocated. The boiler house and its associated maintenance and utility buildings can be closed, and the entire west branch of the sewer can be closed.

The west-central branch of the sewer could be closed if Buildings 316 and 316A are relocated. As stated previously, this segment of the sewer is a prime source of potential contamination in the sewer system. Closure would minimize contamination entering the sewer here and traveling to other areas of RMA.

The east-central branch of the sewer will still be needed to service the new decontamination facility. The pipe is in poor condition and will require rehabilitation or replacement if it continues to be used. If RMA maintenance and utility buildings 543, 751, and 752 are relocated, the part of the sewer upstream of Manhole SA-3 could be closed. The entire east-central branch could be closed if a new line is constructed to transport the flow from the SPLTF.

Without the laboratory on the east branch of the sewer, there is no need to keep this sewer line in service. The only other active buildings on this line are 728, 729, 731, and 732, all of which could be easily relocated.

5.6 ALTERNATIVES FOR THE NORTH PLANTS

The sanitary sewer in North Plants is only in use to receive discharge from the Building 1727 sump IRA treatment system. Potential contamination from the 1727 sump liquids is removed by the treatment system prior to discharge in the sewer. Infiltration of potentially contaminated groundwater will not occur in this area as the water table is 10 to 20 ft below the sewer. The only pathway for contamination to enter the sewer is through the seven exposed sewer connections found by Black and Veatch, which may allow surface water runoff to enter the sewer. Any contamination contained in the runoff water could be transported through the pipe to other areas of RMA. To prevent this, the exposed connections should be capped.

6.0 EVALUATION OF ALTERNATIVES

For the purpose of the IRA, priority segments of the sanitary sewer will require remediation whether they are left in service or are closed. If a priority segment is still needed for service, the options for treatment are replacement of the line or rehabilitation by slip-lining or in situ forming a new pipe inside of the original pipe. If the line can be closed, the choices

are abandonment or complete removal of the line. Because the future need for sanitary sewer service in South Plants has not yet been determined, cost analysis for each possible option has not been attempted. Relative costs for the possible treatment methods have been generated based on a hypothetical sewer line 5,000 ft long, 12 inches in diameter, 8 ft deep, and with 15 manholes. The estimated cost for an above ground replacement line was based on a 3 inch diameter pipe rather than a 12 inch diameter pipe because the above ground line would be a force main instead of a gravity line. A comparison of the costs to remediate this hypothetical sewer line by each of the methods will indicate which method is most cost effective. The least expensive method will be recommended for remediation of priority segments unless a more expensive method is determined to be more effective in reducing contaminant transport through the sewer system.

6.1 RELATIVE COSTS

The relative costs for each remediation method under consideration are shown in Table 2. Costs for slip-lining and in situ forming were provided by vendors (Ericson, 1988; Helm, 1988). Costs for removing sewers were derived from 1985 data for trenching and hauling at construction sites (NCE, 1985). These costs were then scaled to 1988 dollars using the Complete Urban Sewer System (CUSS) cost index developed by the EPA (Hunter, 1988). A hazardous waste work factor was also used to estimate the additional cost of working in a hazardous environment (EPA, 1987). Costs to abandon the line were based on 1985 data for concrete pouring for plugging manholes (NCE, 1985) and were also scaled to 1988 dollars using the CUSS index and the hazardous waste factor.

Replacement costs were taken to be the cost of removing a sewer plus the cost of installing a new, equivalent line. Installation costs for below ground sewers were based on construction costs in 1978 (EPA, 1978) and were scaled to 1988 dollars using the CUSS index and the hazardous waste factor. Installation costs for above ground, insulated pipe were based on cost estimates from another project at RMA and were scaled to 1988 dollars using the CUSS index.

Table 2. Relative Costs of Remediation Methods*

Method	Cost (1988 dollars)
Remediation	
Slip-Line	$ 290,000
In Situ Form	$ 400,000
Replace with Buried Line	$1,500,000
Replace with Insulated Above Ground Line**	$ 510,000
Closure	
Abandon and Plug	$ 9,500
Remove	$ 120,000

*Based on 5,000 ft of 12 inch diameter VCP with 15 manholes.

**Based on 5,000 ft of 3 inch diameter inner pipe and 6 inch diameter outer pipe.

It can be clearly seen from Table 2 that if a line is being closed, abandoning in place is significantly less expensive than removing it. Plugging manholes will stop any transport of potentially contaminated groundwater through the sewer. This method also eliminates the need to excavate in areas of known contamination. Complete removal of closed lines may be included in the final remediation plan for RMA, and the IRA would be consistent with this option.

Sewer lines that must be kept in service can be replaced or repaired. Preliminary cost estimates show that replacement can be done much more cost effectively by installing an above ground line than by installing a buried line. Also, installation of an above ground line will not require extensive excavation, unlike installation of a buried line.

If sewer lines are to be repaired, the choices are in situ forming or slip-lining. In situ forming requires no excavation and has no joints and seals against the walls of the existing pipe, eliminating infiltration. Slip-lining leaves an annular space between the new pipe and the old pipe, but the new pipe is grouted at every manhole, so transport of infiltrating groundwater is eliminated. In addition, excavations are required every 500 to 600 ft to allow installation of the pipe liner.

Based on preliminary cost estimates, in situ forming is roughly 40 percent more expensive than slip-lining. In situ forming is better suited to rehabilitation of sewers in contaminated areas because no excavation is needed, and no joints are present in the liner that could open up later. These considerations make in situ forming the preferred alternative for sewer line rehabilitation.

Preliminary cost estimates also show that the cost of replacement with an above ground line is about 30 percent more expensive than the cost of rehabilitation by in situ forming. The decision to rehabilitate or replace a segment of the sewer will depend on the segment under consideration and will be determined in the final design phase.

6.2 INTERCEPTOR LINE

If the interceptor line is closed from Manholes 98 to 46, the sewer line along December 7th Avenue can also be closed, and a new line installed from the Fire Station to the administration area. Plugging approximately one of every five manholes along the abandoned segment is assured to be sufficient to stop the transport of potential contamination through this length of sewer. Approximately 6,600 ft of sewer would be abandoned and 5 manholes plugged (every fifth manhole). Approximately 3,000 ft of new sewer would be required to connect the Fire Station to the administration area sewers.

This same segment of the interceptor line could be rehabilitated instead of abandoned, requiring approximately 6,600 ft of in situ forming.

Estimates of the costs for each of these options are summarized in Table 3.

6.3 SOUTH PLANTS WITH RMA LABORATORY

If the laboratory remains in South Plants, it will be assumed that the west, east-central, and east branches of the sewer will remain in operation. All of the pipe in these branches need rehabilitation, except that which is upstream of lift station 341B on the west branch, about 5,000 ft in all. It will also be assumed that the west-central branch can be closed by relocating Buildings 316 and 316A. Abandonment will require plugging approximately 5 manholes (one-third of the manholes) to ensure that the transport of potential contamination through the sewer is stopped.

Approximate costs for these activities are summarized in Table 3. Costs for building closures are not included in this IRA.

6.4 SOUTH PLANTS WITHOUT RMA LABORATORY

If the RMA laboratory is relocated out of South Plants, it will be assumed that other buildings will be closed or relocated to the extent that the west, west-central, and east branches of the sewer can all be closed. A total of approximately 15,000 ft of sewer would be abandoned and 20 manholes plugged (about one-third of the manholes).

Table 3. Order-of-Magnitude Costs for Remediation Options

	Cost (1988 dollars)
Interceptor Line	
Rehabilitate by In Situ Forming	$530,000
Abandon and Install New Line to Fire Station	$810,000
South Plants with RMA Laboratory*	$410,000
South Plants without RMA Laboratory*	$180,000
North Plants	$ 5,000

*Does not include the cost of transporting wastewater to the Fire Station if the interceptor line has been closed.

The east-central branch of the sewer will need rehabilitation or replacement to service the new decontamination facility and the SPLTF, which discharges about two gallons per minute (gpm). If the sewer line is closed a very small replacement line would be needed to carry the treatment plant effluent to either the fire station or the interceptor line. Approximately 2,000 ft of sewer would need to be in situ formed to rehabilitate this part of the line. This includes rehabilitation of the line along December 7th Avenue from Manholes 100 to 98. If the existing sewer is replaced, approximately 2000 ft of sewer would be abandoned and two manholes plugged (about one-third of the manholes). In addition, from 1000 to 2000 ft of new pipe would need to be installed. Because this is in an area of high contamination, above ground, weather proofed pipe is recommended.

Estimates of the costs to implement these activities are summarized in Table 3.

6.5 NORTH PLANTS

The sanitary sewers in North Plants are being used as a discharge for the Building 1727 treatment system. Infiltration of contaminated groundwater will not occur because of the distance to the water table, but seven exposed connections should be capped.

An estimate of the cost to perform the capping is presented in Table 3.

7.0 DESCRIPTION OF PREFERRED ALTERNATIVES

The preferred action in North Plants is to cap or plug the exposed sewer connections found by Black and Veatch.

The preferred alternative for South Plants will depend on which buildings are relocated or closed, and how soon that will take place. Some general conclusions can be drawn that can be used as guidelines in developing a plan for South Plants.

- Lines needing rehabilitation should be in situ formed rather than slip-lined.

- o Above ground, insulated pipe should be used for lines needing replacement.

- o Lines being closed should be abandoned in place and plugged at manholes rather than removed.

Building closures are the primary factor affecting the action to be taken in South Plants. It can be speculated that all of South Plants will be closed as part of the final remediation plan. If this is the case, any buildings closed prior to the implementation of the final plan will be consistent with that plan. It should be remembered that building closures are not a part of this IRA, and costs associated with building closures have not been included in the cost estimates presented here. Also note that temporary pumpout systems can be used if a sewer has been closed before its connecting building has been closed or relocated.

8.0 ADDITIONAL DATA REQUIREMENTS

The schedule for building closures in South Plants must be completed before definite plans can be made regarding the sewers.

9.0 PROPOSED ARARs FOR THE SANITARY SEWER REMEDIATION INTERIM RESPONSE ACTION

9.1 ATTAINMENT OF ARARs

The interim action process reported to the Court on June 5, 1987, in United States v. Shell Oil Co. provides that the IRAs (including this IRA for remediation of certain priority portions of the Sanitary Sewer System) shall, to the maximum extent practicable, attain standards, requirements, criterion or limitations under any Federal environmental law (or more stringent promulgated standard, requirement, criterion or limitation under a State environmental or facility siting law) that is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release. A similar provision appears in Paragraph 9.7 of the proposed Consent Decree.

9.2 IDENTIFICATION AND SELECTION OF ARARs

Paragraph 9.7 of the proposed Consent Decree provides that the Organizations, DOI and the State shall have an opportunity to participate at the RMA Committee level, in the identification and selection of ARARs that may be applicable to the IRAs. The Army is to present its proposed decision on ARARs to the other Organizations, DOI and the State prior to, or as part of, the draft IRA Assessment.

In this instance, the Army requested in a February 5, 1988 letter by counsel that EPA, Shell and the State nominate by March 4, 1988 any ARARs that they believed warranted initial consideration by the Army in connection with this IRA. No responses were received to that letter.

Following receipt of this draft, the Army will hold a meeting of a subcommittee at the RMA Committee level to discuss this draft ARAR document if this is the desire of any of the Organizations, DOI or the State. However, the Army needs to receive any such request in writing within seven days of receipt of this document.

9.3 SELECTION OF ARARs AND DETERMINATION OF ARAR IMPACT

9.3.1 Ambient or Chemical-Specific ARARs

Ambient or chemical-specific requirements set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants. Such ARARs either set protective cleanup levels for the chemicals of concern in the designated media or indicate an appropriate level of discharge.

There are no chemical-specific standards which are considered either applicable or relevant and appropriate for this IRA.

9.3.2 Location-Specific ARARs

Location-specific requirements set restrictions on activities depending on the characteristics of the site or the immediate environment. These requirements

function like action-specific requirements. Alternative remedial actions may be restricted or precluded depending on the location or characteristics of the site and the requirements that apply to it.

Paragraphs 23.2(e) and (f) of the proposed Consent Decree provide that:

> (e) Wildlife habitat(s) shall be preserved and managed as necessary to protect endangered species of wildlife to the extent required by the Endangered Species Act, 16 U.S.C. paragraph 1531 et seq, migratory birds to the extent required by the Migratory Bird Treaty Act, 16 U.S.C. paragraph 703 et seq. and bald eagles to the extent required by the Bald Eagle Protection Act, 16 U.S.C. paragraph 668 et seq.
>
> (f) Other than as may be necessary in connection with a Response Action or as necessary to construct or operate a Response Action Structure, there shall be no change permitted in the geophysical characteristics of the Arsenal that has a significant effect on the natural drainage of the Arsenal for floodplain management, recharge of groundwater, operation and maintenance of Response Action Structures, and protection of wildlife habitat(s).

While these provisions are not ARARs, they obviously must be complied with for purposes of this IRA. Based on where the sanitary sewer system which may be affected is located, as well as when the IRA will take place, the Army believes that this IRA will have no adverse impact on any endangered species or migratory birds, or on the protection of wildlife habitats.

Moreover, the Army has determined that this IRA will not change the geophysical characteristics of RMA in a manner that will have significant effect on the natural drainage of RMA for floodplain management, recharge of groundwater and the operation and maintenance of Response Action Structures.

9.3.3 Performance, Design or Other Action-Specific ARARs

Description

Performance, design or other action-specific requirements set controls or restrictions on particular kinds of activities related to the management of hazardous substances, pollutants, or contaminants. These action-specific requirements may specify particular performance levels, actions or technologies, as well as specific levels (or a methodology for setting specific levels) for discharged or residual chemicals.

Construction of Intercept and Treatment System

(1) Air Emissions

In the unlikely event that air emissions are generated during the course of the Remediation of portions of the sanitary sewer system, the Army has reviewed all potential ambient or chemical-specific air emission requirements. As a result of this review, the Army found that 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 which could be released during this remediation.

In the context of this IRA there is only a very remote chance of any release of volatile or semi-volatile and, even if such a release did occur, it would only be intermittent and of very brief duration (because the activity that produced the release would be stopped and modified appropriately if a significant air emission was detected by the contractor's air monitoring specialist). The Health and Safety Plan developed for this IRA will describe specific monitoring plans and work modification procedures.

The NESHAPS standards contained in 40 C.F.R. Part 61 were considered as potential ARARs and determined to be neither applicable nor relevant and appropriate. These regulations apply to stationary sources of these pollutants and are therefore not considered relevant and appropriate to apply to this IRA because they were developed for emissions from manufacturing processes which are significantly dissimilar from the short term construction activity which will take place during this IRA. The Army recognizes that when the actual system is designed it may include equipment which is somewhat similar to a stationary source and if the design does include such equipment, the NESHAPS standards will be reviewed again to determine whether they should be applied to the operations of this IRA.

(2) Worker Protection

With respect to the workers directly participating in this IRA, the worker protection requirements of Section 126 of the Superfund Amendments and Reauthorization Act of 1986 shall be met through compliance with the OSHA interim final rule that appears in 52 Fed. Reg. 45654 (1986).[1]

(3) General Construction Activities

The following performance, design or other action-specific State ARARs are selected by the Army as relevant and appropriate to this portion of the IRA

and more stringent than any applicable or relevant and appropriate Federal standard, requirement, criterion or limitation:

(1) Colorado Air Pollution Control Commission Regulation No. 1, 5 CCR 100-3, Part III(D) (2) (b), "Construction Activities":

(a) Applicability - Attainment and Nonattainment Area

(b) General Requirement

Any owner or operator engaged in clearing or leveling of land or owner or operator of land that has been cleared of greater than one (1) acre in nonattainment areas from which fugitive particulate emissions will be emitted shall be required to use all available and practical methods which are technologically feasible and economically reasonable in order to minimize such emissions in accordance with the requirements of Section III.D. of this regulation.

(c) Applicable Emission Limitation Guideline

Both the 20%-opacity and the no off-property transport emission limitation guidelines shall apply to construction activities; except that with respect to sources or activities associated with construction for which there are separate requirements set forth in this regulation, the emission limitation guidelines there specified as applicable to such sources and activities shall be evaluated for compliance with the requirements of Section III.D. of this regulation.

(Cross Reference: Subsections e, and f, of Section III.D.2 of this regulation.)

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[1]Although OSHA proposed a permanent final rule on August 10, 1987, 52 Fed. Reg. 29620, the comment period on this rule did not close until October 5, 1987. It should be noted that, pursuant to CERLCA Section 301(f), 42 U.S., 9651(f), the NCP is to be amended by December 11, 1988 to provide procedures for the protection of the health and safety of employees involved in response actions.

(d) Control Measures and Operating Procedures

Control measures or operational procedures to be employed may include, but are not necessarily limited to, planting vegetation cover, providing synthetic cover, watering, chemical stabilization, furrows, compacting, minimizing disturbed area in the winter, wind breaks and other methods or techniques.

(ii) Colorado Ambient Air Quality Standards, 5 CCR 1001-14, Air Quality Regulation A, "Diesel-Powered Vehicle Emission Standards for Visible Pollutants":

a. No person shall emit or cause to be emitted into the atmosphere from any diesel-powered vehicle any air contaminant, for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 40% opacity, with the exception of subpart B below.

b. No person shall emit or cause to be emitted into the atmosphere from any naturally aspirated diesel-powered vehicle of over 8,500 lbs. gross vehicle weight rating operated above 7,000 feet (mean sea level), any air contaminant for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 50% opacity.

c. Diesel-powered vehicles exceeding these requirements shall be exempt for a period of 10 minutes, if the emissions are a direct result of a cold engine start-up and provided the vehicle is in a stationary position.

d. This standard shall apply to motor vehicles intended, designed and manufactured primarily for use in carrying passengers or cargo on roads, streets and highways.

The following performance, design or action-specific State ARAR is applicable to this portion of the IRA and is more stringent than any applicable or relevant and appropriate Federal standard, requirement, criterion or limitations:

(iii) Colorado Noise Abatement Statute, C.R.S. Section 25-12-103:

(1) 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 prime 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)

(2) In the hours between 7:00 a.m. and the next 7:00 p.m., the noise levels permitted in subsection (1) of this section may be increased by ten db(A) for a period of not to exceed fifteen minutes in any one-hour period.

(3) 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 in subsection (1) of this section.

(5) Construction projects shall be subject to the maximum permissible noise levels specified for industrial zones for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of project.

(8) For the purposes of this article, measurements with sound level meters shall be made when the wind velocity at the time and place of such measurement is not more than five miles per hour.

(9) In all sound level measurements, consideration shall be given to the effect of the ambient noise level created by the encompassing noise of the environment from all sources at the time and place of such sound level measurement.

In substantive fulfillment of Colorado's Diesel-Powered Vehicle Emission Standards, no diesel motor vehicles associated with the construction shall be operated in a manner that will produce emissions in excess of those specified in these standards.

The noise levels pertinent for construction activity provided in C.R.S. Section 25-12-103 will be attained in accordance with this applicable Colorado Statute.

(4) Removal of soil

There are no action-specific ARARs that pertain to the drilling or excavation of soil during the remediation of the Sanitary Sewer System.

Although not an ARAR, removal of soil from the areas where the system will be remediated will be performed in accordance with the procedures set forth in the Task No. 32 Technical Plan -- Sampling Waste Handling (November 1987) and EPA's July 12, 1985 memorandum entitled "EPA Region VIII procedure for handling of materials from drilling, trench excavation and decontamination during CERCLA RI/FS operations at the Rocky Mountain Arsenal." In general, any soils generated by drilling or excavation during the course of this IRA, either at surface or subsurface, will be returned to the location from which they originated (i.e., last out, first in). Any materials remaining after backfilling has been completed that are suspected of being contaminated based on field screening techniques,[2] will be properly stored, sampled, analyzed, and ultimately disposed of as CERCLA hazardous wastes,[3] as appropriate.

For materials determined to be hazardous waste, substantive RCRA provisions are applicable to their management. These substantive provisions include, but are not limited to: 40 C.F.R. Part 262 (Subpart C, Pre-Transport Requirements), 40 C.F.R. Part 263 (Transporter Standards), 40 C.F.R. Part

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[2]The field screening techniques to be used to determine contamination are HNU, OVA, discoloration (visual) and odor. Readings or visual and odor inspection will be taken at least every five feet.

[3]It should be noted that the "land ban" provisions of RCRA Section 3004, 42 U.S.C. Section 6924, are not pertinent to any such excavated soil that is identified as contaminated because the disposal and storage of these soils will be undertaken solely pursuant to 42 U.S.C. Section 9606 and thus will be subject to the exception in 42 U.S.C. Section 6924 (j) for storage "solely for the purpose of accumulation of such quantities of hazardous waste as are necessary to facilitate proper recovery, treatment or disposal" since this waste will ultimately be subject to treatment pursuant to the ROD for the pertinent CERCLA operable unit.

264 (Subpart I, Container Storage and Subpart L, Waste Piles). The specific substantive standards applied will be determined by the factual circumstances of the accumulation, storage or disposal techniques actually applied to any such material.

Remediation activities performed as part of this IRA may involve the removal and disposal of asbestos cement pipe from the sanitary sewers in South Plants. Several federal regulations found in Volume 40, Code of Federal Regulations (CFR) Part 61 apply to this IRA and are listed below.

40 CFR Section 61.145 - Standard for Demolition and Renovation: Applicability;

40 CFR Section 61.147 - Standard for Demolition and Renovation: Procedures for Asbestos Emission Control;

40 CFR Section 61.152 - Standard for Waste Disposal for Manufacturing Demolition, Renovation, Spraying, and Fabricating Operations;

40 CFR Section 61.155 - Reporting; and

40 CFR Section 61.156 - Active Waste Disposal Sites.

In addition, 40 CFR Section 61.146 - Standard for Demolition and Renovation: Notification Requirements is relevant and appropriate, however, CERCLA Section 121e does not require that such procedural regulations be applicable. Equivalent information will be provided through the IRA process.

Colorado has been delegated authority by the Clean Air Act to administer a State NESAAPS program. State regulations pertaining to the control of hazardous air pollutants are found at SCCR 1001-10, Part II, Regulation 8. Because the federal regulations listed above are as stringent or more stringent than Colorado regulations, the federal regulations will be used.

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APPENDIX
COMMENTS AND RESPONSES

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH

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Roy Romer
Governor

Thomas M. Vernon, M.D.
Executive Director

September 12, 1988

Mr. Donald Campbell
Deputy Program Manager
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Commerce City, CO 80022-2180

Re: Draft Final Sanitary Sewer Remediation Interim Action Alternative Assessment

Dear Mr. Campbell:

The State's review of the Draft Final Sanitary Sewer Remediation Interim Action Alternatives Assessment has raised a number of questions that need to be answered before a comprehensive technical assessment can be completed. In the absence of further information, the State can only submit preliminary comments on the Sanitary Sewer Alternatives Assessment ("SSAA"). The State requests that the Army respond to the concerns identified below, in writing or at a meeting, before a decision is made as to how to proceed with the remediation of the sanitary sewers.

While the State is unable to provide a recommendation regarding the most appropriate alternative for remediating the sanitary sewers, the State agrees that preferential pathways for contaminant migration at the Rocky Mountain Arsenal (RMA), such as the sewers and abandoned wells, should be eliminated as soon as possible. The State also agrees with and fully supports the concept of expediting the remediation of sources of contamination or conduits for contaminant migration at RMA through interim actions. However, such actions should only be taken if they are, or can be demonstrated to be, consistent with the final remedy at RMA.

The State's two initial concerns raised after reviewing the available information are:

1. It appears from the SSAA that the preferred alternative for the sanitary sewer remediation is substantially affected by the question of whether or not existing buildings in use in the South Plants are to be relocated to the administrative area. Based on conversations among Jeff Edson, Col. Quintrell, and Don Campbell, the State understood that a decision had already been made to move all buildings in use in the South Plants to the administrative area as noted in the SSAA. If the decision to relocate active facilities out of the South Plants has not yet been made, the State recommends that all active facilities presently located in the South plants that utilize the sanitary sewer be relocated to allow the remedial investigations and remedial actions to proceed unimpeded. Once the decision to relocate the buildings is made, the sewer repair or replacement alternatives can be eliminated and the SSAA can focus on those alternatives concerned with eliminating preferential pathways for contamination migration. Therefore, the State recommends that the decision be made prior to determining the most appropriate course of action.

2. When the Army first proposed this interim action, the State agreed that the sanitary sewers could be acting as a lateral migration pathway for groundwater contamination in areas where contaminated groundwater is at or above the level of the sewer. These areas are believed to be throughout most of the South Plants and also in the southern half of Section 36, i.e., from the location where the sewer pipe exits the South Plants to the vicinity west of source area 36-11.

As the State originally informed the Army when this interim action was first proposed, removing the sewers and compacting soils in place of the sewer and bedding materials is the only alternative that can be demonstrated to fully eliminate migration pathways in areas where the sewer are at or below the water table. The lateral migration of contamination in and around the sewers could be prevented or inhibited by excavating the sanitary sewers at "critical" locations at and down gradient of areas where infiltration of contaminated groundwater is occurring.

Removing selected portions of the sewers would be consistent with the final remedy. However, the information provided in the SSAA does not demonstrate that the Army's preferred alternative for the sanitary sewer interim action i.e., plugging the sewers

with concrete, will be consistent with the final remedy. Plugging the sewer pipes will not eliminate the migration pathway around and along the sewer trenches which may exist in areas where the sewers are at or below the current water table. Furthermore, conducting this interim action may necessitate that additional work be conducted once a final remedy is implemented at RMA. If the sewers are plugged with cement in the near future and the final remedy selected requires that the sewers be removed, excavation, treatment and disposal of potentially contaminated cement/concrete plugs used to plug the sewers will be necessary.

The State is also reserving its right to comment on the ARARs for this interim action. Until a final decision is made regarding the appropriate course of action for the sewers, it is impossible to determine what ARARs will be applicable.

Based upon the concerns and potential problems identified above, the State recommends that further consideration be given to the selected alternative for this interim action. The State is available to discuss these issues at your convenience. If you have any questions, please call Jeff Edson with this Division.

Sincerely yours,

David C. Shelton
Director
Hazardous Materials and
Waste Management Division

DCS/PB/rw

enclosure

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Connally Mears, EPA
Mike Gaydosh, EPA
Tony Truschel, GeoTrans

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RESPONSES TO COMMENTS OF
COLORADO DEPARTMENT OF HEALTH
SANITARY SEWER REMEDIATION
DRAFT FINAL INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT

Comment 1: It appears from the SSAA that the preferred alternative for the sanitary sewer remediation is substantially affected by the question of whether or not existing buildings in use in the South Plants are to be relocated to the administrative area. Based on conversations among Jeff Edson, Col. Quintrell, and Don Campbell, the State understood that a decision had already been made to move all buildings in use in the South Plants to the administrative area as noted in the SSAA. If the decision to relocated active facilities out of the South Plants has not yet been made, the State recommends that all active facilities presently located in the South Plants that utilize the sanitary sewer be relocated to allow the remedial investigations and relocate the buildings is made, the sewer repair or replacement alternatives can be eliminated and the SSAA can focus on those alternatives concerned with eliminating preferential pathways for contamination migration. Therefore, the State recommends that the decision be made prior to determining the most appropriate course of action.

Response: The decision to relocate active facilities out of South Plants has been made and is final. However, the preferred alternative for the Sanitary Sewer Interim Reponse Action (IRA) may be affected by whether or not existing buildings in use in the South Plants are relocated prior to the timeframe of the sewer IRA. Therefore, the impacts that certain South Plants activities may have on the sewer IRA were discussed in the Assessment Document. Now that the impacts have been identified, the Army is pursuing the possibilities of accelerating the relocation of South Plants activities. In the event that active South Plants buildings cannot be relocated in an acceptable timeframe, some schedule adjustments to the sewer IRA may prove to be necessary.

Comment 2: When the Army first proposed this interim action, the State agreed that the sanitary sewers could be acting as a lateral migration pathway for groundwater contamination in areas where contaminated groundwater is at or above the level of the sewer. These areas are believed to be throughout most of the South Plants and also in the southern half of Section 36, i.e., from the location where the sewer pipe exits the South Plants to the vicinity west of source area 36-11.

As the State originally informed the Army when this interim action was first proposed, removing the sewers and compacting soils in place of the sewer and bedding materials is the only alternative that can be demonstrated to fully eliminate migration pathways in areas where the sewer are at or below the water table. The lateral migration of contamination in and around the sewers could be prevented or inhibited by excavating the sanitary sewers at "critical" locations at and downgradient of areas where infiltration of contaminated groundwater is occurring.

Removing selected portions of the sewers would be consistent with the final remedy. However, the information provided in the SSAA does not demonstrate that the Army's preferred alternative for the sanitary sewer interim action i.e., plugging the sewers with concrete, will be consistent with the final remedy. Plugging the sewer pipes will not eliminate the migration pathway around and along the sewer trenches which may exist in areas where the sewers are at or below the current water table. Furthermore, conducting this interim action may necessitate that additional work be conducted once a final remedy is implemented at RMA. If the sewers are plugged with cement in the near future and the final remedy selected requires that the sewers be removed, excavation, treatment and disposal of potentially contaminated cement/concrete plugs used to plug the sewers will be necessary.

The State is also reserving its right to comment on the ARARs forthis interim action. Unitl a final decision is made regarding the appropriate course of action for the sewers, it is impossible to determine what ARARs will be applicable.

Response: Removing the sewers and compacting soils in place of the sewers and bedding materials is one method that will stop migration of contaminants via the sewer system. However, it is premature to state that this will or will not be consistent with the final remedy, as the final remedy has not yet been determined. Removal of all or some of the sewer under this IRA may interfere with a final remedy in that cleanup action levels for soils (including those surrounding the pipe) have not been determined at this time. Contaminated soil may be left in place after the excavation and backfilling is completed and contaminated soils near the pipe may be disturbed in the process. In addition, if the final remedy states that cleaning or abandoning in place is all that is needed, further measures will be needed to remediate the excavated pipe and soil. A decision to abandon the sewers in place is not inconsistent with possible final remedies in that no final remediation alternatives are eliminated. If a decision is made to remove the sewer and surrounding soils, the actual volume of the concrete plugs would be a very small fraction of the total volume of material excavated. It is not expected that the plugs would interfere with the final remedy.

The concerns surrounding the permeability of the fill material in the sewer trenches would be valid if select backfill had been used. Physical samples taken from beneath the sewer as part of the Task 10 investigations showed that native material was used as backfill material (Ebasco, 1988c; Ebasco, 1988d) and is therefore not more permeable than the surrounding soils. While transport through the sewer trenches is not anticipated, the need for additional containment measures such as cut-off walls will be evaluated in the implementation phase.

It is understood that the State will comment on ARARs applicable to the final decision regarding action taken for the sewers.

Shell Oil Company

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September 9, 1988

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:

Enclosed herewith are Shell Oil's comments on the Assessment Document for the Sanitary Sewer Interim Response Action.

Sincerely,

C.K. Hahn for

R. D. Lundahl
Manager Technical
Denver Site Project

RDL:ajg

Enclosure

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RESPONSES TO COMMENTS OF
SHELL OIL COMPANY ON
DRAFT FINAL SANITARY SEWER REMEDIATION
INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT

Comment 1: Page 3, third paragraph.
This paragraph is somewhat misleading, because some of the language included within quotation marks--"(applicable or relevant and appropriate requirements)"--is not in fact found in paragraph 9.7 of the Consent Decree. We recommend substituting the following definition of ARARs, based upon Section 121(d) (2) of CERCLA (in square brackets, so that there will be no confusion about what language actually found in paragraph 9.7): "[standards, requirements, criteria, or limitations under any Federal environmental laws (or more stringent promulgated standards, requirements, criteria, or limitations under State environmental or facility siting laws) that are legally applicable to the hazardous substance or pollutant or contaminant concerned or are relevant and appropriate under the circumstances of the release or threatened release]."

Response: The quotation marks have been moved to exclude the text inside the parentheses, as this text is not included in paragraph 9.7 of the Consent Decree. A more complete definition of ARAR has been added to Section 9.1 and further clarification can be found in paragraph 3.3 of the Consent Decree.

Comment 2: Page 3.
The last word on the page should be "legally" rather than "specifically."

Response: Neither "specifically" nor "legally" is necessary in this sentence. Therefore, "specifically" has been deleted.

Comment 3: Pages 4 - 8, Section 4.0
It should be explicitly stated that this summary of the condition of the sanitary sewer system is included only to provide general background for this IRA and is subject to the methodologies employed, limitations, and qualifications in the sources cited. For example, stating that a portion of the sewer is in "poor condition" without further definition could be misleading to a reader not familiar with the sources cited.

Response: Agreed. An introductory paragraph has been added to Section 4.1 explaining the sources of information used and the inherent qualifications associated with them.

Comment 4: Page 9, General Considerations for South Plants
Another option, which is not given consideration in this document, is the provision of localized package treatemnt plant(s) to serve the sanitary sewage needs of individual buildings or groups of buildings.

Response: Package treatment plants were not considered appropriate for this IRA because they generate effluent that must be disposed of and do not eliminate the contaminant transport problem. One disposal option is surface drainage which, in South Plants, would most likely lead to Basin A, the South Lakes, or Sand Creek Lateral. Surface discharges in areas of known soil contamination, such as the South Plants area, are as likely to transport contamination as are discharges to the sewer. Additionally, treated effluent from each plant would need to be monitored to assure that it met the substantive requirements for a National Pollutant Discharge Elimination System (NPDES) permit. Subsurface discharges, such as through leach fields, are possible and package plants could be considered during the design phase of this IRA to replace septic tanks. This addition has been made in the text. Effluent from package treatment plants could also be discharged to the sanitary sewer, but this would not affect the current role of the sanitary sewer in potential contaminant transport.

Comment 5: Page 9, Section 5.2
Under paragraph 4.2 of the Access and Use Agreement (Exhibit F to the Consent Decree), the Army agreed that Shell's right of exclusive use and occupancy of each of the Structures (which include Buildings 316-A, 451, 727, and 729) shall continue until "required in connection with implementation of a Final Response Action for any operable unit which includes the Structure." Paragraph 4.2 further provides that, if Shell advises that the Army in writing that a replacement is needed, "the Army shall provide, if available, a suitable replacement then existing on the Arsenal," or, if none is available, land on which Shell can place a structure or trailer to replace the Structure. Have these obligations been considered in the assessment of alternatives for this IRA?

Response: The Army is aware of the obligations cited in the comment, however, these have no impact on the alternatives assessment.

Comment 6: Page 14, Alternatives for South Plants with RMA Laboratory
The first sentence reads: "The presence of the laboratory in South Plants will require the boiler house to remain active." Is this for space heating only? If so, consideration could be given to using gas (LPG) or electric heat which would allow shedding of boiler house sewage load as well as its operating costs.

Response: The west branch of the sanitary sewer services the laundry and laboratory support facilities (Buildings 313 and 314) as well as the boiler house. If the laboratory remains active in South Plants, Buildings 313 and 314 will also remain active, and the west branch of the sewer will need replacement or rehabilitation. Since this work will be required, there is little reason to close the boiler house, which is just upstream of Buildings 313 and 314.

The text has been expanded to include this explanation.

Also, the Army has a policy of using a central heating supply if one is available, rather than multiple individual heating systems whenever possible. Closing the boiler house in this instance would contradict this policy.

Comment 7: Page 18, second paragraph.
Will merely plugging manholes without grouting the lines and trench cross-sections stop the water flow? Plugging the manholes will result in any upstream infiltration backing up at the first manhole, leaking out of the pipe and potentially seeping around the manhole via the more permeable backfill materials. Shell would suggest that manhole plugging be combined with small cutoff walls located transverse to the pipe alignment at key areas.

Response: The concerns surrounding the permeability of the fill material in the sewer trenches would be valid if select backfill had been used. Physical samples taken from beneath the sewer as part of the Task 10 investigations showed that native material was used as backfill (Ebasco, 1988c; Ebasco, 1988d) and is therefore not more permeable than the surrounding soils. While transport through the sewer trenches is not anticipated, the need for cut-off walls or grouting the entire lines will be further evaluated in the implementation phase of this IRA.

Comment 8: Page 18, fourth paragraph.
In situ forming will be difficult, if not impossible, in the areas that are severely broken or collapsed.

Plate 1.
Based on a review of the groundwater mound and the sewer profile, it is likely that more of the sewer reach along December 7th Avenue has been infiltration than just between manholes 101 and 102. Also, the sanitary sewer in Section 36 at the point where the first seepage basin overflowed to the main lake (manhole 90) is a likely source of historic infiltration. This area still transports surface water directly over the pipe alignment, as seen by the indicated stream lines.

Plate 2.
The reach of sewer near the southeast corner of Basin F is suspected to be an area of historic damage. Black and Veatch's work indicates losses of flow as high as 50%, and inspection of the original sewer profiles indicates that this is the area of least pipe cover (only a few feet in some places). A 1956 aerial photo taken during the construction of Basin F shows a large ground stain originating at the manhole 34 to 32 area and flowing down the slope to the north. Although this could have been from the heavy equipment in use at the time, it could also be related to sewer seepage. We recommend that this be considered in the IRA.

Response: This paragraph (sixth paragraph of Section 6.1) weighs the advantages and disadvantages of slip-lining versus in situ forming as a rehabilitation method. Severely broken or collapsed areas of the sewer will present problems whether in situ or slip-lining is employed. This consideration does not warrant revising the choice of in situ over slip-lining.

Plate 1: The plate has been revised to correspond to the text on page 5, where it is stated that Black and Veatch noted heavy infiltration between Manholes 101 and 103. Additional infiltration may be taking place, but this is the only section for which supporting documentation has been found.

While the section of the interceptor line in Section 36 near Manhole 90 is a likely area of historic infiltration, it is unlikely that surface water drainage is now infiltrating this part of the sewer. As long as the sewer is above the water table there is little driving force to cause the water to enter the sewer rather than flow around the outside of the sewer. However, because of the history of infiltration along this section of sewer, it has been identified as a priority segment for remediation.

Plate 2: As noted in the Black and Veatch study, heavy exfiltration was taking place along this part of the sanitary sewer. However, infiltration is not suspected to be a problem along this portion of the line, as the sewer is from 35 to 40 ft above the water table in the vicinity of Manholes 32 to 34 (Ebasco, 1988d). Priority segments for remediation as part of this IRA were chosen as those areas where infiltration of contaminated groundwater or inflow from contaminated surface water runoff is most likely. Areas of exfiltration are not priority segments because contamination in the sanitary sewer originates from infiltration or inflow. Once these mechanisms are stopped, the potential for contamination in the sanitary sewer will be greatly reduced and any exfiltration that does occur will not result in contaminant transport. Therefore the portion of the interceptor line noted in the comment was not included as a priority segment.

Comment 9: Page 22.
Failure to include the costs of building closures would seem to make realistic comparison of the various alternatives impossible.

Response: The cost of building closures will certainly impact the decision of what facilities will remain active in South Plants. That decision will in turn impact the action to be taken to stop potential contaminant transport via the sewer system. Costs of sewer remediation should be taken into consideration when decisions are made to close or not close facilities in the South Plants. However, costs for building closures are not included as part of this IRA.

Comment 10: Page 23, Section 9.2
The second paragraph should be deleted, because it is irrelevant to the process agreed upon for identification and selection of ARARs under paragraph 9.7 of the Consent Decree.

Response: The second paragraph simply describes the action taken by the Army with regards to ARAR determinations. As such, it is a relevant comment on the ARAR determination process.

Comment 11: Page 23, Section 9.2
The last sentence of the third paragraph should be deleted. Paragraph 9.7 of the Consent Decree contains no requirement that notice be given within seven days for a meeting of the RMA Committee (or one of its subcommittees) to discuss ARARs, and, to Shell's knowledge, the Organizations have never agreed to impose such a deadline.

Response: Such action is not inconsistent with the Consent Decree. The Army wants to provide additional time to comment but must set a deadline so the IRA process can continue in a timely manner.

Comment 12: Page 24, Section 9.3.2
Paragraph (f) should be revised to conform to the language in the modified Consent Decree filed with the Court June 7, 1988. Conforming changes are also required in the last paragraph of 9.3.2 (e.g., "physical" should be "geophysical").

Response: The text has been modified to include these changes.

Comment 13: Page 25, Section 9.3.3 (2)
Shell supports the application of worker protection standards to this IRA. These standards, however, are not ARARs and should not be included in the ARAR analysis, unless language is included stating that the standards are not ARARs (as was done, for example, on page 24 with respect to paragraphs 23.2 (e) and (f) of the Consent Decree).

Response: The Army believes that because worker protection requirements are addressed in SARA, it is appropriate to retain this section as an ARAR.

Comment 14: Page 26, Section 9.3.3 (3)
As Shell has previously stated, the Colorado Ambient Air Quality Standards, Air Quality Regulation A, "Diesel-Powered Vehicle Emission Standards for Visible Pollutants," should only be considered an ARAR to the extent that motor vehicles may haul soils off-site.

Response: The Army agrees with this comment.

Comment 15: Page 29, n. 3
Will this IRA be implemented before November 9, 1988?

Response: This IRA will not be implemented before November 9, 1988. The exception for work started before this date has been deleted from the text.

Comment 16: Page 31.
The date of the Consent Decree should be changed to June 1988.

Response: The date of the proposed modified Consent Decree has been changed to June 1988.

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

SEP 12 1988

Ref: 8HWM-SR

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

Re: Rocky Mountain Arsenal (RMA), Draft Final Sanitary Sewer Remediation Interim Response Action Alternatives Assessment, August, 1988.

Dear Mr. Campbell:

We have reviewed the above referenced report. Throughout the Draft Assessment the uncertainty of plans for relocation of South Plants buildings is stated. It is difficult to assess acceptable alternatives without knowing the relocation plans for the South Plants buildings. However, we support the implementation of this IRA and have attempted in our review to consider all possible alternatives, given the current uncertainty. Our other comments on this report are enclosed. Please contact me at (303) 293-1528, if there are questions on this matter.

Sincerely yours,

Connally Mears

Connally Mears
EPA Coordinator
for Rocky Mountain Arsenal Cleanup

Enclosure

cc: Thomas P. Looby, CDH
David Shelton, CDH
Patricia Bohm, Colorado AGO
Lt. Col. Scott P. Isaacson
Chris Hahn, Shell Oil Company
R. D. Lundahl, Shell Oil Company
David Anderson, Department of Justice
John Moscato, Department of Justice

RESPONSES TO COMMENTS OF
ENVIRONMENTAL PROTECTION AGENCY ON
DRAFT FINAL SANITARY SEWER REMEDIATION
INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT

Comment 1: Page 3, Assessment Criteria and page 16, Section 6.0, with the uncertainties associated with the South Plants buildings, this Alternatives Assessment failed to specify and adhere to the criteria stipulated in Section 9.6 of the Consent Decree. Those requirements will have to be addressed in the subsequent Decision Document.

Response: Agreed. Due to the uncertainties associated with the South Plants buildings, actual selection of the most cost effective alternative for attaining the objective of the IRA was impossible. These requirements will be addressed in the Decision Document.

Comment 2: Page 7, third complete paragraph, it is stated that a "section of the interceptor line was later relocated to the west of Basin A to avoid future incidences of contaminated water infiltration and transport." Please clarify whether this section of the sewer line was removed, plugged, or left in place, when the line was relocated.

Response: The original section of the sewer was plugged and abandoned in place (Ebasco, 1988d). The text has been revised to include this information.

Comment 3: Page 10, last complete sentence, it is stated that "excavation should be avoided as much as possible" in areas of heavy soil contamination. Please clarify this point that such excavation will be part of the final remedy.

Response: A final remedy has not yet been determined. Extensive excavation of heavily contaminated material requires a high level of worker protection which results in inefficient and costly construction. While excavation may be necessary as part of the final remedy, it is to be avoided as much as possible in the IRA if the objectives of the IRA can be obtained without excavation.

Comment 4: Page 14, fourth complete paragraph, it is stated that closure of the west-central branch of the South Plants area sewer would be "the single most effective step that can be taken to reduce the possibility of contamination being transported through the sanitary sewer system." This closure hinges on the relocation of Buildings 316 and 316A. Thus, an early decision on their relocation seems necessary, and EPA suggests a positive decision.

Response: The position of the EPA on this matter is recognized.

Comment 5: Page 19, what is the basis for the statement that plugging one out of five manholes along the abandoned segment will be sufficient to stop the transport of contamination? Why one of five? This statement needs to be supported.

Response: Plugging one of every five manholes was assumed to be sufficient to prevent migration of contaminated groundwater through the sewers. This was an approximation needed to develop relative cost information. The actual determination of which manholes will be plugged will be made during the design phase. The text has been altered to clarify that this number was an approximation.

Comment 6: Page 32, the references appear to be incomplete, including, for example, page 7, reference to USAEHA, 1985 report.

Response: A reference for the USAEHA report has been added to the list of references.

Comment 7: Where the basis for conclusion is not present but the results of a prior study are referenced in this document, it would be beneficial to have that rationale/basis for the conclusion included. (For example, see page 8, top paragraph).

Response: The purpose of this paragraph was to justify the choice of priority remediation segments. It has been rewritten to clarify its meaning. A short paragraph has been added to Section 4.1 explaining the sources of information used in the descriptions of the sanitary sewer system and the inherent qualifications associated with those sources.

Comment 8: Page 8, Section 5.1.1, it is stated that the removed section of the sewer would be transported to a temporary storage facility to be constructed on RMA. The temporary storage must be consistent with the final remedy and contribute to the efficient performance of the final remedy. (See Section 9.5 of the Consent Decree.)

Response: It is understood that any interim response measures must be consistent with the final remedy at RMA; however, a final remedy for the sanitary sewers has not been determined at this time. Any materials taken to a temporary storage facility will be available for treatment or disposal as part of the final remedy, and will not be transformed into a state that will inhibit performance of the final remedy.

Comment 9: Page 9, it is stated that numerous buildings and warehosues could be switched to septic tanks and drain fields as part of this IRA. Therefore, as part of a decision, discussion should include for which buildings this would occur, what types of

discharge would occur, and where the new drain fields or septic tanks would be located.

Response: The text states that these buildings could be switched to septic tanks and drain fields or could be relocated our of South Plants. If it is decided to keep the buildings active and use septic tanks and drain fields, a specific plan will be developed to identify the buildings involved, the type of discharges expected, and the locations of the drain fields and septic tanks.

Comment 10: Page 21, Section 6.4, the abandonment procedure for the South Plants sewer lines does not address the material which fills the trench in which the sewer is located. It is likely that this material is more permeable than surrounding undisturbed materials. EPA believes that the trench, which is filled with unconsolidated backfill, is also an important conduit; therefore, filling strategic manholes with concrete would not prevent migration of contaminated water through the system. Since the sewer is documented to be in very poor condition, contaminated groundwater which has entered the pipe may exit the pipe via cracks, etc., when a grouted manhole is encountered and then travel in the backfilled trench. It is recommended that at each manhole location to be plugged, the pipeline trench be excavated and filled with a less permeable backfill to prevent contaminants from migrating in this conduit. If segments of the sewer which are below the water table are to be rehabilitated in place, the trench should still be isolated by excavating the more permeable material at appropriate locations and filling with a less permeable fill.

An alternative abandonment procedure which should be evaluated would be to excavate and remove a section of the sewer just downgradient of where the water table drops below the level of the sewer. The backfill would be removed and the excavation filled with a less permeable material/plug. The open pipe would be pressure-grouted back an appropriate distance (100 feet). Any contaminated groundwater migrating in the pipe or trench would thus be slowed down and/or redirected back the groundwater. Select manholes (every fifth, as proposed) would still be grouted along the part of the sewer which is below the water table.

Response: The concerns surrounding the permeability of the fill material in the sewer trenches would be valid if select backfill had been used. Physical samples taken from beneath the sewer as part of the Task 10 investigations showed that native material was used as backfill material (Ebasco, 1988c; Ebasco, 1988d) and is therefore not more permeable than the surrounding soils. While transport through the sewer trenches is not anticipated, the need for cut-off walls will be evaluated in the implementation phase.

PROPOSED ARARS COMMENTS

Comment 1: Page 23, Section 9.3.1, second paragraph this document should include more detail to support the conclusion that there are no chemical-specific ARARs applicable to the IRA. The assessment should provide specific information on the types and concentrations of chemicals found in the sewer system. Without such information, the validity of the assertion that no chemical-specific standards are ARARs is questionable. Also, without such detail, it is impossible to recommend ARARs.

Response: A complete report of the results of the 1985 USAEHA wastewater quality report is contained in the cited reference. A summary of the compounds detected and the average concentrations are listed below.

	Average Concentration (ug/l)	
Compound	Manhole 96	Manhole 44
Aldrin		2.36
P-chlorophenylmethyl sulfone	30.6	23.8
Dibromochloropropane	4.1	3.3
Chloroform	256	8
Carbon Tetrachloride	4	
Trichloroethylene	11	

Comment 2: Page 24, Evaluation of Compliance with Wildlife Protection Acts, it is stated that "no adverse impact on any endangered species or migratory birds. . ." will result from this IRA. Document and provide information on which to base this conclusion. We suggest a USFWS letter documenting that conclusion as an attachment to this Alternatives Assessment.

Response: The suggestion from EPA is well-taken. The Army will coordinate directly with the USFWS to obtain the documentation suggested.

Comment 3: The results of a wetland assessment, if one were performed, should be included. If the presence or absence of impacts on wetland areas were not addressed, an evaluation should be performed and documented in this report.

Response: A wetlands assessment was not performed. Those portions of the sanitary sewer system recommended for remediation are not located in wetlands areas. It is anticipated that even the most active alternative, excavation in the South Plants area, would not impact wetland areas.

Comment 4: Page 25, first paragraph, it is stated that there are no standards for volatile or semi-volatiles which are ARARs for this action. There is reference made to the ambient air quality standards. A qualitative evaluation of the potential emissions

from contaminated soil excavations for sewer removal (if that is the chosen option) should be made; then, some statment of the lack of appropriateness or relevance of these standards applied in this action can be made. Without such an evaluation, a blanket rejection of these standards appears premature.

Response: Based upon available data, the Army does not believe that excavation of the sanitary sewer has the potential for measurable release of volatiles or semi-volatiles to the air. Ambient Air Quality Standards were not considered applicable because they apply to Air Quality Control Regions (AQCR). RMA does not constitute an AQCR. These standards were not considered relevant and appropriate to apply in the context of this IRA because RMA is significantly smaller than an AQCR and lacks sufficient similarity with an AQCR to make application of these standards not reasonable under the factual circumstances here.

Comment 5: Page 25, third complete paragraph, here it is stated that NESHAPs are not ARARs for this action. We are in agreement, but we refer you to CERCLA Compliance with Other Laws Guidance Manual, Volume 3, page 1-14, Section 1.3, for the correct approach in applying NESHAPs to CERCLA actions.

Response: EPA's citation is appreciated. The Army attempts to apply appropriate analysis to these questions based upon current guidance and appreciates EPA's efforts in providing guidance materials and assistance in interpretations to Army personnel preparing documents.

Comment 6: Page 26, General Construction Activities, subpart (c), Applicable Emission Limitation Guideline, first sentence, it should state "Both the 20%-opacity" and not "20%-capacity", as given.

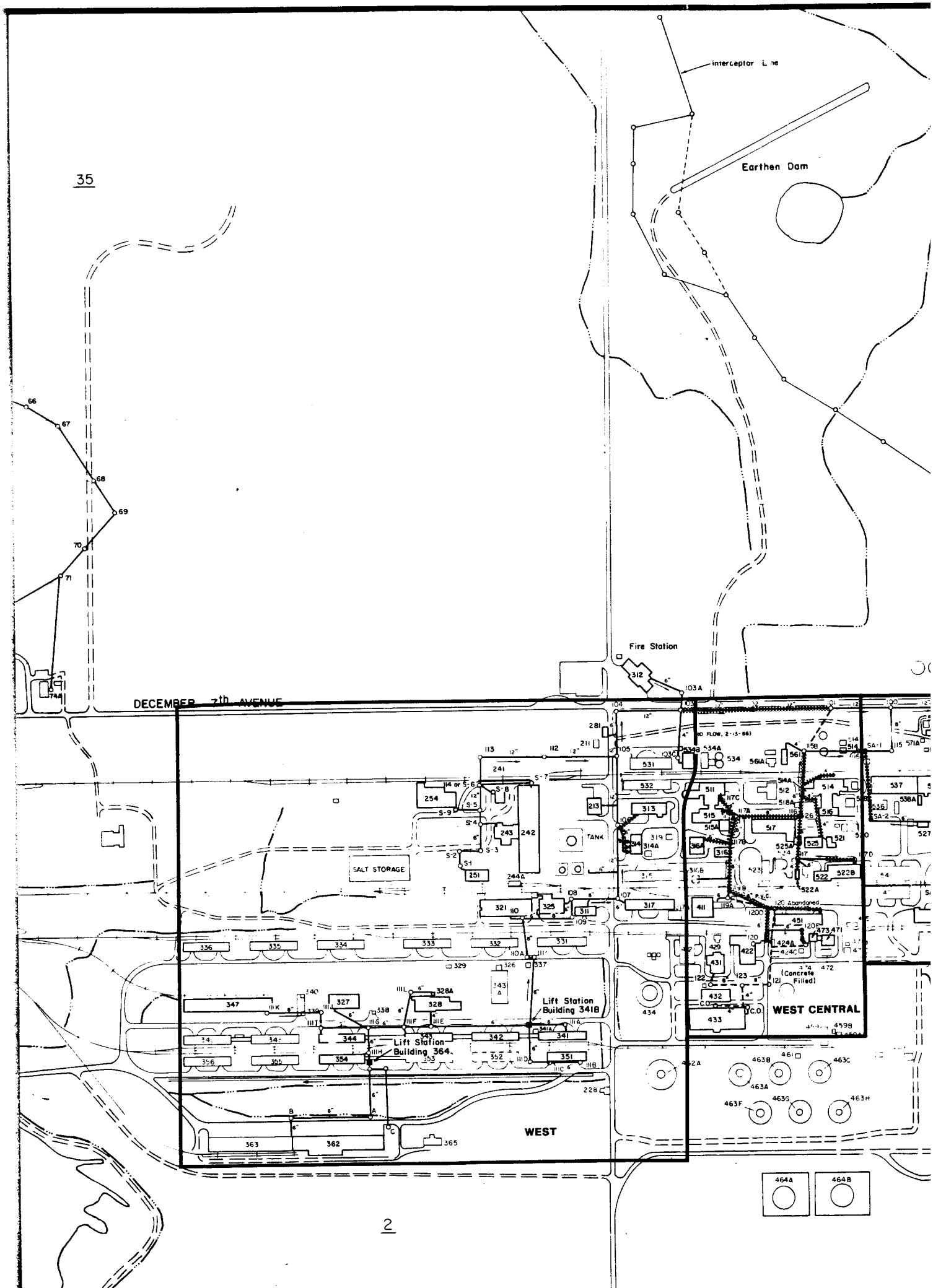
Response: The document has been corrected.

Comment 7: Page 29, Footnote 3, the evaluation regarding land ban restrictions should be included in the Decision Document and Implementation Document.

Response: The evaluation requested will be included in the Decision Document and Implementation Document.

Comment 8: No evaluation was made of asbestos ARARs; however, it is stated on page 5, that asbestos cement is present. ARARs for the proper handling and storage of asbestos-containing materials should be included.

Response: The text has been revised to include ARARs concerning asbestos removal.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Earthen Dam
66
67
68
69
70
71
744
Fire Station
312
103A
DECEMBER 7th AVENUE
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TANK
Lift Station Building 3418
Lift Station Building 364
WEST CENTRAL
WEST
(Concrete Filled)
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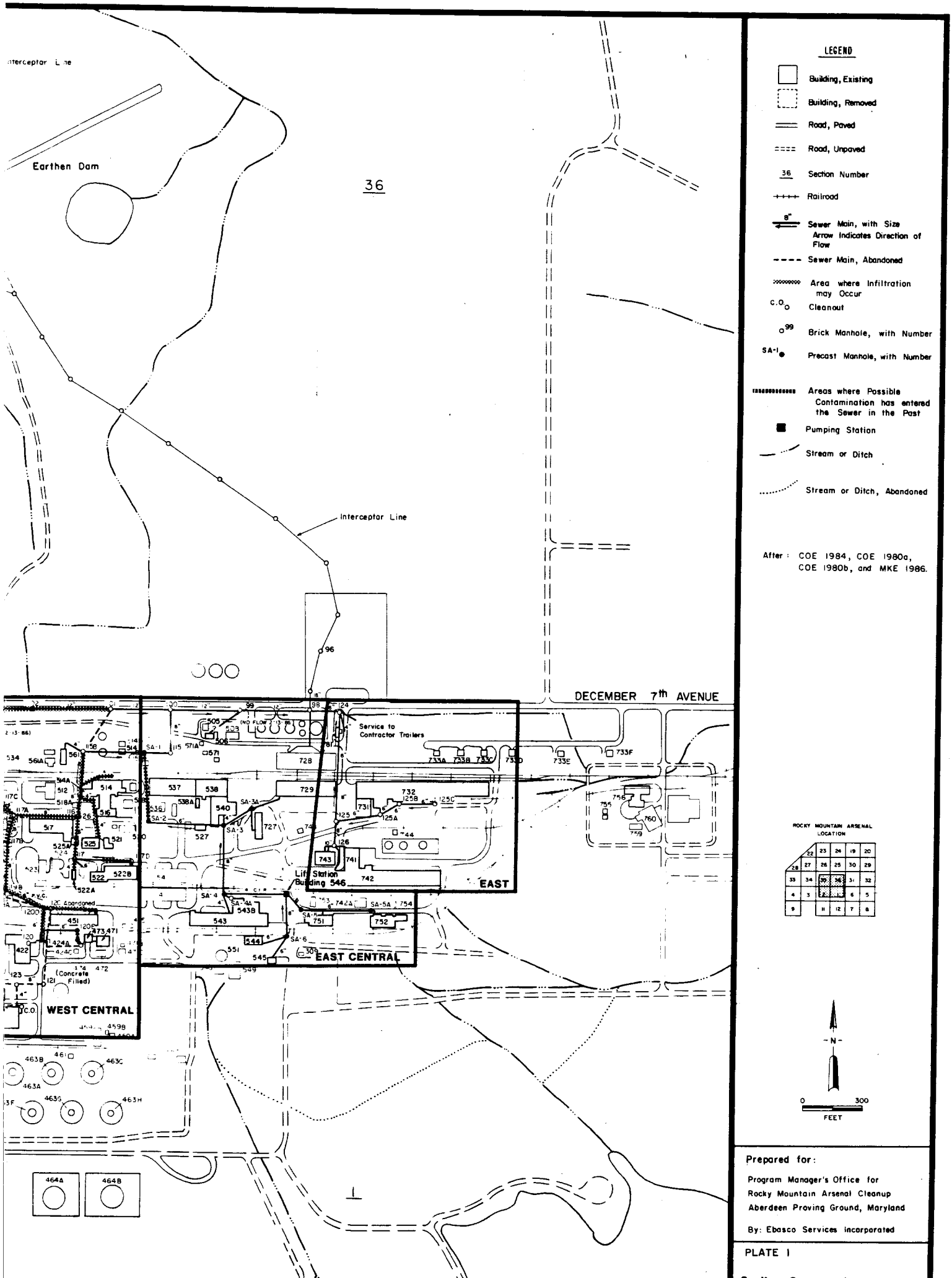
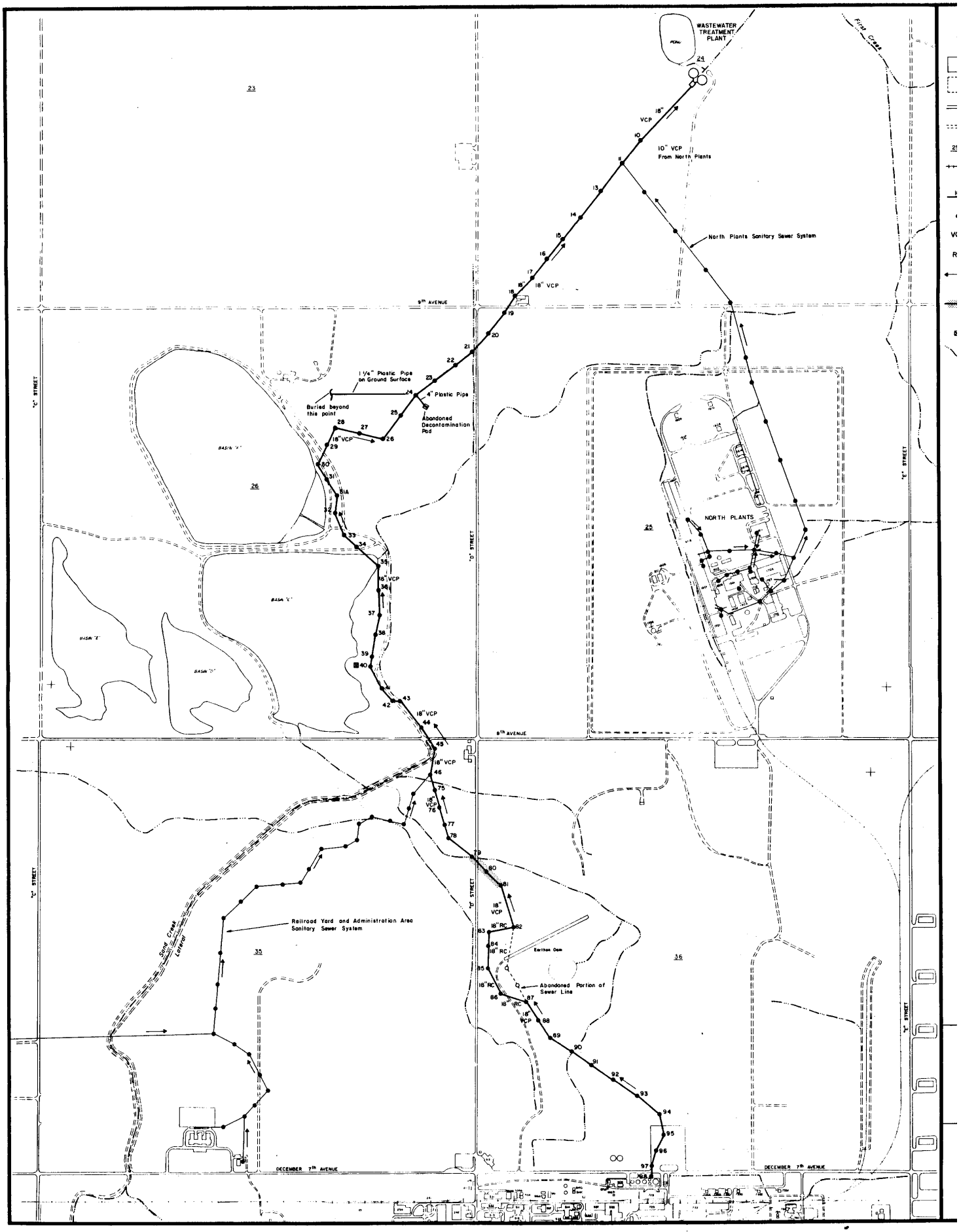
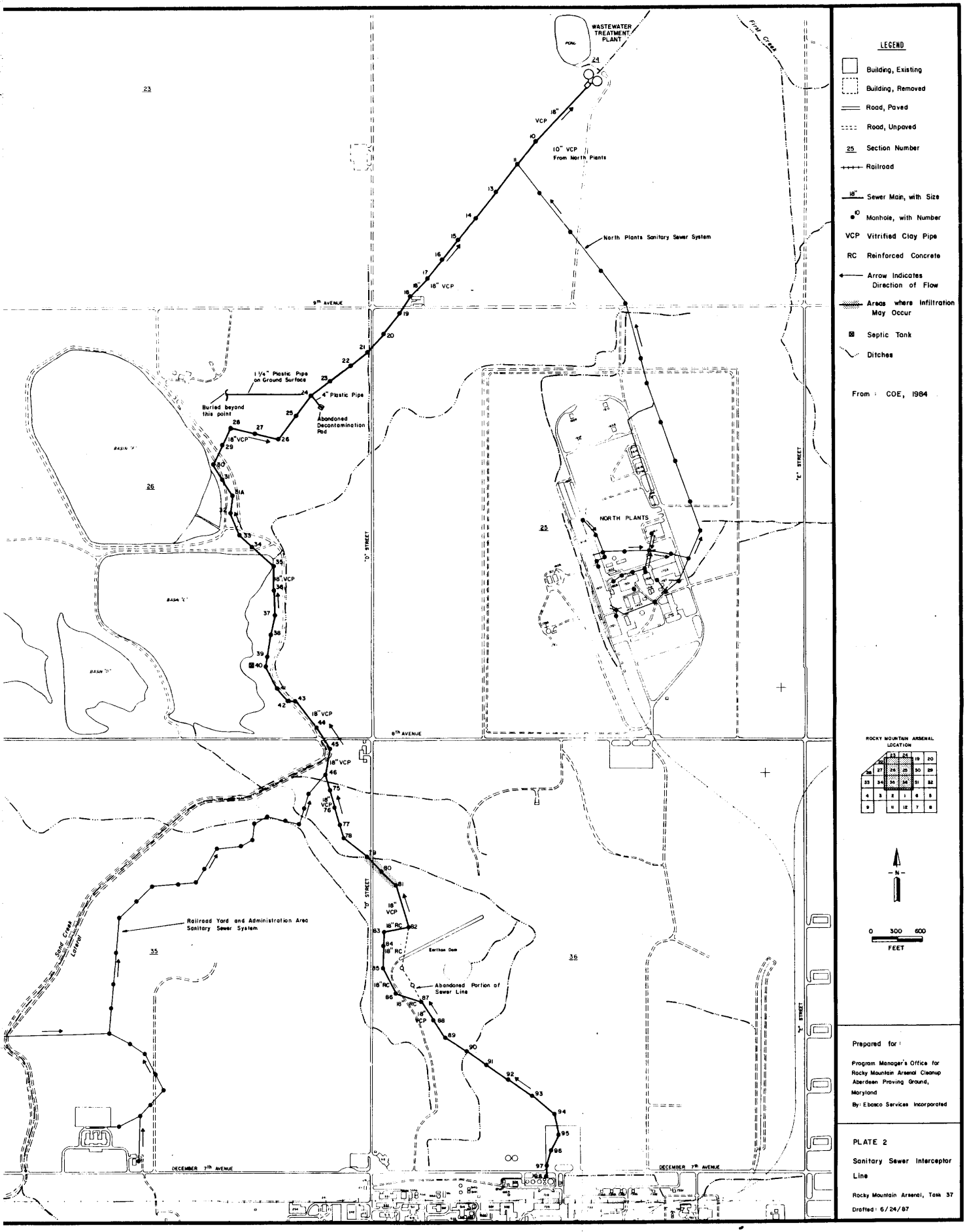

Interceptor Line
Earthen Dam
36
Interceptor Line
96
DECEMBER 7th AVENUE
Service to Contractor Trailers
(NO FLOW 2-13-86)
Lift Station Building 546
EAST
EAST CENTRAL
WEST CENTRAL
(Concrete Filled)
12" Abandoned
LEGEND
Building, Existing
Building, Removed
Road, Paved
Road, Unpaved
36 Section Number
Railroad
8" Sewer Main, with Size Arrow Indicates Direction of Flow
Sewer Main, Abandoned
Area where Infiltration may Occur
C.O. Cleanout
99 Brick Manhole, with Number
SA-1 Precast Manhole, with Number
Areas where Possible Contamination has entered the Sewer in the Past
Pumping Station
Stream or Ditch
Stream or Ditch, Abandoned
After : COE 1984, COE 1980a, COE 1980b, and MKE 1986.
ROCKY MOUNTAIN ARSENAL LOCATION
N
0
300
FEET
Prepared for:
Program Manager's Office for Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland
By: Ebasco Services Incorporated
PLATE 1


WASTEWATER TREATMENT PLANT
POND
FISH CREEK
24
23
18" VCP
10" VCP From North Plants
North Plants Sanitary Sewer System
9th AVENUE
18" VCP
1 1/4" Plastic Pipe on Ground Surface
4" Plastic Pipe
Buried beyond this point
Abandoned Decontamination Pad
"C" STREET
"D" STREET
"E" STREET
BASIN "A"
BASIN "B"
BASIN "C"
26
25
NORTH PLANTS
6th AVENUE
"G" STREET
"F" STREET
Railroad Yard and Administration Area Sanitary Sewer System
Soda Creek Lower
35
36
18" RC
Earthen Dam
Abandoned Portion of Sewer Line
DECEMBER 7th AVENUE



LEGEND

- Building, Existing
- Building, Removed
- Road, Paved
- Road, Unpaved
- 25 Section Number
- Railroad
- 18" Sewer Main, with Size
- 10 Manhole, with Number
- VCP Vitrified Clay Pipe
- RC Reinforced Concrete
- Arrow Indicates Direction of Flow
- Areas where Infiltration May Occur
- Septic Tank
- Ditches

From : COE, 1984

ROCKY MOUNTAIN ARSENAL LOCATION

N

0 300 600
FEET

Prepared for :

Program Manager's Office for Rocky Mountain Arsenal Cleanup
Aberdeen Proving Ground, Maryland

By: Ebasco Services Incorporated

PLATE 2

Sanitary Sewer Interceptor Line

Rocky Mountain Arsenal, Task 37

Drafted : 6/24/87