DALECARLIA WATER TREATMENT PLANT
and
GEORGETOWN RESERVOIR
RESIDUALS DISPOSAL FACILITIES

RESIDUALS DISPOSAL STUDY

U.S. ARMY CORPS of ENGINEERS
BALTIMORE DISTRICT
WASHINGTON AQUEDUCT DIVISION

WHITMAN, REQUARDT AND ASSOCIATES
BALTIMORE, MARYLAND

In Association with:

MALCOLM PIRNIE, INC.
NEWPORT NEWS, VIRGINIA

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1.0 EXECUTIVE SUMMARY

This report, presents the findings of a study of disposal and reuse alternatives for dewatered alum residuals generated from the Dalecarlia Water Treatment Plant (WTP). The Dalecarlia WTP is operated by the Washington Aqueduct Division ("the Aqueduct") of the U.S. Army Corps of Engineers, Baltimore District ("the Corps"). The study was conducted in response to the prohibition by EPA on future discharging of alum residuals into the Potomac River, and is part of a design project for residuals collection, conveyance, thickening, and dewatering facilities.

1.1 KEY FINDINGS

The scope of this study was to provide a "short list" of disposal and reuse alternatives to the Aqueduct, complete with an Implementation Plan for each. The final set of disposal and reuse options which remained after evaluation and ranking of alternatives are shown in Exhibit 1-1. Refer to Section 7.0 for additional details on the ratings and cost estimates for short-listed options.

1.2 KEY STUDY PARAMETERS

The generation rate and characteristics of alum residuals were the primary factors in determining and assessing the feasibility and range of disposal alternatives. This study addresses the management of the Water Treatment Plant residual solids to be ultimately disposed.

1.2.1 Residuals Characteristics

The feasibility of residuals dewatering and identification of resultant dewatered cake characteristics were determined during the November 1994 Pilot Study Testing. The Pilot Studies evaluated centrifuge and diaphragm filter press technologies. The tests demonstrated that both types of dewatering equipment can consistently dewater Dalecarlia residuals to a consistency of at least 28 percent Total Suspended Solids (TSS). Subsequent evaluation supported the recommendation to use centrifuge dewatering technology for the Dalecarlia dewatering facility design. This report is based upon a solids concentration range of 28 to 32 percent TSS. Test results presented herein will be for centrifuge-dewatered residuals.

EXHIBIT 1-1

SUMMARY OF ALTERNATIVES BY MANAGEMENT APPROACH

MANAGEMENT APPROACH	TECHNOLOGY	RATING*	ESTIMATED COST RANGE**
1. Contract Disposal	Land Application (Private)	9	$25-30/ton
	Sanitary Landfill (Private)	9	$40-50/ton
	Sanitary Landfill (Public)	13	$35-40/ton
	Manufacturing (Brick)	11	$12-35/ton
2. Aqueduct-Controlled Disposal	Land Application	12	$25-30/ton
3. Disposal via Partnership	Disposal of Dewatered Residuals with Dredge Spoils	13	$20-25/ton

Notes: See Section 7.0 for additional detail.

* Low ratings indicate higher feasibility.

** Cost estimates based on preliminary contacts with potential contractors. Actual negotiated costs may vary.

Physical and chemical tests conducted to determine the usefulness of the dewatered residuals and corresponding limitations in various disposal/reuse alternatives were presented in Technical Memorandum No. 7 entitled, "Alum Residuals Dewatering Equipment Pilot Testing Protocol", dated October 1994. The residuals can be described as a fine-medium sandy, organic silt, the appearance of a loose, brown soil, with an organic content of approximately 23 percent, and no free water present. The residuals "passed" the EPA's Toxicity Characteristics Leaching Procedure (TCLP), indicating that they can be disposed of in a sanitary landfill meeting Resource Conservation and Recovery Act (RCRA) Subtitle D standards (synthetic liner, leachate collection, post-closure care and maintenance, etc.).

(Refer to Section 2.0 for Additional Detail)

1.2.2 Generation of Residuals

The total average annual production of residuals has been estimated to be about 48,000 wet tons per year (at 30 percent TSS). Dewatering operations are expected to vary by season, with a 3-month low-production rate in the winter months, during which residuals will not be removed from the Georgetown and Dalecarlia reservoirs. During those 3 months, residuals production will be about one-third the level of production during the other 9 months. The range of solids produced is from 79 to 355, with an average of 190 wet tons per day.

(Refer to Section 2.0 for Additional Detail)

1.3 ALTERNATIVES ANALYSIS PROCESS

The alternatives evaluated for the disposal/reuse of alum residuals were identified by a combination of discussions with Aqueduct and Corps project team members, staff at similar facilities, regulators, university faculty members, articles in technical journals, and review of reports previously prepared for the Dalecarlia WTP.

The disposal/reuse options considered included the following:

- Landfill disposal with municipal solid waste or construction and demolition (C&D) debris.
- Mine/land reclamation.
- Land application.

- Alum recovery prior to disposal.
- Co-disposal with dredge spoils.
- Discharge to Blue Plains sewage collection system.
- Co-disposal with Blue Plains bio-solids.
- Use in a manufacturing process.

The evaluation of disposal/reuse alternatives available to the Aqueduct was conducted using a sequential screening process. A first ("initial") screening was conducted based on regulations governing disposal and reuse of alum residuals, technology limitations, logistical considerations, and institutional constraints. A second ("final") screening was conducted based on a multi-variate ranking of options remaining after the initial screening, the options past history (track record), long-term potential, cost, environmental impacts, the availability of suitable sites (or, in the case of a privatization option, the availability of commercial capacity), regulatory risk, Dalecarlia requirements, institutional constraints, management complexity and time to implement the disposal option. The final short list is grouped by management approach, namely: management by contract, incorporation into Aqueduct controlled operations, or by partnership with a public agency.

(Refer to Section 7.0 for Additional Detail)

1.4 PRELIMINARY SCREENING

Based on a review of disposal technologies, state and federal regulations, logistics and institutional constraints, the option for alum recovery, co-disposal and co-treatment with Blue Plains W.W.T.P. "sludge", and mine/land reclamation disposal were eliminated from further assessment at the initial screening stage for the reasons described in Exhibit 1-2.

(Refer to Section 3.0 and 4.0 for Additional Detail)

The options remaining after the initial screening were:

- Landfill disposal with municipal solid waste, or in a single-use landfill (monofill).
- Land application.

EXHIBIT 1-2

SUMMARY OF INITIAL SCREENING RESULTS

OPTION		STATUS/REASON FOR ELIMINATION
4.1	No Action	Eliminated due to regulatory constraints
4.2	Landfilling 4.2.1 Sanitary Landfill (Co-Disposal) 4.2.2 C&D (Rubble) Landfill 4.2.3 Monofill	 Still under consideration Eliminated due to regulatory constraints Still under consideration
4.3	Mine/Land Reclamation	Eliminated due to regulatory constraints (equivalent to land application), and logistics complexity for quarries.
4.4	Land Application	Still under consideration
4.5	Alum Recovery	Eliminated due to technology limitations
4.6	Disposal with Dredge Spoils	Still under consideration
4.7.1	Treatment by Blue Plains WWTP	Eliminated due to added cost of Blue Plains WWTP improvements and transmission main.
4.7.2	Co-Management with Blue Plains Biosolids	Eliminated: Blue Plains uses commercial land application for disposal/reuse.
4.8	Manufacturing	Still under consideration

- Co-disposal with dredge spoils.
- Use in a manufacturing process.

These options were also categorized by "Management Approach," into the following three categories: Contract Disposal, Aqueduct-Controlled Disposal, and Disposal via Partnership (with a Public-Sector Agency).

(Refer to Section 5.0 for Additional Detail)

1.5 SITE EVALUATION AND AVAILABILITY

A combination of approaches were applied during the evaluation of available sites. These included manufacturing, monofilling and disposal with dredge spoils, and the **identification of specific disposal sites**. An evaluation of existing private land capacity was conducted to obtain the viability of various disposal options, including: commercial land application, sanitary landfilling, and manufacturing. The likelihood of private-sector options became evident during this review. For Aqueduct-controlled land application, present and future viability was determined by **estimation of potential acreages suitable and available for land application**. See Exhibit 6-4 and Exhibit 6-5.

The results of all three types of site evaluation and availability studies were incorporated into the final screening, as criteria for ranking options.

(Refer to Section 6.0 for Additional Detail)

1.6 EVALUATION OF REMAINING OPTIONS AND FINAL SCREENING

Upon completion of both the "initial" and "final" screenings, those options remaining were critiqued under the following combination of "quality factors", "risk factors", and corresponding cost.

The quality factors are:

- Track Record of Technology or Approach
- Long-Term Potential

The risk factors are:

- Environmental Impacts
- Site Suitability
- Regulatory Risk
- Dalecarlia Requirements
- Institutional Constraints
- Management Complexity
- Time to Implement

Ratings were given to each of these alternatives, using the integers 1, 2 and 3. Lower numbers correspond to a "favorable" (more feasible, less risky) rating. The point ratings for the evaluated "Final Short-List Criteria" are presented in Exhibit 1-3. Exhibit 1-4 presents which options remain under consideration in the final screening. Using this methodology, two options were eliminated from further consideration.

The remaining options were grouped by management approach, in order to facilitate the development of the implementation plans.

(Refer to Section 7.0 for Additional Detail)

The sample implementation plans and corresponding schedules developed describe each management approach. These programatic approaches are in order of easiest to manage, and are listed as follows:

- ***Contract Disposal*** (comprising several technology options). Implementation would be in the form of a procurement seeking bids and offers from interested private companies and public agencies.

- ***Aqueduct-Controlled Disposal*** (land application). Implementation would first be initiated under negotiated agreements with federal facilities that control sufficient acreages suitable for land application. Several facilities are identified later in Section 6.0 and Section 8.0.

- ***Disposal via Partnership*** (disposal with dredge spoils). Implementation requires obtaining approval for a barge docking and disposal site.

(Refer to Section 6.0 for Additional Detail)

Exhibit 1-3
Dalecarlia Residuals Disposal Study
Final Short-List Criteria

		QUALITY FACTORS		RISK FACTORS							
Option	Cost/Unit (Estimated)	Track Record	Long-Term Potential	Environmental Impacts	Site Suitability	Regulatory Risk	Dalecarlia Requirements	Institutional Constraints	Management Complexity	Time to Implement	Total Points
LAND APPLICATION											
-Commercial	$25 - $30 / TON	GOOD 1	GOOD 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	9
-Aqueduct Managed	$25 - $30 / TON	GOOD 1	GOOD 1	LOW 1	LOW 1	LOW 1	LOW 1	MODERATE 2	MODERATE 2	MODERATE 2	12
LANDFILLING											
-Commercial	$ 40 - $60 / TON	GOOD 1	GOOD 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	9
- Public	$ 35 - 40 / TON	GOOD 1	SATISFACTORY 2	LOW 1	LOW 1	LOW 1	LOW 1	MODERATE 2	MODERATE 2	MODERATE 2	13
- Aqueduct-Owned Monofill	$ 80 - $85/ TON (at 190 CY/DAY)	SATISFACTORY 2	GOOD 1	MODERATE 2	MODERATE 2	MODERATE 2	LOW 1	MODERATE 2	HIGH 3	MODERATE 2	17
BARGING											
- Blue Plains	$20 - $25 / WET TON $75 - $85 / DRY TON (at 190 CY/DAY)	GOOD 1	GOOD 1	LOW 1	MODERATE 2	LOW 1	LOW 1	MODERATE 2	MODERATE 2	MODERATE 2	13
- Georgetown 2.5% TSS	$105 - $110/ TON $355 - $365 / DRY TON (at 190 CY/DAY)	GOOD 1	GOOD 1	LOW 1	MODERATE 2	LOW 1	DEWATERING NOT REQUIRED	HIGH 3	MODERATE 2	MODERATE 2	13
MANUFACTURING											
- Brick Manufacturing	$ 12 - 35 / TON	GOOD 1	SATISFACTORY 2	LOW 1	LOW 1	MODERATE 2	LOW 1	LOW 1	LOW 1	LOW 1	11
- Topsoil Blenders *	$ 30 - 35 / TON	GOOD 1	SATISFACTORY 2	LOW 1	HIGH 3	LOW 1	LOW 1	LOW 1	HIGH 3	LOW 1	14

* No single company available to process all residuals produced

EXHIBIT 1-4

SUMMARY OF FINAL SCREENING RESULTS

OPTION	STATUS/REASON FOR ELIMINATION
7.3.1 Land Application - Commercial	Still under consideration
7.3.2 Land Application - Aqueduct-Managed	Still under consideration
7.3.3 Landfilling - Commercial Landfill	Still under consideration
7.3.4 Landfilling - Public Landfill	Still under consideration
7.3.5 Landfilling - Aqueduct-Managed Monofill	Eliminated due to high cost
7.3.6 Barging to Dredge Disposal Area - Blue Plains docking	Still under consideration
7.3.7 Barging to Dredge Disposal Area - Georgetown docking	Eliminated due to Institutional Constraints and high cost
7.3.8 Manufacturing	Still under consideration

2.0 CHARACTERISTICS OF RESIDUALS

Pilot tests were conducted for 10 days in November of 1994 to determine the feasibility of residual dewatering at Dalecarlia WTP and to identify characteristics of the residuals for disposal under a variety of operational conditions. The dewatering tests included two types of dewatering equipment operating side-by-side: a diaphragm filter press and a centrifuge. The pilot tests showed that the residuals at Dalecarlia can be consistently dewatered to 28 percent Total Suspended Solids (TSS) or more, under either filter press or centrifugation technology pursuant to the pilot tests and related evaluations of economic and technical factors, the centrifuge dewatering method was selected. Additional information on the use of centrifuge technology has been presented in the "Alternative Operating Concepts for Residuals Handling Facilities and Presentation of Proposed Design Concept", Technical Memorandum No. 8 dated June 1995 (separate cover).

The results of the pilot tests, particularly the chemical and physical analysis of dewatered residual, are assumed to be representative of residuals to be produced from the full scale operating system. All disposal options are based on dewatered residual characteristics data obtained from the pilot test.

2.1 SUMMARY OF TEST RESULTS

Samples of cake produced by each type of dewatering equipment were analyzed by an independent laboratory. Important characteristics of the materials for disposal/reuse include the concentrations of plant nutrients and pollutant metals. Except for the common earth elements aluminum, iron and manganese, metal concentrations are low. Plant nutrients are present, but at low levels compared to commercial fertilizers. Complete test results are documented in the "Residuals Thickening and Dewatering Pilot Study" Technical Memorandum No. 7, dated March 1995 (Technical Memo No. 7), and representative test results are included as exhibits at the end of this section.

2.1.1 Chemical Characteristics

Laboratory tests were conducted for alkalinity, chemical oxygen demand, total organic carbon, plant nutrients, micro nutrients, and metals. The test data is shown in Exhibit 2-1. The results of these tests are the basis for determining the possible reuses or available disposal methods for the residual materials. For example, these tests indicated that the limiting factor for how much residual material can be land applied to agricultural or forest land is nitrogen loading.

The samples were also subjected to a Toxicity Characteristic Leaching Procedure (TCLP) analysis. This test is one of the criteria used to determine whether a waste can be disposed of in an RCRA Subtitle D landfill (with synthetic liner, leachate collection, etc.). The results indicate the residual material can be disposed of in a landfill that meets current Federal Subtitle D standards (see Exhibit 2-2).

2.1.2 Physical Characteristics Tests

Samples of the residuals were analyzed for physical parameters utilizing standard soil testing methods as shown in Exhibit 2-3. These testing methods include:

- Natural Moisture Content (ASTM D-2216)
- Specific Gravity (ASTM D-854)
- Particle Size (ASTM D-422, D-1140)
- Field Capacity (Water Holding Capacity as per American Society of Agronomy)
- Moisture Density Relationship (Modified Proctor ASTM D-1557)
- Cohesion (Triaxial Shear - unconfined/undrained ASTM D-2850)
- Organic Content (ASTM D-2974)
- Falling Head Permeability (ASTM D-5084)

The testing of residual materials produced during the pilot tests by both methods of dewatering indicate that the residuals from either method will be produced in the range of 28-32 percent Total Suspended Solids (TSS). Therefore, the evaluations and recommendations

EXHIBIT 2-1

DALECARLIA WATER TREATMENT PLANT

CENTRIFUGE AND FILTER PRESS CAKE NUTRIENT AND METAL ANALYSES
(units reported in mg/kg unless otherwise indicated)

Constituent	Detection Limit		Practical Quantitation Limit		Results	
	Centrifuge	Filter Press	Centrifuge	Filter Press	Centrifuge	Filter Press
Total Solids, %	n/a	n/a	n/a	n/a	29.0	34.4
Alkalinity as $CaCO_3$	167	139	167	139	1590	1180
COD, %	0.1	0.1	n/a	n/a	8.9	6.0
Total Organic Carbon (mg/L)	1	1	10	10	580	510
Plant Nutrients						
Ammonia	3	3	30	3	645	259
Total Kjeldahl Nitrogen	341	281	682	562	8,889	6,578
Total Nitrogen	33	28	330	28	8,903	6,596
Organic Nitrogen	33	28	330	280	9,534	6,846
Nitrate/Nitrite	1.6	1.4	3.2	2.8	14.1	8.8
Total Phosphorus	32	29	640	580	874	1348
Calcium	16	14	160	140	8,300	7,250
Magnesium	14	14	140	140	3,310	3,170
Potassium	17	14	425	350	1,960	2,020
Sulfate as S	1.6	1.6	1.6	1.6	233	140
Micro Nutrients						
Boron	0.25	0.25	0.25	0.25	0.68	<0.25
Chloride	16	14	14	14	32	182
Copper	2	1	21	1	62	62
Iron	16	14	16	2800	44,800	47,500
Manganese	2	1	20	1	1,340	1,220
Sodium	165	144	165	144	227	215
Zinc	2	1	2	1	113	138

EXHIBIT 2-1
(Continued)

DALECARLIA WATER TREATMENT PLANT

CENTRIFUGE AND FILTER PRESS CAKE NUTRIENT AND METAL ANALYSES
(units reported in mg/kg unless otherwise indicated)

Constituent	Detection Limit		Practical Quantitation Limit		Results	
	Centrifuge	Filter Press	Centrifuge	Filter Press	Centrifuge	Filter Press
Metals and Cyanide (total recoverable)						
Aluminum	82	72	2460	3600	90,000	114,000
Arsenic	0.2	0.1	25	5	16	14
Barium	82	72	82	72	308	265
Cadmium	1	1	1	1	<1	<1
Chromium	7	6	7	6	74	72
Lead	16	14	16	14	20	16
Nickel	16	14	16	14	30	30
Selenium	0.3	0.3	0.3	0.3	<0.3	<0.3
Silver	2	1	2	1	2	2
Cyanide	0.42	0.36	0.42	0.36	1.33	1.23

Note: Results reported on a dry weight basis.

Source: WR&A Tech;nical Memorandum No. 7. Table 6.

EXHIBIT 2-2

DALECARLIA WATER TREATMENT PLANT

CENTRIFUGE AND FILTER PRESS CAKE TOXICITY CHARACTERISTIC CONSTITUENTS (units reported in mg/L)

Constituent	Detection Limit	Regulatory Level	Results	
			Centrifuge	Filter Press
Arsenic	0.001	5.0	<0.001	<0.001
Barium	0.5	100.0	<0.5	<0.5
Benzene	0.005	0.5	<0.005	<0.005
Cadmium	0.007	1.0	<0.007	<0.007
Carbon Tetrachloride	0.005	0.5	<0.005	<0.005
Chlordane	0.005	0.03	<0.005	<0.005
Chlorobenzene	0.005	100.0	<0.005	<0.005
Chloroform	0.005	6.0	0.029	0.009
Chromium	0.04	5.0	0.10	0.10
o-Cresol	0.050	200.0	<0.050	<0.050
m-Cresol	0.050	200.0	<0.050	<0.050
p-Cresol	0.050	200.0	<0.050	<0.050
Cresol	0.050	200.0	<0.050	<0.050
2,4-D	0.005	10.0	<0.005	<0.005
1,4-Dichlorobenzene	0.005	7.5	<0.005	<0.005
1,2-Dichloroethane	0.005	0.5	<0.005	<0.005
1,1-Dichloroethylene	0.005	0.7	<0.005	<0.005
2,4-Dinitrotoluene	0.005	0.13	<0.005	<0.005
Endrin	0.005	0.02	<0.005	<0.005
Heptachlor(+ epoxide)	0.005	0.008	<0.005	<0.005
Hexachlorobenzene	0.005	0.13	<0.005	<0.005

Source: WR&A Technical Memorandum No. 7. Table 8.

EXHIBIT 2-2
(Continued)

DALECARLIA WATER TREATMENT PLANT

CENTRIFUGE AND FILTER PRESS CAKE
TOXICITY CHARACTERISTIC CONSTITUENTS
(units reported in mg/L)

Constituent	Detection Limit	Regulatory Level	Results	
			Centrifuge	Filter Press
Hexachloro-1,3-butadiene	0.005	0.5	<0.005	<0.005
Hexachloroethane	0.005	3.0	<0.005	<0.005
Lead	0.1	5.0	<0.1	<0.1
Lindane	0.005	.04	<0.005	<0.005
Mercury	0.0002	0.2	<0.0002	0.0003
Methoxychlor	0.005	10.0	<0.005	<0.005
Methyl ethyl ketone	0.100	200.0	<0.100	<0.100
Nitrobenzene	0.005	2.0	<0.005	<0.005
Pentachlorophenol	0.020	100.0	<0.020	<0.020
Pyridine	0.500	5.0	<0.500	<0.005
Selenium	0.002	1.0	<0.002	<0.002
Silver	0.01	5.0	<0.01	0.01
Tetrachloroethylene	0.005	0.7	0.012	<0.005
Toxaphene	0.005	0.5	<0.005	<0.005
Trichloroethylene	0.005	0.5	<0.005	<0.005
2,4,5-Trichlorophenol	0.050	400.0	<0.050	<0.050
2,4,6-Trichlorophenol	0.050	2.0	<0.050	<0.050
2,4,5-TP (Silvex)	0.005	1.0	<0.005	<0.005
Vinyl Chloride	0.010	0.2	<0.010	<0.010

Source: WR&A Technical Memorandum No. 7. Table 8.

EXHIBIT 2-3

DALECARLIA WATER TREATMENT PLANT

CENTRIFUGE AND FILTER PRESS CAKE PHYSICAL CHARACTERISTICS

ANALYSIS	UNITS	CENTRIFUGE	FILTER PRESS
Soil Classification	NA	Fine to Medium Sandy Organic Silt (OH), Brown	Fine to Medium Sandy Organic Silt (OH), Brown
Natural Moisture Content	(%)	244	237
Specific Gravity	NA	2.30	NR
Atterberg Limits			
Liquid Limit	(%)	312	404
Plastic Limit	(%)	219	217
Plasticity Index	(%)	93	187
Particle Size Analysis			
Sand	%	46.6	58.9
Silt	%	51.4	NR
Clay	%	2	NR
Field Capacity	%	18.7	NR
Standard Proctor			
Maximum Dry Density	pcf	52	58
Optimum Moisture Content	%	77	67
Triaxial Compression (UU)	ksf	4.8	3.1
Organic Content	%	23	25
Permeability	cm/sec	2.7×10^{-7}	NR

Notes: NA = Not Applicable
NR = Not Reported

Source: WR&A, Technical Memorandum No. 7. Table 9.

in this report are based on this design production. Significant deviation from 30 percent TSS (or from the other results of the pilot test samples) would merit re-evaluation of the various available disposal options. For example, disposal in a sanitary landfill would be prohibited for residuals failing to meet the requirements of the Toxicity Characteristic Leaching Procedure (TCLP).

2.1.2.1 Discussion

Dewatered alum residuals have a greater water retention capacity than do residuals without alum. Alum coagulates soil particles so the soil can settle out of the treated water. The alum creates a larger bonded particle by taking the clay and colloidal particles and making a silt and medium-fine sand size particle. In the process, water is chemically attracted to and retained within the soil particle.

The residual material samples retrieved from Dalecarlia WTP are classified by particle size distribution as a fine-medium sandy, organic, silt. The Unified Soil Classification designation is OH, an organic clay/silt of medium to high plasticity. The natural moisture contents were 244 and 237 percent, for the centrifuge and diaphragm filter press generated residual materials, respectively. As a comparison, an in-situ soil material ranging from a windblown silt to a soft, slightly organic clay would have a moisture content of 21 to 70 percent. The natural moisture content of the alum residual material is 3.5 to 11 times higher than a typical in-situ material of similar size particles without alum.

The centrifuge residual material is a loose, brown, wet soil as compared to the thin slabs of stiff, compact, brown, moist-wet soil created by the diaphragm filter press. The diaphragm filter press creates a slightly dryer, finer grain material, but more significant is the tightly-compacted structure.

The Atterberg Limits test determined the liquid and plastic limits of the residual materials. The plasticity index is the difference between the liquid limit and plastic limit. The centrifuge residual material had a liquid limit of 312 percent compared to 404 percent for the diaphragm filter press. The plastic limit for the centrifuge and diaphragm filter press materials were 219 and 217, respectively. Comparing the natural moisture contents to their respective Atterberg limits shows both residual materials to be in a plastic state. However, the

diaphragm filter press residual material can absorb more moisture before liquefying. The liquid limits of the residual materials are in excess of those of soils described on the Unified Soil Classification system plasticity chart.

The organic content was 23 and 25 percent for the centrifuge and diaphragm filter press residual materials, respectively. Soils used in structural soil foundations typically contain little or no organic matter and have a maximum dry density of 100 pounds per cubic foot (pcf). At a 22 to 25 percent organic matter content, the residual material would be a highly compressible soil material not suitable for foundations. The centrifuge's residual materials maximum dry density is 52 pcf with an optimum moisture of 77 percent compared to 58 pcf and 67 percent for the diaphragm filter press.

The cohesion strengths for the centrifuge and diaphragm filter press residual materials were 4.8 and 3.1 kips per square foot, respectively. The permeability of the centrifuge residual material was 2.7×10^{-7} centimeters per second. A typical permeability value for a clay to colloidal clay is 10^{-7} to 10^{-9} centimeters per second. The field (water holding) capacity using one-third bar pressure was 18.7 percent for the centrifuge residual material.

Residual material with an organic content greater than 20 percent, and a water holding capacity typical of a silt might be suitable as a soil conditioner. (Section 6 and Appendix D contains the evaluation of residuals for land treatment). A chemical characteristic analyses of the residual material is included in this report. Preliminary agricultural and forested land application rates, residual nitrogen content and crop nitrogen uptake are included in Section 6.

2.1.3 Loading and Handling Characteristics

The dewatering pilot testing conducted at Dalecarlia Water Treatment Plant (WTP) resulted in an average total suspended solids content of 30 percent from the centrifuge and 34 percent from the diaphragm filter press. The residual material produced is classified as a brown, moist to wet, medium to fine sandy, organic, silt. No "free" water was present in the residual materials produced by either dewatering method.

The residual material from the centrifuge is a loose soil which can be "kneaded" because of its high moisture content in the plastic range. The high pressure used in the

diaphragm filter press dewatering process creates a compact soil cake. The high moisture content in the diaphragm filter press cake is slightly lower compared to the centrifuge material. A high moisture content in the plastic range may cause the residual materials to adhere to objects the material comes into contact. Careful investigation of the handling systems is highly recommended and should be included in a design memorandum.

The on-site residual material storage capacity is expected to be equivalent to one daily shift of dewatered residuals. Twenty-four hours is therefore the maximum on-site average drying time for the dewatered residual material. The residual material from centrifuge dewatering stored in an enclosed structure is expected to have very little moisture loss. The residual material will remain "sticky" and plastic during handling.

Loading of the residual material into dump trucks or dump trailers may be performed using heavy construction equipment such as an excavator or front-end loader, automated conveyor system, or hopper silo. All three techniques of loading would be quick and efficient. The testing of various handling and loading systems is highly recommended to assure that facility functions properly.

The diaphragm filter press residual material is a compact cake of a higher percent solids versus the centrifuge cake. The large slab cakes discharged from the diaphragm filter press must be broken apart if a land application disposal method is to be pursued.. This additional step is necessary when land applying filter press cake and some literature has reported that farmers prefer the dewatered centrifuge residuals for field applications. The filter press dewatered cakes form a slab material requires additional container space and is, therefore, more difficult to uniformly land apply if not broken apart. This additional process step can be performed by either heavy construction equipment or a gravity impact sieve placed below the discharge opening of the diaphragm filter press.

Use of either dewatering method will require even distribution into dump trucks and dump trailers to maximize the load weight. Heavy construction equipment and automated conveyors with an alternating discharge chute could evenly distribute the residual material. A hopper silo might require manual labor in distributing the residual material.

When the material's moisture content is below the plastic limit, distribution can be achieved by gravity. Residual material with the moisture content in the plastic range will

clump together. Hopper openings must be adequately sized and side sheets sufficiently steep to discharge the residual material, which could potentially clog due to its "sticky" properties. The hopper should be equipped with mechanical devices for rapid clearing of any blockage that might occur.

If operations generate cakes with a high moisture content the unloading of dump trucks and dump trailers at the disposal site might require mechanical assistance due to the residual materials' "sticky" consistency. A recommended mechanical device commercially available to address a "sticky" condition would be a vehicle with a hydraulic push plate. Discharge of the residual material evenly through the tailgate could be performed with minimum retention in the dump box.

Although the test results do not indicate "free" water, free water may be contained within the residual material and during extended transportation, seepage from the container box may occur. To minimize the potential for seepage along the transportation route, dump trucks and dump trailers should be equipped with water-tight tailgates. Local jurisdictions require canvas or tarp covers over the dump boxes to prevent wind blown material from damaging other vehicles on the roadways. The canvas or tarp covers should be adequate to prevent residual material from blowing from the truck dump box.

Whether or not a hydraulic push plat and water tight tail gate will be required is not known at this time. The alum residual recovered from the Pilot Testing has characteristics indicating the material may be "sticky". Dalecarlia proposed high solids concentration, the high volume of residuals output and chemical characteristics of the alum residuals are not directly comparable to another dewatering facility in this new venture. It is recommended that during the initial startup and testing of the dewatering facility dump body vehicles be loaded with the alum residual material and transported to a disposal facility. Dump body vehicles with and without water tight tailgates ad hydraulic push plates should be tested to determine which would better suit Dalecarlia's WTP residual disposal.

2.2 SOLIDS GENERATION

The dewatering facility is designed to dewater residuals year round, during two shifts, 5 days per week during the 9 month (spring, summer and fall) period and one shift 5 days per week during the 3 month winter period (the latter schedule can be expanded if weather prevents residuals removal from the site for several days). The residuals processed during the year will be divided into two periods, each having a different daily processing rate. During 9 months (spring, summer, fall) of each year, the facility will dewater residuals from the Dalecarlia and Georgetown reservoirs as well as from the Dalecarlia settling basins as shown in Exhibit 2-4. The average amount of residuals processed during this period will be a residuals cake amount of 242 wet tons per day at 30 percent cake solids. The average daily residual cake production during the maximum month of that 9-month period is expected to be 355 wet tons per day.

During the 3 winter months of each year, residuals from Dalecarlia and Georgetown reservoirs will not be removed; only the residuals from the settling basins will be dewatered. Therefore, the amount of residual materials processed will be approximately one-third of the production during the other 9 months. During this period, the average residual production is expected to be 77 wet tons per day, 5 days per week. The average daily production during the maximum month of the winter 3-month period is expected to be 190 wet tons per day.

The annual production of alum residuals is estimated to total 48,300 wet tons based on operating the dewatering facility an average of 20-days per month.

2.2.1 Storage

During the 9 month spring, summer, fall period, dewatering operations are anticipated to be conducted during two shifts per day, 5 days per week. Sufficient on-site storage is required to allow materials to be hauled from the site during one 8-hour shift per day, five days per week, to preclude the requirement for operating large trucks during evening hours. On-site storage hoppers are planned to allow gravity loading of residual materials into transport vehicles. Assuming that each transport vehicle is capable of hauling approximately 20 cubic yards (20 wet tons), hauling residuals off-site would require an average of 12 loads

EXHIBIT 2-4

DALECARLIA WATER TREATMENT PLANT AND GEORGETOWN RESERVOIR RESIDUALS DISPOSAL RATES

	Processing Rates (dry lbs/day)	Residuals Disposal	
		Cake Volume[1] (cf/day)	Cake Weight[2] (wet tons/day)
Average Conditions			
9-Month Period	132,000	6,912	**242**
3-Month Period	42,000	2,200	**77**
Maximum Conditions			
9-Month Period	193,200	10,116	**355**
3-Month Period	103,200	5,404	**190**

Notes:

1. Considering 30 percent solids and a 98 percent centrifuge recovery rate.
2. Assuming a unit weight of 70 lbs/cf, and 20 working days per month.

Source: WR&A, Projections of Residuals Production. Technical Memorandum No. 5.

per day, with a maximum of approximately 18 loads per day during peak periods. Should some operational constraint (i.e., weather restricting access to the dewatering facility or disposal site, truck driver strike, etc.), prevent residual hauling, a temporary storage pad is being incorporated into the site layout. The temporary storage pad is expected to accommodate 30 working days of dewatered residuals at 190 cubic yards per day production.

This small on-site storage pad is planned to be built adjacent to the dewatering facility. This pad can be used for emergency storage of dewatered residuals. Significantly larger storage capability is available in the reservoirs and sedimentation basins. If a temporary condition prevents the hauling of dewatered residuals from Dalecarlia, the residuals can be stored within the system by not being collected and conveyed to the dewatering facility until the condition is corrected and production of dewatered materials can be resumed.

The current dewatering facility operations will include nine months of solids dredging (four and one-half months each for Dalecarlia Forebay and Georgetown Reservoir), and 12 months solids removal from the Dalecarlia Sedimentation Basins.

2.3 Hauling and Transportation

Any disposal option for the dewatered or slurry residual material requires transport from Dalecarlia Water Treatment Plant which is conveniently located near a major highway system (I-495 Capital Beltway), navigable waterway (Potomac River, below the Key Bridge) and rail system (Alexandria, Virginia). This Section reviews truck transportation, and briefly rail transportation. Waterway transportation is discussed in Section 4, "Disposal with Dredge Spoils", in Section 7, "Disposal of Dewatered Residuals with Dredge Spoils", and "Disposal of Slurry Residuals with Dredge Spoils", and in Section 8, "Co-Disposal with Dredge Spoils".

2.3.1 Rail Transportation

Two internodal rail facilities are located in the District of Columbia area. One is Norfolk Southern Corporation's facility in Alexandria, Virginia. The second is Montgomery County's Shady Grove Solid Waste Facility, served by CSX.

Access to the Shady Grove Facility would necessitate agreement negotiations with Montgomery County, CSX and establishment of a disposal facility located near another internodal facility, preferably serviced by the same railroad system . Use of Alexandria, Virginia's internodal facility would similarity require negotiations with Norfolk Southern Corporation and a disposal facility located near another internodal facility. In either case, containers of residual material would have to be transported by truck from Dalecarlia Water Treatment Plant to the internodal site, and then off-loaded. Containers unloaded at the disposal site internodal facility would then have to be transported by truck to the disposal facility. Management and coordination of this operation present significant logistical challenges. An alternative would be to contract the disposal operation to a private company, see Section 5, "Contract for Disposal". For rail transportation to be considered a viable option particularly for "contract" disposal, the disposal site would need to be a significant distance from the Dalecarlia site.

2.3.2 Transport by Truck

The review of truck transportation of residuals covered several key factors, divided into three categories:

- Physical Characteristics and Production Disposal Rates
- Travel Route and Disposal Site Distance
- Capital, Labor, and Management Investment.

The residuals produced by the centrifuge dewatering facility can be transported by either a tandem dump or tractor dump trailer truck. Daily production is expected to range from between 190 cy/day, based on annual quantities, to 355 cy/day, based on maximum month production estimates (a complete review of these numbers can be reviewed in Technical Memorandum No. 5, "Residuals Production Projections"). The tandem dump or dump trailer truck should be equipped with a hydraulic push plate, to assist in unloading the

residual material. A water tight tail gate and a bed cover is required, see Section 2.1.3, "Loading and Handling Characteristics".

2.3.3 Truck Disposal Routes

Eight potential disposal routes from Dalecarlia Water Treatment Plant to the Capital Beltway were identified for this study. This section describes each route from Dalecarlia to the Capital Beltway I-495 and determines the least disruptive route. The route distances, from Dalecarlia Water Treatment Plant to the Capital Beltway range from approximately 4.4 miles (Route Number One) to 8.3 miles (Route Number Three). Refer to Exhibit 2-5 and Exhibit 2-6. Routes Two and Three approach the Capital Beltway west of Dalecarlia Water Treatment Plant. Routes One, Four, Five and Eight approach the Capital Beltway northwest of Dalecarlia Water Treatment Plant. Routes Six and Seven approach the Capital Beltway at points north of Dalecarlia Water treatment Plant.

Trucks hauling residual material from Dalecarlia Water Treatment Plant will be approximately 30 to 40 tons, gross weight. Route One and Four, using MacArthur Boulevard north of Dalecarlia Water Treatment Plant, are eliminated because the maximum road weight limit is six tons.

Routes Five and Eight use River Road to access the Capital Beltway. Route Number Eight traverses an upscale residential neighborhood along Massachusetts Avenue and a densely populated, residential neighborhood on Goldsboro Road. Route Five utilizes Western Avenue, a more commercial route. During certain daytime hours there is a restricted left turn from Western Avenue onto River Road. On the return trip, River Road has a tight turn from River Road onto Western Avenue.

For points west of Dalecarlia Water Treatment Plant, Routes Two and Three were considered. Canal Road and Chain Bridge Road, the first section length of both routes, have variable roadway grades which will impact the speed and noise of heavily loaded trucks. The residential neighborhood along Chain Bridge Road is expected to vigorously oppose a steady flow of trucks through its neighborhood. Georgetown Pike, on Route Two, and Dolley Madison Boulevard, on Route Three, the secondary phase of the routes are already

EXHIBIT 2-5

DISPOSAL ROUTES FROM DALECARLIA WASTEWATER PLANT TO THE CAPITAL BELTWAY (ESTIMATED MILEAGE)

Route 1: ***MacArthur Boulevard to Capital Beltway ..... 4.4 miles***

- Road weight load limit is 6 tons
- Not viable

Route 2: ***MacArthur Boulevard, Arizona Avenue, Canal Road, Chain Bridge Road, Georgetown Pike to Capital Beltway ..... 6.8 miles***

- Upscale residential land use along Chain Bridge Road
- Light commercial and commuter route
- Expect community opposition
- Not viable

Route 3: ***MacArthur Boulevard, Arizona Avenue, Canal Road, Chain Bridge Road, Dolley Madison Boulevard to Capital Beltway ..... 8.3 miles***

- Canal and Chain Bridge Roads have changing grades/additional travel times, increased noise
- Commercial route along Dolley Madison Boulevard
- Upscale residential land use along Chain Bridge Road
- Expect community opposition
- Not viable

Route 4: ***MacArthur Boulevard, Goldsboro Road, River Road to Capital Beltway .. 5.7 miles***

- Road weight limit 6 tons
- Goldsboro Road - heavy residential
- Not viable

Route 5: ***MacArthur Boulevard, Loughboro/Dalecarlia Parkway, Western Avenue, River Road to Capital Beltway ..... 6.7 miles***

- Return trip, tight turn at River Road and Western Avenue
- Return trip alternate River Road, Goldsboro Road, Massachusetts Avenue, Dalecarlia Parkway
- Commercial route along Western Avenue and River Road
- Restricted left turn from Western Avenue onto River Road during rush hour drive times
- Good route to the Beltway

EXHIBIT 2-5
(Continued)

Route 6: ***MacArthur Boulevard, Loughboro/Dalecarlia Parkway, Western Avenue, Wisconsin Avenue to Capital Beltway*** ..... ***6.6 miles***

- Can be very congested/ additional travel time
- A mixture of residential and commercial neighborhoods
- Possible route

Route 7: ***MacArthur Boulevard, Loughboro/Dalecarlia Parkway, Western Avenue, Connecticut Avenue to Capital Beltway***

- Very narrow lanes from Chevy Chase Circle North
- No access to Beltway, truck restrictions
- A mixture of residential and commercial neighborhoods
- Not viable.

Route 8: ***MacArthur Boulevard, Loughboro/Dalecarlia Parkway, Massachusetts Avenue, Goldsboro Road, River Road to Capital Beltway*** ..... ***6.7 miles***

- Upscale residential housing set back along Massachusetts Avenue
- Goldsboro Road - heavy residential
- Expect community opposition
- Possible route

commercially and commuter traveled roads, where opposition may be somewhat less significant.

Wisconsin Avenue, on Route Six, can be heavily congested. Route Seven, on Connecticut Avenue, is a very narrow road from Chevy Chase Circle north and there is no direct truck access to the Beltway (I-495) at the Connecticut Avenue and Capital Beltway interchange. Routes Six and Seven are therefore considered the least desirable.

Route Five is the best truck route. Route Five begins by traveling south on MacArthur Boulevard then traversing along Loughboro/Dalecarlia Parkway to Western Avenue. Heading east on Western Avenue to intersect and proceed north on River Road. River Road intersects the Capital Beltway northwest of Dalecarlia in Montgomery County, Maryland. Western Avenue and River Road are commercially traveled with a left turn restriction from Western Avenue onto River Road during morning rush hours. Western Avenue has a tight radius turn when turning west onto Western Avenue from River Road. This tight radius turn will limit the use of the longer dump trailers. Route Eight is a possible alternative return route for the longer dump trailers.

2.3.4 Estimate of Trucking Cost

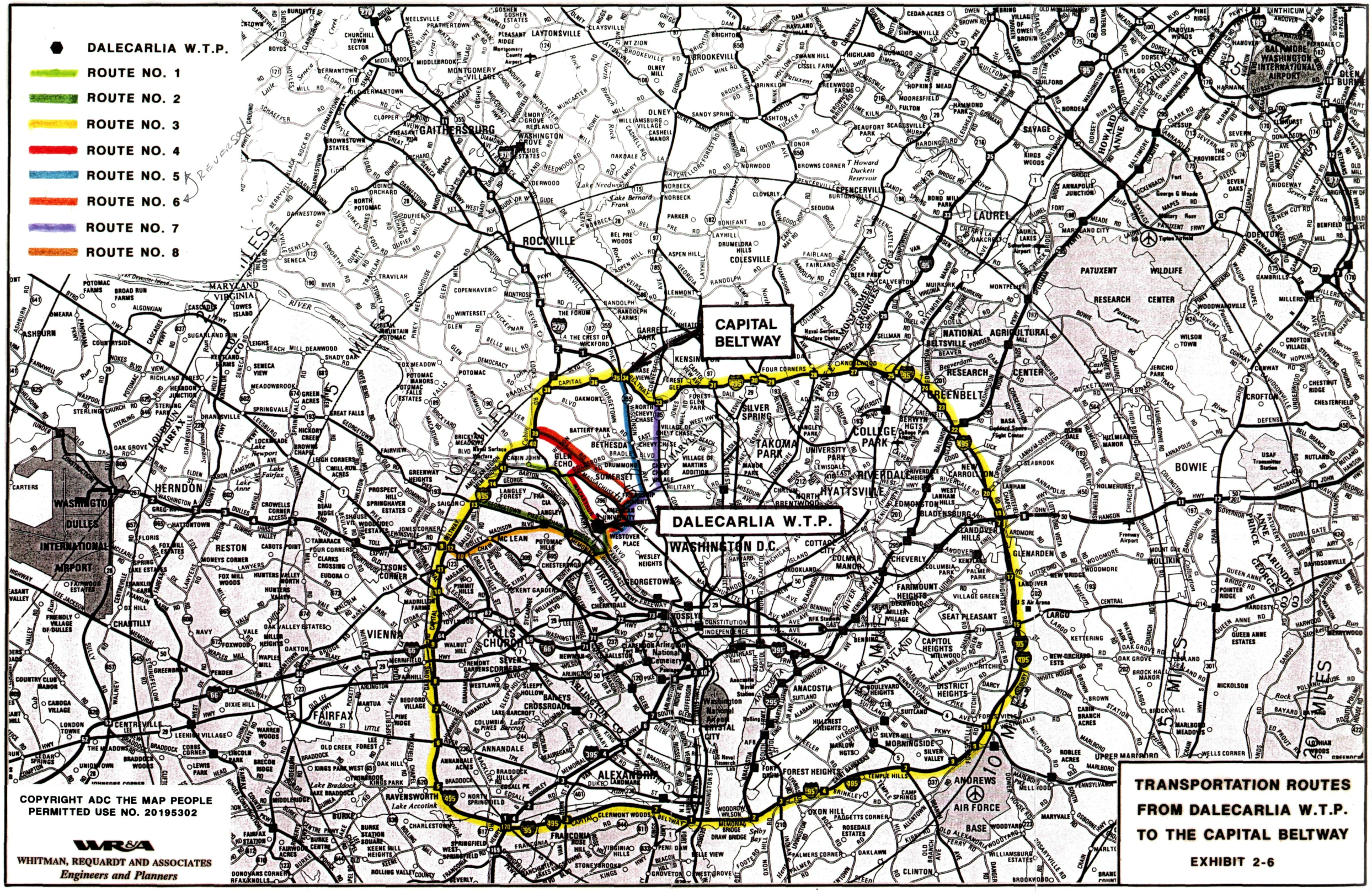
When determining the cost for transporting the residual material by truck, four different mileage distances were used to provide a range of cost estimates. The mileage ranges were:

- Less than 25 miles
- 26-50 miles
- 51-100 miles
- 101-150 miles.

The maximum mileage distances of 101-150 miles is based on a 300-mile round trip in a ten hour work shift.

Within each mileage range two different daily production rates were used:

- A Peak Capacity of 355 C.Y./Day



TRANSPORTATION ROUTES FROM DALECARLIA W.T.P. TO THE CAPITAL BELTWAY

EXHIBIT 2-6

- An Annual (Average) Capacity of 190 C.Y./Day.

Included in Appendix B are additional assumptions used to determine trucking costs. Round-trip times estimated for the different distances as well as capital costs, labor rates and maintenance costs for each mileage; volume case, are included in the Appendix. Using the assumptions, round-trip times, capital, labor and maintenance costs, production rates and truck types, the cost per wet ton of residual material at a 30 percent total solids was estimated. The costs per wet ton are then broken down by distance range. Exhibit 2-7, "Estimated Transportation Cost" summarizes the transportation cost per wet ton, for centrifuge dewatered residuals for the different mileage distances.

2.3.4.1 Discussion

Within a 50 mile distance, two round trips a day were assumed based on a working shift of 8 to 9 hours. With a 51 to 150 mile distances, one round-trip a day was assumed based on a working shift of 8 to 10 hours.

The number of trucks needed to transport residual materials daily from Dalecarlia Water Treatment Facility is based on two factors. One is the legal allowable volume, by weight for each truck type, (in this case a 12 C.Y. tandem truck or a tractor and 20 C.Y. dump trailer). In addition daily production rates affect the number of trucks needed. For a production rate of 190 C.Y./day, sixteen tandem dump truck or ten tractor dump trailer loads will be required. At 355 C.Y./day production of residual materials, (peak capacity), thirty-two tandem dump trucks or nineteen dump tractor trailer loads are needed.

Capital, maintenance, and labor costs vary slightly, between truck types, (see Appendix B). Capital costs for a tractor and dump trailer operation include the purchase of a tractor truck and dump trailer. While the cost of a tractor and dump trailer is slightly higher than a tandem dump truck, the flexibility and payload capacity are greater. Tractors can be used as hostlers, haulers for dump trailer disposal, and adapted for use with other container trailers. Dump trailers with a 20 C.Y. capacity have 1.5+ times more cargo capacity than 12 C.Y. tandem dump trucks. Dump trailers can be used as daily carriers, temporary storage containers, and very limited emergency storage container during times of inclement weather,

Exhibit 2-7

ESTIMATED TRANSPORTATION COST

CENTRIFUGE DEWATERED RESIDUALS

Based on "Max Month" Loadings @ 355 CY/DAY	12 CY Dump Truck	20 CY Dump Trailer
Less than 25 mile distance	$ 108.40/truck load $ 9.00/cy	$ 147.60/truck load $ 7.50/cy
26-50 mile distance	$145.10/truck load $ 12.00/cy	$ 196.70/truck load $ 10.00/cy
51-100 mile distance	$ 277.40/truck load $ 23.00/cy	$ 308.20/truck load $ 15.50/cy
101-150 mile distance	$ 397.86/truck load $ 33.00/cy	$ 452.00/truck load $ 22.50/cy

Based on "Annual Average Month" Loadings @ 190 CY/DAY	12 CY Dump Truck	20 CY Dump Trailer
Less than 25 mile distance	$ 111.75/truck load $ 9.50/cy	$ 165.50/truck load $ 8.50/cy
26-50 mile distance	$160.25/truck load $ 13.50/cy	$ 239.35/truck load $ 12.00/cy
51-100 mile distance	$ 274.05/truck load $ 23.00/cy	$ 361.15/truck load $ 18.00/cy
101-150 mile distance	$ 375.70/truck load $ 31.50/cy	$ 496.15/truck load $ 25.00/cy

when there is insufficient on-site storage pad space or problems with off-site disposal facilities.

The maintenance costs for tandem trucks and tractor and dump trailers are very close. Tractor and dump trailer maintenance cost are slightly higher due to the extra tires and lower fuel economy. Maintenance costs for both vehicle types are expected to be about $.40/mile. The cost can vary significantly depending on truck capacity and the distance to the disposal site. Daily production rates of residual material for disposal also contribute to the cost due to staffing and equipment requirements to accommodate peak disposal sites.

At a production rate of 355 C.Y./day, the cost of transporting residuals using a 12 C.Y. tandem dump truck will be between $9.00 to $33.00 /C.Y. At the same production rate and mileages the cost of transporting residuals using a tractor and 20 C.Y. dump trailer cost will be between $7.50 to $22.50/C.Y. Exhibit 2-7 indicates an economy for a tractor and dump trailer operation, which increases as the distance to the disposal site increases. A secondary advantage is the reduced truck traffic through the neighborhood between Dalecarlia and the Capital Beltway and along the approach roadways to the disposal site(s).

3.0 REGULATORY ISSUES AND CONSTRAINTS

3.1 INTRODUCTION

Dalecarlia WTP lies within the jurisdictions of both District of Columbia and Montgomery County, Maryland. The Potomac River water intakes are on the shorelines of Montgomery County, Maryland. Drinking water is supplied to the District of Columbia, and Arlington County, City of Falls Church, the Pentagon, and National Airport in Virginia.

A 100-mile radius of the Dalecarlia WTP encompasses jurisdictions in the states of Maryland, Virginia, West Virginia, and Pennsylvania, and the District of Columbia. The Federal government also controls significant acreage within these jurisdictions. These governing jurisdictions, with the exception of the District of Columbia, are potential disposal areas for alum residuals. The District of Columbia no longer has available open acreage for disposing of dewatered residuals.

Several technologies for disposal of water treatment plant dewatered residuals were identified for evaluation:

- Landfilling
- Mine/land reclamation
- Land application
- Alum recovery prior to disposal
- Co-disposal with dredge spoils
- Discharge to Blue Plains sewage collection system
- Co-disposal with Blue Plains biosolids
- Use in a manufacturing process

Using these technologies as a guideline, Federal, Maryland, Virginia, West Virginia, and Pennsylvania regulations were reviewed. A general classification of water treatment plant residual materials was determined, where applicable.

The regulatory review is summarized under Sub-sections 3.2 - Federal; 3.3 - Maryland; 3.4 - Virginia; 3.5 - West Virginia; and 3.6 - Pennsylvania, and is followed by Section 3.7 - Conclusion. Exhibit 3-1 summarizes regulations by jurisdiction.

The recovery of alum from residual material has not been sufficiently documented by the water industry for a dewatering facility this large. No review of state regulations related to alum recovery was made. The recovery of alum leaves non-alum residual for disposal without a significant volume reduction.

3.2 FEDERAL

Disposal of water treatment plant residuals is impacted by regulations promulgated under several federal acts:

- The Clean Water Act (CWA) regulates the discharge of water treatment plant residuals into receiving streams, and governs the disposal of wastewater treatment plant sludges.
- The Resource Conservation and Recovery Act (RCRA), amended by the Hazardous and Solid Waste Amendments, governs the land disposal of solid and hazardous wastes.
- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) regulates the cleanup of existing hazardous waste disposal sites and impacts the proposed disposal of new hazardous wastes.

Clean Water Act

The impact of the CWA on water treatment plant residual disposal is discussed at length in Technical Memorandum No. 3, entitled "Clean Water Act and Safe Drinking Water Act Impact Assessment", dated November 1994. CWA, as well as the local regulatory environment, preclude the practice of releasing residuals into the surface waters. The Dalecarlia facility's current NPDES permit requires a "zero discharge" of alum residuals into the Potomac River.

RCRA/CWA Act

Regulations promulgated under the authority of RCRA and CWA impact the land disposal of water treatment plant residuals and municipal solid or wastewater treatment plant waste. Governing regulations include:

EXHIBIT 3-1

REGULATORY SUMMARY TABLE

Jurisdiction	Regulatory Classification	Monofill	Sanitary Landfill	C&D Landfill	Land Application	Mine Reclamation	Alum Recovery	Dispose w/ Dredge Spoils	Discharge to Blue Plains	Co-Disposal (Land App) with Blue Plains Biosolids
Federal	Solid Waste Non-Municipal, Solid Waste Non-Wastewater Sludge.	40 CFR Part 257 Non-Hazardous Solid Waste.	40 CFR Part 258 Solid Waste Management Subtitle D.	See Monofill.	40 CFR Part 257 Demonstrate Soil Benefit for Permit.	40 CFR Part 257 Demonstrate Soil Benefit for Permit.	Not Considered a Viable Option.	EPA Review	40 CFR Part 503 Wastewater Sludge Disposal Standards.	40 CFR Part 502 Wastewater Sludge Disposal Standards.
MD	No Specific Regulations Controlling the Disposal of Water Treatment Plant Residuals ——— Classified According to Technology.	Sanitary Landfill Guidelines	Industrial Waste. Municipal ——— Permits and Testing Required. ——— Local Ordinances commonly Prohibit Acceptance of Extra-jurisdictional Waste.	Rubble Landfill. ——— 1996 Regulations follow Sanitary Landfill Guidelines.	Classified as a soil Conditioner or Fertilizer. ——— Permits and Testing Required. ——— Controlled by Md. Department of Agriculture and Md. Department of Environment.	Classified as a Soil Conditioner or Soil Substitute. ——— Permits and Testing Required. ——— DNR/WRA Surface Mining Division	Not Considered a Viable Option.	MD Port Authority and COE. ——— Permits and Testing Required.	No Co-Treatment Letter Dated 5/24/94.	Same as current Blue Plains (private land application).
VA	Industrial Waste	Must Be Permitted Subtitle D Landfill.	Allowed if Permit Amended. ——— No Free Water in Residuals.	Not Allowed.	VPA Permit from DEQ required.	Active Mines Require Permit Amendment. ——— Inactive Mines: Unclear	Not Considered a Viable Option.	COE Norfolk District	N/A	Same as current Blue Plains (private land application).

EXHIBIT 3-1
(Continued)

Jurisdiction	Regulatory Classification	Monofill	Sanitary Landfill	C&D Landfill	Land Application	Mine Reclamation	Alum Recovery	Dispose w/ Dredge Spoils	Discharge to Blue Plains	Co-Disposal (Land App) with Blue Plains Biosolids
WVA	Classified as a Sludge.	Sanitary Landfill Guidelines.	Solid Waste Management. Class A Disposal Facility. ——— Permits and Testing Required. ——— Department of Natural Resources.	Not allowed.	Permits and Testing Required. ——— Department of Environmental Protection.	Permits and Testing Required. ——— Case by Case Basis. ——— Department of Environmental Protection.	Not Considered a Viable Option.	N/A	N/A	Same as current Blue Plains (private land application).
PA	Classified as a Residual Waste.	Sanitary Landfill Guidelines.	Class II or III Landfill. ——— Permits and Testing Required. ——— Department of Environmental Resources.	Not allowed	Permit by Rule. ——— Testing, Material must Be Equal to Soil. ——— Department of Environmental Resources.	Bureau of Mines Reclamation. ——— Class III Disposal System. ——— Permits and Testing	Not Considered a Viable Option.	N/A	N/A	Same as current Blue Plains (private land application).

Notes:

1. Alum recovery was not considered a viable option because of technical complexity and lack of a reference facility of similar size to Dalecarlia.

- 40 CFR Part 257, defines solid waste land disposal options and regulates the land disposal of non-sewage residuals.
- 40 CFR Part 258, establishes minimum standards for municipal solid waste disposal.
- 40 CFR Part 503, establishes permitting requirements for the disposal of wastewater treatment plant biosolids.

Solid waste disposal and land application regulations are covered under CFR 40 Part 257, Criteria for Classification of Solid Waste Disposal Facilities and Practices. That regulation does not include municipal solid waste and wastewater treatment plant residuals, which are covered under Part 258 and 503 respectively. Part 257 covers siting, design and closure requirements for solid waste disposal facilities, criteria for land application of solid wastes and includes minimum criteria for classification as an approved solid waste disposal facility. Water treatment plant residuals disposal at a municipal solid waste facility or co-disposal with wastewater treatment plant sludge and residual land application are governed by Part 257.

Disposal of water treatment residuals in a municipal solid waste landfill would be subject to the requirements of Part 258. Part 258 sets forth minimum criteria for facilities receiving municipal solid waste. Criteria include impacts on landfill siting, construction, operation, monitoring, closure and post closure operation and maintenance. Also included are financial assurance requirements for solid waste facilities, and corrective action requirements. These requirements may be more stringent based on additional state regulations and permitting requirements at the disposal site.

While Parts 257 and 258 include some minor provisions for federal enforcement, no federal permit is required under these regulations. Both regulations provide minimum standards and criteria for states to develop consistent solid waste management programs. All permitting and the majority of enforcement are to be performed by the individual states.

Co-disposal of water treatment plant residuals with wastewater treatment plant biosolids would make the disposal operation subject to Part 503 regulations. Part 503 was developed to be "self-implementing" for sewage sludge land disposal. The generator (of the residuals) is allowed to commence disposal operations once the permit application has been submitted to the EPA (but prior to review and issuance of a permit) as long as the disposal operation is in compliance with the regulations. However, by combining water and wastewater treatment plant residuals for disposal, the residual handler would be considered a residual "preparer"--a party who changes the quality of the sewage sludge. In that case, Dalecarlia Water Treatment Plant would be required to submit basic disposal operation information 180 days prior to commencing land application of the sludges. The EPA may respond by asking for more

information, but does not issue a permit. No state is yet authorized to enforce or permit sludge land disposal operations under Part 503.

CERCLA Impacts

CERCLA regulates the cleanup of abandoned hazardous waste disposal sites. Under CERCLA, disposers of hazardous wastes are required to adhere to CERCLA reporting and notification guidelines.

Water treatment plant residuals typically are not considered a hazardous waste and are not named in the EPA's list of wastes considered to be hazardous (found in 40 CFR Part 261). EPA's hazardous waste characteristics are: ignitability, reactivity, corrosivity, and toxicity.

CERCLA poses future liability risks as a result of the disposal of Dalecarlia residuals. The liability would occur if residuals from Dalecarlia WTP show up at an abandoned hazardous waste site at some future time.

3.3 MARYLAND

The State of Maryland has no specific regulations classifying and controlling water treatment plant residuals disposal. The common practice is to classify the water treatment plant residual material according to the technology for disposal. Regulatory guidance for the following technologies were reviewed; monofill (land disposal of residuals in a single material landfill), sanitary landfill (with other solid wastes), construction and demolition (rubble) landfill, land application, mine/land reclamation, and co-disposal with dredge spoils and discharge to Blue Plains. A summary of the regulations controlling water treatment plant disposal by technology option is provided in the following paragraphs.

Landfill Disposal

Landfill disposal types include monofill, sanitary, construction and demolition (C&D) also known as rubble landfill, and land clearing debris. Alum residual material derived from a water treatment plant dewatering facility is classified as an industrial waste. As an industrial waste, chemical testing would be required to determine the residual material's metal contents and hazardous characteristics, if any. The EPA "Paint Filter Test" is used to ensure that the substance contains no free liquid. The review agency for landfilling of residual materials would be the Maryland Department of Environment (MDE).

Municipal Sanitary Landfills are further restricted by local jurisdiction. Ordinances forbidding disposal of non-jurisdictional waste are common. Disposal in rubble landfills and land clearing debris landfills may be permitted with written authorization from MDE's Division of Waste Management. By March 31, 1996 all new landfill disposal cells must comply with Federal Subtitle D standards. Such authorization will include a request for leachate analysis and groundwater discharge permits.

Land Application

Land application of water treatment plant residual materials for agricultural and forestation falls under the guidance of the Maryland Department of Agriculture (MDA) and the MDE. MDE has jurisdiction over the residual material review for metal content and hazardous determination. The applicant registers the residual material with MDA as either a soil conditioner or fertilizer. MDA tracks the application location, method of application, application rates, tonnage, and other measures in an agreement between MDA and registrant. A sample application and memorandum for registration of WTP sediments has been provided as Appendix C. Fees and incidental use permits would be required.

Mine/Land Reclamation

The State of Maryland is now considering the use of water treatment plant residual materials in the reclamation of lands and mining operations. Authority for these uses would fall under the guidance of MDE and the Department of Natural Resources, Water Resources Administration (DNR/WHITMAN, REQUARDT AND ASSOCIATES). The residual material could be classified as a soil conditioner or soil substitute. MDE would require chemical characteristic testing to determine the residual materials metal contents and if it is hazardous. DNR/WHITMAN, REQUARDT AND ASSOCIATES has permitting authority over the mining/land reclamation sites. MDE currently allows water treatment plant residuals usage per land application dosage rates. Leachate analysis and groundwater discharge permits may be required. Mine/land reclamation with residual materials would be reviewed on a case-by-case basis.

Co-disposal with Dredge Spoils (Maryland-specific Option)

The Maryland Port Administration regulates, and the Corps of Engineers (COE) issues permits for the disposal of dredge spoils within the Chesapeake Bay and its tributaries. Material acceptance at Poplar Island Restoration Project, now under design, will be regulated by the Maryland Port Administration (MPA). The COE will have a vested interest in this project. Material acceptance guidelines established thus far have included; 1) exclusion of Baltimore Harbor Dredge Spoils, 2) dredge spoils must be clean Chesapeake Bay material. Chemical testing results characterizing the residuals metal and nonhazardous content will have to be submitted to MPA.

Discharge to Blue Plains

In a letter dated May 24, 1994, the District of Columbia's Department of Public Works replied that co-treatment of water and wastewater treatment residuals would be compatible but not feasible. Capital improvements to the Blue Plains Wastewater Treatment Facility would have to be constructed along with a transmission pipeline leading from Dalecarlia WTP to Blue Plains. The current

transmission line is not adequately sized to carry the additional discharge from residual disposal. Maryland State regulations in effect at the disposal site would apply.

3.4 VIRGINIA

Regulatory requirements in the Commonwealth of Virginia for classifying and disposal of water treatment plant residuals were reviewed. The Department of Environmental Quality (DEQ) is the primary environmental regulatory agency. A summary of the regulatory issues for these technologies are provided below:

Landfill Disposal

Virginia regulatory requirements for landfill disposal of water treatment plant residuals are provided in the Virginia Solid Waste Management Regulations. These regulations allow water treatment plant residuals to be disposed in Subtitle D landfills subject to certain restrictions. The restrictions limit the amount of residuals that can be accepted at facilities where leachate collection is not provided or is inadequate. The restrictions also require that residuals contain no free liquid, using the EPA Paint Filter Test. Water treatment plant residuals with approximately 20 to 22 percent solids (or higher) typically pass this test. The solid waste regulations do not allow water treatment plant residuals to be disposed of in construction and demolition debris landfills or inert material monofills. A variance to these requirements may be requested, but approval is difficult to predict.

Municipal sanitary landfills are allowed to accept water treatment plant residuals, but local jurisdictions may impose additional regulations on its use or acceptance.

Land Application

Water treatment plant residuals are classified as an "industrial waste" when used in land application and are regulated by DEQ's Office of Water Resources Management. In order to land apply residuals, a Virginia Pollution Abatement (VPA) permit is required, as well as special use permits. VPA and special use permit review usually takes 4 to 12 months. The permit application requires site descriptions which include: vegetation analysis, climate, hydrology, geology, water quality analysis, soils investigation and classification. The permit is site-specific, meaning the residuals can only be applied to the site stated in the permit. The permit application and state review process makes land application difficult, expensive and time consuming.

Mine/Land Reclamation

Mine/land reclamation is regulated by the Virginia Department of Mines, Minerals and Energy (DMME). DMME requires that DEQ land application requirements be satisfied and submitted with the

request before a review will be undertaken. DEQ has suggested that if the mine/land reclamation disposal option is pursued, it will be considered similarly to land application use. DMME reviews are considered on a case-by-case basis.

3.5 WEST VIRGINIA

The State of West Virginia classifies water treatment plant residuals as a sludge. The Department of Natural Resources regulates residuals for landfill disposal and the Water Resource Administration regulates the use of residuals in land application and mine/land reclamation.

Landfill Disposal

West Virginia's Department of Natural Resources Solid Waste Management (SWM) regulates landfilling of solid waste in seven categories, Class A, B, C, D1-D3, and E. Class A, B, and C are commercial solid waste (sanitary waste) disposal facilities. The facilities are classified according to the volume and type of solid waste disposed. Water treatment plant residual material would be disposed of in a Class A, sanitary waste disposal facility, according to West Virginia waste management officials. Class D, commercial solid waste disposal facilities, accept only construction and demolition materials. Class E, solid waste facility, accepts only solid waste for the purpose of recycling.

Water treatment plant residual material could be disposed in a monofill or sanitary landfill, but not in a construction and demolition landfill. A waste profile and chemical characteristic analysis will be required to show that the residuals do not have metal contents or hazardous characteristics that are of concern. An EPA Paint Filter Test may be required to ensure the absence of free liquid.

Land Application and Mine/Land Reclamation

The Water Resource Administration's Department of Environmental Planning (DEP) regulates the land application and mine/land reclamation of water treatment plant residuals. DEP requires a chemical characteristic analysis of any material land applied or used in mine/land reclamation. The chemical characteristic analysis must show the residual materials' metal content, nutrient value and hazardous characteristic if any. The site selection application or reclamation is reviewed on a case-by-case basis. The State of West Virginia DEP views the application and reclamation use of residual material favorably.

3.6 PENNSYLVANIA

The State of Pennsylvania classifies water supply treatment facilities residual materials as a residual waste. The Department of Environmental Resources (DER) is the primary regulatory review agency for the disposal of residuals.

Landfill Disposal

Pennsylvania classifies its Residual Waste (Sanitary) Landfills into three categories; Class I, Class II, and Class III. The disposal of water treatment plant residuals materials are classified based on chemical characteristics analysis. The chemical characteristics analysis includes the residual materials' metal contents and potential hazardous characteristics. According to officials at DER, water treatment plant residual materials fall into a Class II or Class III Residual Waste Landfill. A Class II system is a single liner landfill and a Class III is a no-liner landfill system.

A monofill landfill system would have the same regulatory requirements as a Residual Waste Landfill. The State of Pennsylvania does not allow the co-disposal of water treatment plant residual materials with construction and demolition materials.

Land Application

DER allows the land application of water treatment plant residual materials under one of the following classifications:

- Permit-by-Rule
- A General Permit
- Site-Specific Permit

The residual material would be classified after chemical characteristics are analyzed for possible metals and/or hazardous content. Water treatment plant residual materials have been reported to generally fall into a Permit-by-Rule or a General Permit classification.

Mine/Land Reclamation

Mine and land reclamation falls under the jurisdiction of the Bureau of Mines Reclamation. The residual materials must meet the requirements for a Class III Residual Waste Landfill (no liner). Residual materials must be placed above the groundwater aquifer, and lowering of the groundwater aquifer by pumping is not permissible.

3.7 CONCLUSION

A summary of the various jurisdictional regulations and the review of each technology option is listed and interpreted accordingly. The further investigation into **alum recovery** are not warranted because of its technical complexity and the lack of documented experience by the water industry at comparable size facilities (see Section 4.5).

For new **sanitary landfills**, Federal Subtitle D regulations require impervious liners and a leachate collection system. The municipal sanitary solid waste facilities reviewed for this study already have such requirements in place. Additionally, residual material must be non-hazardous, and pass the EPA's Paint Filter Test before acceptance for all states reviewed. Existing unlined sanitary solid waste facilities in Pennsylvania are permitted to accept residuals, on a case-by-case basis. Municipally controlled landfills in Maryland generally do not accept out of jurisdiction waste.

Dewatered residual materials placed in a **monofill** must satisfy the same regulatory guidelines as a sanitary landfill. In most cases, landfill cells must have a liner overlain with a leachate collection system. Only Pennsylvania was found to allow residual material disposal in an unlined landfill.

Maryland was found to be the only jurisdiction where residual material could be disposed in a **Construction and Demolition (C&D) Landfill**. Written approval from MDE's Solid Waste Management Division would be required before any disposal activity takes place. However, on March 31, 1996, all new landfills in the State of Maryland (including C&D) will require an impervious liner and leachate collection system, making the C&D landfill option indistinguishable, at least in regulatory terms, from sanitary landfilling.

All four states allow the **land application** of residual materials. Maryland and Pennsylvania actively engage in the use of residual materials for land application. West Virginia is becoming more receptive to the idea and has allowed land application on a case-by-case basis. Virginia stringently controls residuals application and monitoring, which would probably result in a highly uncertain and potentially costly permitting process. Currently, Virginia has only one permit (as of June 1995) approved for land application.

The Mine/land reclamation approach to residual materials handling was determined on a case-by-case basis in all four states. Virginia is currently conducting studies using wastewater sludges and is beginning to look at water treatment plant residuals. Although the four states investigated allow the disposal of water treatment plant residuals, the practice is not widespread in any of these states, and all have set strict limitations.

The proximity of the facility to navigable waterways of Maryland and Virginia makes **co-disposal of residual material with dredge spoils** a viable option, therefore the pertinent regulations of these two states were reviewed. Both Maryland and Virginia follow guidelines set up by Environmental Protection Agency (EPA) and Corps of Engineers (COE). Maryland's Port Administration (MPA) sets preliminary guidelines for material acceptance, method of dredging operation and, if applicable, type of disposal facility. The disposal facility can be open water or a variation of containment cells. The Corps of Engineers, Baltimore District, permits dredging and disposal operations with EPA's final review. Virginia has a similar application and review process through the Corps' Norfolk District. Again, EPA has the final review before a dredging and disposal plan is permitted.

According to EPA, water treatment plant residual materials cannot be disposed of in the ocean. The residual material is considered an industrial waste byproduct. Industrial waste must be placed in a containment disposal system. The containment system most likely will have to be a lined, impervious, system.

Treatment of residual materials at the Blue Plains wastewater treatment facility was investigated. Applicable regulations included transporting wastewater via pipeline (sanitary sewage system) or by tanker truck. This option was eliminated from further consideration pursuant to a District of Columbia Government letter, dated May 2, 1994, which advised that this option was not acceptable (see Exhibit 4-3).

4.0 DISPOSAL OPTIONS CONSIDERED

Several disposal options have been identified for this study by a combination of:

- Discussions with Aqueduct and Corps staff.
- Discussions with staff at other similar facilities, (see Exhibit 4-1).
- Discussions with regulators.
- Review of reports on alum residual disposal, including those prepared previously for the Dalecarlia WTP.

This section provides a description of disposal approaches and technologies, and an initial screening and elimination of certain options. Subsequent sections of this report provide greater detail on selected options.

4.1 NO ACTION

According to the proposed National Pollutant Discharge Elimination System (NPDES) Permit, Number DC 0000019 (which expired 5-2-94), discharge of solids from the Dalecarlia WTP to the Potomac River will no longer be permitted. The Dalecarlia WTP's forthcoming proposed NPDES permit renewal will be issued with the understanding that solids will no longer be discharged into the Potomac River, pending public comment. Current solids discharging has been permitted only because development of an alternative disposal method is underway. A copy of the USEPA letter, August 16, 1994, discussing the NPDES permits is provided as Exhibit 4-2. Continued return of alum modified solids into the Potomac River should not be considered a viable option.

4.2 LANDFILLING

One option for disposal of residuals is landfilling. Residual materials may be landfilled in any of three configurations: first, by themselves in a single-use monofill; second, in a construction and demolition debris (C&D) or rubble landfill; or third, in a sanitary landfill with other solid waste. It is possible that the residuals could be used beneficially as a daily or intermediate cover for other waste in the landfill. The determination of acceptability as cover material would be made on a case-by-case basis by regulators and landfill operators at each landfill.

EXHIBIT 4-1

WATER TREATMENT PLANT PRACTICES
DISPOSAL OF RESIDUAL MATERIALS

Operating Authority	Plant Name	Process
Hagerstown , MD	Hagerstown	Residuals sent to Lagoon (used as landfill cover)
Baltimore, MD	Ashburton	Residuals to Lagoon , decanted residuals to the WWTP via sewer
Baltimore, MD	Montebello	Residuals to Lagoon (disposed into sanitary sewers)
WSSC, MD	Potomac Plant	Currently returned to Potomac River. Are working with MDE to explore other options
WSSC, MD	Patuxent Plant	Residuals to WWTP via sanitary sewer
City of Wilmington, DE	Brandywine Filter Plant	Residuals to WWTP via sanitary sewer
City of Wilmington, DE	Porter Filter Plant	Residuals to WWTP via sanitary sewer
Harford County, MD	Abingdon	Residuals to WWTP via sanitary sewer
Frederick County, MD	Lake Linganore	Residuals to WWTP via sanitary sewer
Ocean City, MD	Gorman Ave.	Residuals to WWTP via sanitary sewer
City of Brunswick, MD	Brunswick	Residuals to WWTP via sanitary sewer
City of Annapolis, MD	Annapolis	Residuals to WWTP via sanitary sewer
City of Frederick, MD	Linganore	Residuals to Lagoon
Fairfax County Water Authority, VA	Occoquan Potomac	Disposal into a quarry Land Applications
City of Richmond, VA	Richmond	Residuals to sanitary sewers (sent to Lagoon as backup)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

8-16-94

Colonel Randall R. Inouye, P.E.
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203

Dear Colonel Inouye:

This letter is to update you on the status of National Pollutant Discharge Elimination System (NPDES) Permit Number DC0000019 which regulates the discharge of solids from the Dalecarlia water treatment plant. At a meeting last spring, EPA informed the Corps of Engineers that the discharge of solids from the Dalecarlia water treatment plant would no longer be permitted since the discharge violated the District's water quality standards and technology to treat the wastewater is readily available. At the time of the meeting, the Corps committed to install the necessary treatment to eliminate the discharge and later provided EPA with a proposed construction schedule. As of that time, it was contemplated that the construction schedule would be included in the reissued NPDES permit. However, upon subsequent review by our legal staff, it was determined that the permit was not the appropriate mechanism to address the matter and recommended that a Federal Facility Compliance Agreement (FFCA) be developed.

The Agency believes that it is within the best interest of the Corps and EPA to enter into a FFCA for the following reasons:

- the proposed compliance schedule for the construction of required treatment extends beyond the effective date of the permit;

- the compliance dates, specified by the Clean Water Act, for the achievement of water quality and technology based effluent limitations, is passed. Therefore, the Agency is prohibited from incorporating a compliance schedule in the NPDES permit;

- it is anticipated that the FFCA will be entered prior to permit reissuance. This will enable the Corps to begin working on the elimination of the solids discharge promptly, thus demonstrating its expressed commitment to provide safe drinking water without adverse impact to the environment; and

if demonstrated to be necessary, the adjustment of a construction schedule in a FFCA is more easily achieved than modification of a permit schedule.

It is the Agency's intention to also include in the FFCA, provisions to address periodic discharges that will result from required operation and maintenance activities at the plant. Finally, although our staffs are currently in discussions regarding the Corps' recent request to discharge, for approximately five (5) days, 1.3 MGD of chlorinated drinking water to facilitate the replacement of a pump, it may be possible to address the discharge in the FFCA. EPA is sensitive to the Corps' interest in minimizing operational costs through the replacement of the rented pump and is confident that an acceptable compliance agreement will be entered timely so that the work may be performed expeditiously and in a manner which is environmentally protective.

If you have any questions or would like to arrange for a meeting to discuss the matter further, please contact me at (215) 597-9410 or have someone from your staff call Lorraine H. Reynolds, Chief of the General Enforcement Section, at (215) 597-3689.

Sincerely,

Alvin R. Morris, Director
Water Management Division

EXHIBIT 4-2
(2 OF 2)

4.2.1 MSW Landfill - Co-Disposal

Landfilling of the materials in privately owned landfills, through intergovernmental agreements or in a Dalecarlia-operated monofill can be considered as viable options.

Disposal of water treatment plant residuals in sanitary landfills is a common practice. However, construction of landfills that meet Federal Subtitle D requirements has greatly increased the cost of the landfills and disposal for all materials, including residuals. As the number of landfills that meet these requirements increase, so will the number of potential landfilling options for alum residuals.

Based on the results of pilot tests, the physical properties, and chemical acceptability as indicated by the TCLP test, the residuals may be landfilled if they are sufficiently dewatered. The material cannot be landfilled if it does not pass the EPA paint filter test. The EPA paint filter test for free liquids is done by placing a sample of residuals in a paint filter for 5 minutes. If any liquid passes through and drops from the filter, "the material is deemed to contain free liquids." If the material contains too much moisture, is sticky and difficult to handle, or cannot support the weight of refuse trucks or other equipment, special handling and perhaps mixing with dry soil may be necessary to allow it to be landfilled.

4.2.2 Rubble (C&D) Landfill

Rubble or Construction and Demolition (C&D) Landfills generally accept land clearing, demolition, construction and other inert debris. Because of regulatory differences between states, practice and definition of C & D landfills differs between states. Disposal of water treatment plant residuals in Rubble or Construction and Demolition (C&D) landfills, although not a common practice, is an alternative for disposal. Water treatment plant residuals are not a readily acceptable material by most jurisdictions' for disposal in a rubble landfill. Authorization must be obtained from a jurisdiction before disposal is allowed in either public or private C & D landfills.

Rubble (C&D) Landfills, by most jurisdictions' definitions, accept only those materials from construction of buildings, structures, and roadways and demolition of buildings or other structures. Such materials would consist of concrete, asphalt, brick, glass, wood fragments, drywall, insulation, and other materials. By definition, water treatment plant residual material is considered an industrial waste by-product.

The residual materials' chemical and physical characteristics received from the Dalecarlia WTP's pilot testing program (reference Technical Memo 7) passed the TCLP testing required for disposal in a Subtitle D landfill. The pilot test studies concluded that at a 30 percent solids content, the residual material is dewatered enough to pass the EPA's Paint Filter Test. The alum residual, a soil-like

material, could be an excellent "filler" material to mix with the rubble debris to minimize the voids created by a strictly rubble landfill.

4.2.3 Monofill

A monofill is a contained disposal or storage area for a primary constituent material. Generally, a monofill is used for disposal of designated waste materials (such as municipal incinerator ash) to isolate them. Water treatment plant residuals could be monofilled as a waste or temporarily stored while awaiting application of some beneficial use.

Based on the results of the pilot testing study, most jurisdictions would apply Federal Subtitle D requirements to the residual material when monofilling. A monofill would require a liner with a leachate collection system. The Subtitle D requirements will make the cost to construct and maintain a monofill comparable to those experienced by sanitary landfill operations (see Section 7.3.3). It is possible, however, that negotiations with a neighboring state, such as Pennsylvania, could result in a relaxing of the Subtitle D requirements for monofilling residuals.

4.3 MINE/LAND RECLAMATION

Mine/land reclamation can be defined as the restoration of strip-mined land or quarry excavation for vegetative growth. The water treatment plant residual material would primarily be used as a soil conditioner. The residuals could also be used as a nonstructural fill to restore the excavated land to pre-excavation contours, or some more acceptable aesthetic shape.

Mining in the State of Maryland and Commonwealth of Virginia, within a 50-mile radius of Dalecarlia Water Treatment Plant, is primarily for sand and gravel. The sand and gravel is often mined below the groundwater table. Most mining operators tend to push unusable waste material back into the excavated holes or abandon the excavation completely, creating a silt pond which eventually becomes a wetland habitat. Current regulations require a more developed reclamation plan before a mining operation can proceed.

Several sand and gravel mining operations were identified as potential disposal sites. A review of state regulations and conversations with regulatory officials indicates that the placement of residual materials would follow the same guidelines as land application (see Section 4.4). The use of land application guidelines would severely limit the amount of residual material that could be placed at a given site. The conservative application rates allowed by state regulators results from: 1) the uncertainty of the effect the residuals would have on surrounding groundwater, and 2) placement of residuals into

surface mining operations is an untried technology. In all cases, the residual material must be applied above the groundwater table.

A quarry, in Lorton, Virginia is permitted to receive residuals from a water treatment plant operated by the Fairfax County Water Authority. This is the only known quarry or surface mine within a 50-mile radius of Dalecarlia Water Treatment Plant that is permitted for such disposal. The quarry is considered part of the water treatment process with an estimated 1 billion gallon capacity, and a 100-year disposal life expectancy.

If the Washington Aqueduct Division was allowed to dispose of Dalecarlia WTP residual material into the Lorton quarry, the useful disposal life to the Fairfax County Water Authority would be reduced by 40 percent. If a residual material, at an assumed 3 percent TSS, was transported from Dalecarlia Water Treatment Plant by tanker trucks, 200 to 500 truck loads a day would be required, depending on daily production. An alternative is to mix the 30 percent TSS dewatered residuals with the slurry discharge from Fairfax County Water Authority before the total residual material enters the quarry. This would be, approximately, a maximum of 20 dump trailer loads a day from Dalecarlia Water Treatment Plant. Disposal of combined Dalecarlia and Fairfax solids would necessitate significant accommodations by the Fairfax County Water Authority, including amendment of the current discharge permit.

4.4 LAND APPLICATION

Land application is a method of disposal currently used by water treatment plants in the region, which would provide beneficial use of the residuals by applying them to agricultural or forest lands. The residuals contain low levels of nitrogen, which have some value as a fertilizer. The clay-like consistency of the material can be used to increase the water retention properties of certain soil types. In order to accommodate weather conditions and crop readiness, some storage of residuals at the site of application would probably be required.

Co-application of alum residuals with biosolids is an option, but would invoke the more-stringent regulatory standards and application limits for biosolids. Accordingly, this discussion will be limited to application of alum residuals without amendment, recognizing that an eventual disposal solution might include additional materials.

The likely application areas within 50 miles of the facility are in Maryland or Virginia. Land application of alum residuals is regulated differently by these two states. In Maryland, where land application is a widely used disposal method, alum residual material is classified as a soil additive which is regulated by the Department of Agriculture. The Commonwealth of Virginia considers the residuals

a waste material and regulates them similarly to biosolids, which results in a difficult permitting cycle when attempting to employ land application. For example, only one project for land application of water treatment plant residuals is currently permitted in Virginia.

Methodology - Implementation of a land application operation would include the procurement of hauling and spreading equipment. Additionally, arrangement for spreading residuals on public or private lands requires permitting and soils testing to determine appropriate application rates. Both forest and farm land are potentially suitable for land application. The land could be owned, leased, or a combination. Residual spreading on lands could be arranged by contracting with landowners, by agreement with government agencies or by purchasing the required amount of land. Crops that require larger amounts of nitrogen could accommodate higher application rates. Those crops which are largely removed from the field upon harvest, such as hay, also allow higher application rates. Application rates for farmland are generally higher than for forest lands. Refer to Appendix D for additional information.

Other approaches to land application include contracting with a land application company or through use of a broker to manage the entire land application process. Several land application companies are active in the Greater Washington, D.C. area. Land application companies normally contract with farmers who receive the benefits of the materials spread on their land. Such a company or broker, under a contract, could be responsible for hauling the materials from the facility, processing the materials as required, locating areas for application, acquiring permits, and applying the materials.

4.5 ALUM RECOVERY

Recovery of reusable alum from alum residuals is technically complex, but feasible. The largest facility in the United States currently recovering alum is the Williams WTP in Durham, N.C., a 22 mgd facility. The designers of the facility were contacted as part of this study.

The alum recovery process uses highly-concentrated acids to process residuals (process streams have a pH of about 2). Operation of an alum-recovery process requires special precautions, including worker protection, training, and special equipment such as acid-resistant pumps and scrubbers to prevent sulfuric acid gas emissions. In addition, the acidic by-product of the alum recovery process requires special disposal (e.g., in a hazardous waste facility).

Because of these operational complexities, the fact that the technology has only been demonstrated at facilities significantly smaller than Dalecarlia in the U.S., and the need to dispose of a hazardous residual, alum recovery is not considered a feasible option for the Dalecarlia facility.

4.6 DISPOSAL WITH DREDGE SPOILS

A co-mingled disposal of dewatered water treatment residuals and dredge spoils included an evaluation of two alternatives:

- Barging as a slurry residual
- Barging as a dewatered residual

4.6.1 Slurry Residual

This option would require pumping of a residual slurry from the Dalecarlia facility to a moorage facility along the Potomac River (Georgetown Waterfront) and then transport the material by tanker barge to a dredge spoils disposal site. This alternative would effectively enable the elimination of most of the dewatering facility. Slurry residuals, at a 2.5± percent TSS content (thickened under flow) would be pumped through a force main alignment along the Hiker/Biker (old railroad) right-of-way. A moorage facility constructed on the Georgetown Waterfront below the Key Bridge would be a terminal point for loading the slurry into tanker barges. From Georgetown, the slurry would be transported to a dredge spoils disposal site in the Chesapeake Bay or its tributaries. A potential waterfront site for the moorage facility is currently owned by the District of Columbia government and is used for vehicle storage.

4.6.2 Dewatered Residuals

A second alternative would be to transport the dewatered residuals at a 30 percent TSS content via dump trailer to an existing moorage facility, such as Blue Plains Wastewater Treatment Plant's waterfront site. The residual material would be loaded onto a barge and transported to a dredge spoils disposal site within the Chesapeake Bay or its tributaries.

4.6.3 Dredge Disposal Site

Several potential dredge disposal sites were considered for this report. Most of the sites were scheduled for closure before or soon after Dalecarlia's residuals handling and dewatering facilities are scheduled to be operational (within the next 5 to 8 years). The Poplar Island Restoration Project, in the upper Chesapeake Bay, appears to be a feasible disposal site. The project is to begin operations in 1998 with the Corps playing a major role in its development. The Maryland Port Administration is setting the preliminary criteria for the restoration project material acceptability. Results from the pilot test studies

(Technical Memo 7) were sent to MPA, but as of August 1995, no official word of the residual material's acceptability had been received.

Craney Island, located near Norfolk, Virginia is a containment dredge spoils disposal facility and currently the Craney Island facility only accepts dredge spoils from the Hampton Roads and Norfolk, Virginia area.

An alternative to using an existing dredge spoil disposal site is the development of an upland disposal site used specifically for residuals. If the upland site were to be located in the upper Chesapeake Bay, MPA would set the preliminary guidelines. MPA recommends the selection of a disposal site that would benefit the surrounding community after the disposal site's closure. For an upland site located in the lower Chesapeake Bay and Virginia waterways, COE's Norfolk District would regulate the development process. In either case, the approval of a specific site is difficult to predict.

4.7 BLUE PLAINS TREATMENT OF SOLIDS

Treatment of dewatered or slurry residuals at the Blue Plains WWTP facility could be accomplished by discharging the residuals into the Dulles Interceptor Sewer which leads to Blue Plains Wastewater Treatment Plant.

In March 1994, the Corps contacted the District of Columbia, by letter, requesting a meeting to discuss the possibility of disposing of Dalecarlia Water Treatment Plant residual materials into the sanitary sewer system. On May 2, 1994, the District of Columbia responded stating, "we do not believe this is a viable option..." and listed three economic and technical reasons as a basis for their decision (see Exhibit 4-3). The study team did not pursue this alternative further.

4.8 CO-MANAGEMENT OF RESIDUALS WITH BLUE PLAINS BIO-SOLIDS)

Blue Plains WWTP was contacted as part of this study to determine the feasibility of co-managing Dalecarlia and Blue Plains residuals. According to the plant manager, Blue Plains is currently contracting with private-sector firms for disposal of most of its biosolids (co-management of Dalecarlia residuals with Blue Plains residuals would likely increase the stringency of regulatory standards and scrutiny that Dalecarlia would have to deal with for alum residuals alone.)

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF PUBLIC WORKS
2000 14TH STREET NW
6TH FLOOR
WASHINGTON, D.C. 20009

OFFICE OF THE DIRECTOR
202 939-8000

May 2, 1994

Mr. J. Richard Capka
Department of the Army
Baltimore District
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Capka:

I am writing in response to your letter of March 18, 1994 wherein you advised us of the United States Environmental Protection Agency's (EPA) requirement that Washington Aqueduct Division (WAD) eliminate discharge of water treatment plant residuals to the Potomac River. We look forward to the meeting of the technical managers you have proposed.

We have considered your proposal to evaluate the conveyance of the water treatment residuals to the District's Wastewater Treatment Plant at Blue Plains. While an engineering study would be required to develop exact costs for treating this sludge at Blue Plains, we do not believe this is a viable option for the following reasons:

1. The Aqueduct approached the District approximately 25 years ago to discuss this issue. At that time it was decided that Blue Plains would not treat the water plant sludge. There is currently no capacity at the plant to treat this sludge nor is there capacity in the sewer system to deliver this flow to Blue Plains.

2. Water treatment plant sludge is not compatible with the wastewater treatment processes at Blue Plains. This sludge consists primarily of inert solids and is not amenable to treatment by the biological processes used at Blue Plains.

3. It makes little economic sense to concentrate sludge at the water treatment plants and then dilute it and process it through a wastewater treatment plant. The water plant sludge at a rate of 40 dry tons per day would increase the load at Blue Plains by approximately 17 percent. The estimated increase in operating cost for Blue Plains would be $11 million per year. Facility capital construction costs may be estimated at approximately $60 million. The cost of sewer enlargement can not be estimated at this time. Even if grant funding could be used at Blue Plains and local funding would be required for constructing facilities at the water plant, cost would be significantly lower (by WAD's preliminary cost estimates) if the sludge is treated at the water plant.

The District appreciates being brought into the planning process at this early time. Thank you for your consideration.

Sincerely,

Betty Hager Francis

Betty Hager Francis
Director of Publics Works

EXHIBIT 4-3
(2 OF 2)

4.9 MANUFACTURING

In addition to previously discussed disposal and reuse options, there are opportunities to use residual materials in beneficial ways to manufacture useable products. Two companies have been identified that service the area which includes the Dalecarlia facility. One company would use the residuals as an ingredient in manufacturing bricks, the other would use them as a component in a blended topsoil.

4.9.1 Brick Manufacturing

In brick manufacturing, the bricks are baked at a temperature sufficient to eliminate any volatile contaminants that may be present. This process is well suited to (and currently used for) treating soils that are highly contaminated, such as soils containing petroleum products. The brick manufacturing company contacted as part of this study reported that the company does not currently have the correct permits to process the residual materials, but is pursuing them accordingly.

4.9.2 Soil Blending

Use of the materials in soil blending was also reviewed. Pilot test results indicate that residuals are basically contamination free and have low levels of nitrogen, which could provide some benefit as a fertilizer. The residuals also have an organic content (approximately 20 percent) and moisture-holding capacity, which would be beneficial to the topsoil. However, the soil blender contacted for this study is not currently capable, using local facilities, of processing the large volume of materials expected to be produced by the Dalecarlia facility.

4.10 ELIMINATION OF OPTIONS: INITIAL SCREENING

Based on regulatory, institutional, and technology criteria, some of the options discussed above can be eliminated from further consideration. In general, regulatory prohibitions in Virginia and Maryland were considered decisive for eliminating particular options at this stage.

4.10.1 No Action

The "No Action" option (Section 4.1) or continued river discharging, was found to be unacceptable to the regulatory community. Dalecarlia WTP's forthcoming NPDES permit will prohibit future discharge of solids into the waterways (see Exhibit 4-2).

4.10.2 C&D (Rubble) Landfilling

Virginia, West Virginia, and Pennsylvania regulations governing landfills do not permit disposal of alum residuals in Construction and Demolition debris landfills. Maryland regulations require that future rubble landfills be constructed to meet the same design requirements as sanitary landfills (see Section 4.2.2). Therefore, the C&D or rubble landfill option is no longer significantly different from the sanitary landfill option in Maryland, and is not feasible in other states because of regulatory restrictions.

4.10.3 Mine/Land Reclamation

Mine/land reclamation regulations, as discussed in Section 4.3, effectively limit the rate at which residuals could be used for reclamation of strip mines. Rates of residuals loading at a strip mine would be the same as those applicable for land application. Therefore, the strip mine reclamation option is not significantly different from the land application option regarding the acceptable application rate and the amount of land required to accept the residuals. As such, this option's further feasibility will be considered as part of the land application option. The option of hauling residuals to Fairfax County's Lorton quarry at 3 percent TSS content becomes cost prohibitive due to the logistics of dispatching 200 to 500 truck loads per day.

4.10.4 Alum Recovery

The Alum recovery option, discussed in Section 4.5 presents significant technical problems, such as the need for special equipment, handling, and by-product disposal processes. In addition, it has not been adequately proven in the U.S. to be technically feasible at the scale of the Dalecarlia facility. A significant volume of residuals remain for ultimate disposal. Therefore, this option is eliminated from further consideration.

4.10.5 Co-treatment at Blue Plains Wastewater Treatment Plant

The option to treat residual materials at the Blue Plains Waste Water Treatment Plant proved unacceptable to the District of Columbia Government, as discussed in Section 4.7, and it has been eliminated from further consideration in this report. See Exhibit 4-3 for a copy of the letter regarding treatment at the Blue Plains facility.

4.11 REMAINING OPTIONS

Based upon the residual disposal options eliminated above, remaining options have been indicated in the following summary table. These remaining options will be subsequently evaluated and discussed in greater detail.

SUMMARY OF INITIAL SCREENING RESULTS	
Option	**Status / Reason for Elimination**
4.1 NO ACTION	Eliminated due to regulatory constraints
4.2 LANDFILLING	
4.2.1 Sanitary Landfill (Co-Disposal)	Under consideration
4.2.2 C&D (Rubble) Landfill	Eliminated due to regulatory constraints
4.2.3 Monofill	Under consideration
4.3 MINE/LAND RECLAMATION	Eliminated due to regulatory constraints (equivalent to land application) and logistics complexity for quarries.
4.4 LAND APPLICATION	Under consideration
4.5 ALUM RECOVERY	Eliminated due to technology limitations
4.6 DISPOSAL WITH DREDGE SPOILS	Under consideration
4.7.1 DISCHARGE TO BLUE PLAINS WWTP	Eliminated due to added cost of Blue Plains WWTP improvements and transmission main.
4.7.2 CO-MANAGEMENT WITH BLUE PLAINS BIOSOLIDS	Eliminated: Blue Plains uses private land application.
4.8 MANUFACTURING	Under consideration

5.0 MANAGEMENT APPROACHES TO DISPOSAL

The disposal options considered most viable from the initial screening in Section 4.0 include the following technologies:

- Landfilling (both co-disposal with municipal solid waste and monofilling)
- Land application
- Disposal with dredge spoils
- Use of residuals in a manufacturing process

This section discusses *how* each of these options could be implemented. Exhibit 5-1 shows the disposal options grouped by management approach, as described in the following sections. The management approaches discussed in this section include the following:

- Contract disposal
- Disposal at a facility controlled by the Corps
- Partnership with another agency, which would manage the disposal facility

Although each of these categories could be subdivided further, they provide a good framework for discussion, and capture the salient characteristics of Dalecarlia's management options.

5.1 CONTRACT DISPOSAL

The term contract disposal describes a management approach in which the Aqueduct would contract with a private company or enter into a Memorandum of Agreement (MOA) with a local government (such as a county) for residuals management, transport, and/or disposal. A contractual or MOA approach would be appropriate for the following disposal options:

- Land application using the capabilities of private firms.
- Landfilling (by contract with a private or public sanitary landfill).
- Reuse in a manufacturing process.

EXHIBIT 5-1

DALECARLIA RESIDUALS DISPOSAL STUDY
SUMMARY OF OPTIONS BY MANAGEMENT APPROACH
(OPTIONS REMAINING AFTER INITIAL SCREENING)

Management Approach	Technology
1. Contract Disposal (Not owned or operated by the Aqueduct)	Land Application
	Sanitary Landfill (Private)
	Sanitary Landfill (Public)
	Manufacturing
2. Dalecarlia-Controlled Disposal (May be operated by plant staff, under contract or by Memorandum of Agreement).	Land Application
	Sanitary Landfill (Monofill)
3. Disposal via Partnership (At a federal facility not owned or operated by the Aqueduct, Memorandum of Agreement).	Dredge Spoils Disposal (Dewatered)
	Dredge Spoils Disposal (Slurry)

Implementing a contractual approach is straightforward from an administrative standpoint, placing most of the operating responsibility on the entity that is under contract for disposal/handling of residuals. The Aqueduct could conduct an "omnibus" Invitation for Bid (IFB) procurement to identify the cost and availability of private disposal capacity to manage residuals through land application, landfilling, or manufacturing. Following IFB, one or more contracts could be executed. The delegation of responsibility to one or more private vendors would not necessarily be technology-specific. For example, a contract could allow the use of more than one disposal/reuse approach by each vendor (e.g., landfilling and land application). Appendix E includes several sample RFP's and Disposal Contracts.

Residuals management by Service Contract with the private sector minimizes staffing and additional property acquisition. However, it will require management overview to assure compliance with contract terms and regulatory requirements. Well-crafted IFB and contract documents that clarify the respective responsibilities of each party could minimize the risks of non-performance, and the Aqueduct's potential liability. Default by the Contractor could result in no residuals disposal for a limited time.

In Section 6.0 of this study, the contractual option is discussed in terms of site availability. Because of the uncertainty of the outcome of a procurement for disposal/reuse capacity, it was determined that a combination of methods would be used to determine the feasibility of finding site(s) for the contractual option. For **land application**, a rough determination was made, using available data, of the acreages surrounding the Dalecarlia facility that have potential use as land application sites. For **landfilling**, a survey of private facilities (and one public facility) that could be expected to respond to a procurement for disposal capacity was made. For **manufacturing**, discussions were held with two potential alum residuals users that serve the area surrounding the Dalecarlia facility. In this way, determination of the feasibility of finding a contractual disposal option rests on an evaluation of likely respondents to a procurement.

5.2 AQUEDUCT-CONTROLLED DISPOSAL

In contrast to disposal management by contract, disposal at an Aqueduct-controlled facility would require increased staffing and property acquisition. Options that fall into this management category include the following:

- Land application at Aqueduct-owned or leased lands
- Landfilling in a single-use Aqueduct-owned disposal facility (monofilling)

Operation of such a facility by Aqueduct staff or by Service Contract, would ensure that the facility operation would rest with the Aqueduct management. The implementation process of site identification, purchase or lease, and permit acquisition and compliance would be the responsibility of the Aqueduct staff and the Aqueduct would have control over the continuing availability and cost of disposal capacity (which would be driven by regulatory and operating cost changes, but not by changes in competitive private-market dynamics).

A combination of approaches is used in Section 6.0 to assess the viability of Aqueduct-controlled options. For the **land application** option, a minimum required site size was determined, and an assessment was made of potentially-appropriate, federally-owned lands in the vicinity of Dalecarlia WTP. For the **monofilling** option, new and previously-identified sites near the Dalecarlia WTP were evaluated. Section 6.1 provides a summary of those site evaluations.

5.3 DISPOSAL VIA PARTNERSHIP

Disposal via a partnership is an option in which a Memorandum of Agreement is negotiated with another public entity to provide disposal capacity. Disposal of residuals at **a dredge spoils facility** falls into this category. Disposal of either dewatered or slurry residuals, could be managed through a partnership arrangement. Depending on the details of the partnership, this option could offer secure, long-term capacity without the risk or obligation associated with primary control of the disposal facility.

In Section 6.0, a small number of potential sites for dredge spoils disposal are discussed, along with the logistical and physical arrangements that would be required to access that capacity.

6.0 SITE EVALUATION AND AVAILABILITY

The disposal options remaining after the initial screening encompass a broad range of technologies and management approaches. Similarly, evaluation of the availability and suitability of sites requires the use of a number of different approaches.

This section is organized by site evaluation approaches. **Specific site identification** is used to assess sites for manufacturing, monofill and disposal of residuals with dredge spoils. An **evaluation of existing capacity** is used as a surrogate for site availability for the contract disposal options: private land application, sanitary landfilling, and manufacturing. Finally, an approach for **estimating potential available** acreage is used to assess the site-related feasibility question for Aqueduct-controlled land application. Exhibit 6-1 summarizes disposal options by technology, management approach, and site evaluation approach.

6.1 SPECIFIC SITE IDENTIFICATION

Between October 19-21, 1994 a site reconnaissance was conducted to review the status of the 17 "Identified Potential Sites" in the Camp Dresser & McKee report to the COE dated December 1979. The CDM sites were reviewed for availability and suitability by field reconnaissance observation for current site status (as compared to site description in 1979 Report) including:

- Change in site ownership.
- Current usage of the site.
- Adjacent land usage.
- Acreage available for residual disposal and possible technology disposal option .
- Significant changes since the 1979 report .
- Political and/or regulatory constraints placed on the site since 1979.
- Four adjacent sites were also identified during site reconnaissance, bringing the total potential sites to 21.

EXHIBIT 6-1

DALECARLIA RESIDUALS DISPOSAL STUDY
DISPOSAL OPTIONS BY MANAGEMENT AND
SITE EVALUATION APPROACH

Management Approach	Technology	Site Evaluation Approach		
		Site Identification	Acreages Available	Available Existing Capacity*
1. Contract Disposal	Land Application (Private)		X	X
	Sanitary Landfill (Private)			X
	Sanitary Landfill (Public)			X
	Manufacturing	X		X
2. Aqueduct-Controlled Disposal	Land Application (by Aqueduct)		X	
	Monofill	X		
3. Disposal via Partnership	Dredge Spoils Disposal (Dewatered)	X		X
	Dredge Spoils Disposal (Slurry)	X		X

* Except in the case of Sanitary Landfilling (Public), consists of evaluation of private-sector capacity.

6.1.1 Description of Potential Sites

1. *Site M-18, Brown Station Sanitary Landfill, Upper Marlboro, Prince George's County.* **(Eliminated)**

"The Brown Station Road Sanitary Landfill is the primary solid waste disposal facility serving Prince George's County, Maryland. It is a municipal solid waste lined landfill of modern design located along Western Branch, north of Upper Marlboro, Maryland. The topography of the site is flat and depth to groundwater shallow making the availability of adequate cover material on-site limited. The current disposal fee is $60.00 per wet ton (MES' Environmental Forum, January/February 1995). Material suitable for daily cover is accepted without charge. The current hours of operation are 8:00 a.m. - 4:00 p.m. weekdays and 9:00 a.m. - 12:00 noon Saturdays." Prohibits disposal of out-of-county waste.

Status: Active Municipal Sanitary Landfill Permit No. 90-16-03-01A
Projected closure undetermined at this date.

2. *Site M-19, Sandy Hill, Bowie, Prince George's County.* **(Eliminated)**

"This site is a municipal solid waste landfill located on property owned by the Maryland National Capital Park and Planning Commission (MNCPPC) who intends to ultimately develop the site for recreation. The site is located near Bowie, Maryland on Route 197. It is a modern design facility operated under contract to the MNCPPC by Waste Management Corporation of Chicago, Illinois. The local manager expressed a willingness (1979), to accept the WAD residual at the prevailing residual disposal rate which is currently $60.00 per ton (MES's Maryland's Environmental Forum, January/February 1995). Rate changes must be approved by the County. Hours of operation are 7:00 a.m. - 4:00 p.m. weekdays and 7:00 a.m. - 12:00 noon Saturdays." Prohibits disposal of out-of-county waste.

Status: Active Sanitary Landfill Permit No. 89-16-15-17A
Projected closure undetermined at this time.
Entrance Sign Says: Sandy Hill Creative Disposal Project
Waste Management of Prince George's County, Inc.

3. *Site M-20, Contee-Whitehead Rubble-Fill (Old Gunpowder Road), Beltsville, Prince George's County.* **(Eliminated)**

"This site was a privately owned, inert materials landfill (rubble-fill) operating under County permit."

Status: No longer available. This site is now the Fairland Athletic Complex with three olympic indoor pools and gymnasium, outdoor tennis, ballfield, batting cages, jogging path, and parking lots.

4. *Site M-22, Spicknall Rubble Landfill (Old Gunpowder Road), Beltsville, Prince George's County.* **(Eliminated)**

"This site is a privately owned, inert materials landfill (rubble-fill) operating under County permit."

Status: Closed disposal site, no longer available.
This old sand and gravel surface mine was operated as a rubble landfill during the period 1977 to 1985. It is currently monitored by the County Health Department and the owner is definitely not interested in any future disposal use for the site. Excessive truck traffic and community opposition are major concerns.

5. *Site M-24, Formerly Maryland Clay Products Company, Presently Cherakee Sanford Group, Inc., Beltsville, Prince Georges County.*

"This site is a worked-out clay pit consisting of about 30 acres adjacent to the Maryland Clay Products Corporation Plant. The plant manufactures brick from clay derived from the site which was owned by Thomas A. Sommerville. The site must be reclaimed as required by the Maryland Mine Reclamation Act. The owner of the Maryland Clay Products Corporation was interviewed and expressed an interest in considering the use of the residuals in the manufacture of bricks. This interest was sparked by a visual inspection of a small sample of dewatered residual shown to him."

Status: Not available at this time, for disposal. Available for manufacturing. This site in an active brick plant and some clay mining continues. Truck access is excellent with a traffic signal controlled intersection into the site. Roads are new, 2-lane asphalt with curb and gutter, leading to unrestricted major arteries. Potential use of residuals disposal as an admixture in the brick manufacturing process is a consideration. Current ownership has an interest in use of the residual materials for manufacturing.

6. *Site M-25, W.D. Pleasant Excavating Company, Hyattstown, Frederick County.*

"This site is raw land located in Frederick County just over the Montgomery County line near Hyattstown, Maryland. The site has been purchased by W. D. Pleasant of Pleasant Excavating Company for development of a rubble landfill. The site is in a rural area and is located in a ravine, estimated capacity of about 0.5 million cubic yards. However, development of a solid waste disposal site at this location involves environmental impacts which would be difficult to overcome."

Status: Active disposal site.

This site is a small privately owned rubble landfill (primarily stumps and asphalt). The gate was locked on a Friday afternoon with no sign of activity although the road into the dump appears well maintained. The site usage is limited, only 24 acres. Current draft MDE regulations would require a liner and leachate collection system.

7. *Site M-26, Rockville Crushed Stone, Inc., Rockville, Montgomery County.* **(Eliminated)**

"This site is an operating surface limestone quarry owned by the Rockville Crushed Stone, Inc. It is a very large excavation located near Rockville. Montgomery County entered into negotiations with the owners to explore the possibility of co-use of the site for the disposal for baled municipal residues from Montgomery County. Engineering of such a project would be quite extensive since it would be necessary to protect against groundwater contamination, which could be very difficult in the limestone formation. If operated for municipal solid waste disposal it would be necessary to import material for daily cover. The County has previously recognized a potential value of water treatment sludge for this purpose."

Status: Active Quarry, No disposal.

Quarry personnel stated limited land acreage is available and the whole site is under operation. The quarried stone is serpentonite, not limestone as stated in the Study.

8. *Site M-27, J. E. Owens, III, Davidsonville, Anne Arundel County.*

"This site is an operating sand and gravel quarry located in Anne Arundel County along the Patuxent River south of Route 50. It is a well-operated site under a continuous reclamation plan which prevents sediment pollution and maintains a graded slope back towards the quarry face. The operator was in the process of seeking a permit to dispose of inert materials as part of the reclamation plan. The equipment is on the site for handling the material. Mr. Owens also has a weigh station and operates a trucking business. He would be interested in providing contract hauling and disposal services. Access to the site is good from Route 50."

Status: The primary site has been purchased by Brandywine Enterprises, Inc. and is actively surface mined. Supplemental sites have been included and are listed as 27b and 27c.

9. 27b Supplemental site, Genstar Stone Product Company, Davidsonville - owner. Closed sand and gravel mine.

10. 27c Supplemental site, Chaney Construction Sand & Gravel. Active sand and gravel mine and limited yard compost disposal.

South of the Genstar site is Chaney Construction Sand & Gravel, a very large operation. Part of its operation include areas of reclaimed land and areas of compost/woodchip piles, on areas leased by others.
Truck access is primarily south on Patuxent River Road to Route 214 (Central Avenue)

11. Site M-28, Formerly John Rogers Property, Presently 1691 Limited Partnership, Crofton, Anne Arundel County.

"This site is located on the west side of Route 301 in Anne Arundel County opposite the community of Crofton, Maryland. It consists of 60 acres lying between Route 301 and the Little Patuxent River. Land use of the area is industrial/commercial. Nearby land uses include a sand and gravel operation, an industrial park, and the County's Patuxent Sewage Treatment Plant. The site itself was previously a sand and gravel mine. An earth wall of approximately ±20 feet borders the site on the eastern boundary which parallels Route 301. The site is well screened from view from the highway by trees. Access is convenient direct from Route 301. Northbound vehicles coming from Route 50 would turn left at a cross-over through a highway median strip directly opposite the site entrance road which is now chained off and slightly overgrown. The site contains piles of sand and gravel that could be used to blend with the wet residuals if that method of operation were adopted. A portion of the site is within the 100 year flood plain and could therefore not be used for disposal. Otherwise this site is well suited to the operation of a single purpose landfill operation."

Status: Closed sand and gravel pit - available.

As described on the Study. Now owned by 1691 Limited Partnership. Accessibility to the site is restricted due to mature trees and growth. Access reconstruction would be necessary for heavy truck traffic. The current site size is 173 acres. Over 50 percent of the site is located within the 100 year floodplain.

12. *Site M-29, Muirkirk Property (District of Columbia), Muirkirk, Prince George's County.*

"This site is located in the vicinity of Muirkirk Road and U.S. Route 1. It is owned by the District of Columbia and consists of 143 acres of undisturbed land. The property has been assigned by the D.C. Government to the University of the District of Columbia but to date the University has not developed the site. Although the site is zoned residential, it is surrounded by United States Department of Agriculture properties, Howard University facilities and warehouses. The site was proposed for a sanitary landfill 10-15 years ago (1964-1969) but the County and the State both opposed this proposal. The District Government would consider a proposal by WAD to use this site for disposal of water plant residual (1979), however, such a proposal would be weighed by the District within the context of other proposed uses. It is conceivable that the District would be willing to sell the property, however, the State of Maryland would be given the first right of refusal."

Status: Available site but disposal may not be compatible with current usage.

As described in the Study. A portion of the site is presently used as gardens and storage warehouse by University of D.C. Agricultural Department.

13. *Site M-32, R. L. Sandsbury, Forrestville, Prince George's County.* **(Eliminated)**

"This site includes a worked out sand and gravel mine subject to the reclamation requirements of the Maryland Mine Reclamation Act. This is a privately owned site."

Status: Not available.

Entire site owned by Pepco. A new entrance has been constructed along Westphalia Road leading to a major Pepco Office Complex. Along the Pennsylvania Avenue Service Road is a gravel entrance to the Pepco equipment storage yard and warehouse. A survey crew on the roadside indicated they were contracted by Pepco for a proposed Industrial Site. Under development.

14. *Site M-35, Contee Sand and Gravel Company, Muirkirk, Prince George's County.*

"This site includes worked out sand and gravel mines subject to the reclamation requirements of the Maryland Mine Reclamation Act. They are privately owned sites. Officials of Contee Sand and Gravel Company, the owner had expressed an interest in discussing prospects of reclaiming some of its holdings using the WAD residues."

Status: The primary and supplemental sites have been purchased by a limited partnership totaling more than 1300 acres. Sites have been leased back to contractors and surface mining operations for various uses.

35 Primary Site, Sand and gravel pit, stump disposal - stump dump acreage is not available.

Large sand and gravel operation with pans, loader, dozer, but no offices or weigh station. Some of the acreage has been reclaimed and some acreage is used for a stump dump.

15. 35b Supplemental Site, Closed sand and gravel mine, rubble fill - available. At Van Dusen Road and Virginia Manor Road is the gravel entrance road to A. H. Smith Contractors. The small site was a sand and gravel mine pit but is now used for rubble fill by A. H. Smith.

16. 35c Supplemental Site, At Van Dusen Road and Indian Creek is the Laurel Sand and Gravel Company and the Laurel Asphalt Co. Extent of land and operations is unknown.

17. Site V-1, District of Columbia Regional Sanitary Landfill, Lorton, Fairfax County, Virginia. **(Eliminated)**

"This site is located some 25 miles southwest of Washington, D.C. west of Interstate 95. The site encompasses about 800 acres of which 400 were originally dedicated for recreational development by the Northern Virginia Regional Park Authority. Of the remaining 400 acres, 110 are in buffer zones, roads, employee and administrative facilities, and for future resource recovery facilities. The remaining 290 acres are used for actual landfilling. Upon completion of the landfill, this acreage will be developed for recreational use."

The site has been engineered for a sanitary landfill and operates according to established site preparation plans and operation procedures. It has all the permits required for operation and accepts wastewater treatment plant sludge. The site is inspected bi-weekly by the Virginia State Health Department. Monitoring of silt basins and test wells is by Fairfax County authorities with test results reviewed also by the Virginia State Health Department.

The project is controlled through a memorandum of understanding between the using jurisdictions of Fairfax County, Arlington County, the City of Alexandria, and the District of Columbia. The District operates the sanitary landfill with the guidance of a policy committee of members from the using jurisdictions and citizen representatives. A technical committee has been established for the purpose of advising the policy committee on operational aspects. The landfill employs some 43 persons; it maintains a full compliment of operating equipment. Haul trucks delivering refuse to the landfill must be licensed by their respective jurisdictions. Their loads must be covered to prevent spillage and they must be operationally sound.

The respective jurisdictional users of the landfill are billed quarterly based on a previously adopted annual budget which includes annual tonnage allocations for each jurisdiction. Using jurisdictions are billed for the actual cost per ton to operate the landfill.

The landfill is currently open five (5) days per week, including all holidays except Christmas and New Years Day, from 5:30 AM to 6:00 PM."

Status: Currently operated by Fairfax County. Active Resource Recovery Facility (Mass burn incinerators) Sanitary Landfill and Incinerator Ash Landfill. Projected Closure undetermined at this time, however, it is our understanding the Regional Landfill is committed to sanitary landfill closure at the end of 1995. Access good, scales available. This site was not visited.

18. *Site V-3, Rainwater Landfill, Lorton, Fairfax County, Virginia.* **(Eliminated)**

"This site is owned by Ray Rainwater and is located at 9917 Richmond Highway, (U.S. Highway 1) Lorton, Virginia, approximately 1-1/2 miles southeast of the intersection of Lorton Road and U.S. 1. The site, which is about 125 acres in size, is operated as an inert material landfill. It was engineered by Jack Rinker and

Associates, City of Fairfax, Virginia. Wastewater treatment plant residuals are accepted under provisions of his permit, although there is a possibility that his permission to accept wastewater treatment plant residuals might be revoked at some time in the not-too-distant future. In view of his acceptance of wastewater treatment residuals, Mr. Rainwater indicated that he was convinced that his permits would allow acceptance of water treatment plant residuals. Rainwater is not in the business of transporting sludges for disposal at his site, however, he would consider providing transport services for a minimum five-year contract. He indicates that he would be willing to write a 15 year contract for disposal services at his site with provisions for annual review of prices. The owner estimated disposal fee for use of his landfill for disposal of water treatment plant residuals would range from $7.00 -$10.00 per wet ton (1979)."

Status: Current Virginia regulations do not allow the disposal of residual materials into a non-sanitary landfill. Rainwater is classified as an inert material landfill.

19. Site V-5, Super Concrete Corporation, 3058 K Street, N.W., Washington, D.C.

"This corporation, which for years has operated a sand and gravel operation in the vicinity of Leonardtown, Maryland, has been assured recently that its efforts to acquire approximately 1,000 acres in King George and Stafford Counties, Virginia will be successful. The firm expressed an interest in contracting to dispose of water treatment plant residues produced by WAD at sites on the Virginia acreage that could be reached by water, rail and truck transportation. The sites will range in distance from 25 miles by truck to 50 miles by barge or rail from Washington, D.C. The unique feature offered by this firm is that it proposes to use barges normally empty on return trips, having unloaded sand and gravel at its Washington docks on the K Street waterfront, to haul water treatment plant residuals by barge down river to proposed disposal sites in Virginia. Although it is likely that the firm will not be able to maintain ownership of its present K Street waterfront property in Georgetown because of plans for redevelopment of the entire Georgetown waterfront, nevertheless, the firm has assurances of being able to locate, within a year or two,

docks for its operation on the Anacostia waterfront in the District. The firm has, or would acquire, all of the necessary equipment to provide a complete service to WAD. It would be able to provide transport of residuals from Dalecarlia by truck to dockside on the Anacostia for barging down river and thence by truck to a landfill site that it would own and operate. The firm maintains an interest in providing the service to WAD but it is unable or unwilling now to submit information requested of it to enable a satisfactory evaluation of its potential alternative site for disposal. The firm indicates that the time frame of 3 years before production of water treatment plant residues presents problems to them in respect to projections of availability and costs of disposal sites and the necessary transportation to these sites. If, at some future time, due to changes in circumstances, the WAD should wish to reconsider its method of disposal, it may want to reevaluate the possibilities offered by this corporation."

Status: Primary site location was incorrectly described in CDM's report. We understand that CDM intended to describe a site now owned by the Fairfax County Water Authority.

The primary site is shown on the map as V-5 and listed as such under the Study descriptions, but is labeled as site V-6 in Table 5-2 in the Study. The description in the Study mentions property in King George and Stafford Counties but does not describe this proposed site. Supplemental properties include the Vulcan Stone Quarry, Fairfax County Water Authority and the Lorton Reformatory (District of Columbia).

Potential exists for co-disposal with the Lorton Water Treatment Plant residuals operated by the Fairfax County Water Authority, Site V-5b. The Lorton Water Treatment Plant pumps sludge into a large, flooded and previously abandoned quarry purchased by the Fairfax County Water Authority from either the Vulcan Stone Quarry or Super Concrete Corporation.

The Vulcan Stone Quarry is a very large, active quarry operation, Site V-5.

20. *Site V-11, Baird Estate, Springfield, Fairfax County, Virginia.* **(Eliminated)**

"This site, which is a part of the estate of W. P. Baird, is located in Fairfax County at the end of Fleet Drive, southeast of its intersection with Beulah Street and is shown on Annandale USGS Quad Map, and on the Fairfax County Quad Map, sections 91-1 and 91-2. The Baird Estate is administered by the principal heir, Ray Baird, son of W. P. Baird. The property, which is approximately 150 acres in size, has good access from I-95 south. Although property surrounding the 150 acres is residential and access to the property is by roads through residential areas, nevertheless, an exit is planned by the Department of Highways in Virginia from the proposed Springfield bypass that will terminate onto Alforth Avenue, very close to the Baird property at Beulah Street and Hayfield Road. The property is a former sand and gravel mining operation, which has been reclaimed. Request of the owners for rezoning the property for residential development is now being considered. The asking price of the land was $2.5 million ($17,000 per acre). The owner would be willing to accept a down payment of $300,000 and the balance of $2.2 million in tax-free bonds, if such bonds could be issued. Obtaining the required County and State permits for operation of a single-purpose landfill for disposal of water treatment plant residuals would be difficult because of expected citizen opposition and would be time consuming."

Status: Underdevelopment - Not available. This site has been subdivided for development. Some raw land or farm land may still exist from the original estate, but most is now townhouses, community park/ballfield, with an adjacent strip shopping center complex and new intercounty connector highway. The area is actively in construction with townhouses, commercial and industrial development.

21. *Site V-20, Lynch Properties, Inc., Colchester, Fairfax County, Virginia.* **(Eliminated)**

"This property is undisturbed land owned by Lynch Properties, Inc. with offices at Springfield, Virginia, P. O. Box 607, and is located in the Colchester area in the vicinity of Old Colchester Road, Gilles Run and South Branch. It consists of approximately 300 acres of formerly agricultural land, now fairly heavily wooded in second and third growth timber. The Rainwater Landfill, previously described, lies just north of this site. The property is zoned residential. The area surrounding the property is also a residential area but it is not densely developed. Considerable opposition to development as a single-purpose landfill disposal would come from the nearest residential area, Gunston Heights, and also from Harbor View, a housing development, which is at a greater distance from the site but which would be expected also to develop considerable citizen opposition. Obtaining permits to operate this site as a landfill disposal area would be difficult and time consuming."

Status: Wooded - available - possible adjacent residential opposition. Zoned Residential.

6.1.2 Elimination of Sites: First Cut

Eleven sites were eliminated in the preliminary review for the following reasons:

- Three sites (M-18, M-19, V-3) have been eliminated due to County policy of not accepting out of jurisdictional waste (sites M-18 and M-19) and Virginia does not allow residuals to be disposed in a non-sanitary landfill (V-3).

- One disposal site (V-1) has been eliminated because it has been scheduled for closure near the time of the Dewatering Facility construction. (Effective December 1995)

- Two sites (M-20, M-32) were eliminated because of a change in ownership and subsequent business development.

- One site, (M-22) formerly a rubble landfill, has been closed and is now being monitored by County Health Department officials for possible enforcement action.

- Two sites (M-26 and V-5) are active surface mines and unclassified stone quarry operations. All available acreage are being used. Their current useful lives go beyond the start-up and 20 year residual disposal needs used in this study.

- Two sites (V-11 and V-20) have been eliminated due to zoning changes and residential development.

During the site reconnaissance, site changes were noted and are listed under "Status" following CDM's 1979 quoted (" ") and paraphrased text. Exhibit 6-2 summarizes this text. The descriptions and summary table include the original 17 CDM sites plus additional sites found during the review. Maryland (M) sites are listed first, followed by Virginia (V) sites. Of the 21 potential sites, ten were determined to be viable.

6.1.3 Secondary Review of Remaining Sites

The site evaluation format presented in Section 6.1 was used to review the potential sites identified in the CDM December, 1979 report. This report identified ten potential disposal sites for further consideration (see Exhibit 6-2). A secondary screening of the ten potential disposal sites began with the technology disposal options available, see Section 4 and the management approach required, see Section 5 and Exhibit 5-1. Section 4, discussed an option of disposal into a C&D (rubble) landfill, such as potential sites M-25 and M-35b. M-25 and M-35b were eliminated in part for not being legally registered disposal facilities with Marylands Department of the Environment. Sites M-35a, M-35b, and M-35c were leased properties under a partnership group and are being treated as one site, M-35. The remaining disposal options considered for the seven potential disposal sites are; Land Application, Manufacturing, Monofill, and Co-disposal with Dredge Spoils.

EXHIBIT 6-2

SUMMARY OF POTENTIAL SITES
REVIEW OF CAMP, DRESSER & MCKEE
REPORT DATED DEC. 1979

Permit Number	Site Number	Name	Owner	Site Location	Currently In Operation	Disposal Space Availability	Current Usage	Possible Usage	Comment
Maryland Sites									
MDE 90-16-03-01A	M-18	Brown Station Sanitary Landfill	County	Upper Marlboro, Prince George's County, MD	Yes	Yes	Sanitary Landfill	No	Will not accept out of county material
MDE 89-16-14-10A	M-19	Sandy Hill Waste Management Co.	County	Bowie, Prince George's County, MD	Yes	Yes	Sanitary Landfill	No	Will not accept out of county material
N/A	M-20	Contee-Whitehead Rubble Fill (sold)	Private	Beltsville, Prince George's County, MD	No	No	Fairland Athletic Complex	No	
-	M-22	Spicknall Rubble Landfill	Private	Beltsville, Prince George's County, MD	No	No	Abandoned	No	
-	M-24	Maryland Clay Products Co.	Private	Beltsville, Prince George's County, MD	Yes	Yes	Active Claypit & Brick Plant	Yes	Residual for brick manufacturing
-	M-25	W.D. Pleasant Excavating Co.	Private	Hyattstown, Fredrick County, MD	Yes	Yes	Active Rubble Fill	Yes	
WRA 77-SP-0061-D	M-26	Rockville Crushed Stone, Inc.	Private	Rockville, Montgomery County, MD	Yes	Yes	Active Stone Quarry	No	Not interested in residuals
WRA 77-SP-0018-F	M-27	J.E. Owens III Contracting Co. (sold to Brandywine Enterprises, Inc.)	Private	Davidsonville, Anne Arundel County, MD	Yes	Yes	Active Sand & Gravel Pit	Yes	
WRA 77-SP-0035-C	M-27b	Genstar	Private	Davidsonville, Anne Arundel County, MD	No	Yes	Closed Sand & Gravel Pit	Yes	
WRA 77-SP-0073-1	M-27c	Chaney Construction	Private	Davidsonville, Anne Arundel County, MD	Yes	Yes	Active Sand & Gravel Pit	Yes	Active compost/ woodchip storage
N/A	M-28	John Rogers Property (sold to a limited partnership)	-	Crofton, Anne Arundel County, MD	No	Yes	Closed Sand & Gravel Pit	Yes	Access reconstruction necessary
N/A	M-29	Muirkirk Property District of Columbia	District of Columbia	Muirkirk, Prince George's County, MD	Yes	Yes	Raw Land/Agricultural	Yes	Residual disposal may not be compatable w/current usage.
N/A	M-32	R.L. Sansbury (sold to PEPCO)	-	Forestville, Prince George's County, MD	No	No	PEPCO Building and adjacent structures	No	

EXHIBIT 6-2

SUMMARY OF POTENTIAL SITES
REVIEW OF CAMP, DRESSER & MCKEE
REPORT DATED DEC. 1979
(Continued)

Permit Number	Site Number	Name	Owner	Site Location	Currently In Operation	Disposal Space Availability	Current Usage	Possible Usage	Comment
WRA 83-SP-0151-A 84-SP-0160-A	M-35	Laurel Sand & Gravel Co. (owned by a limited partnership)	Private	Muirkirk, Prince George's County, MD	Yes	Yes	Active Sand & Gravel Pit	No	Active tree stump disposal (leased)
WRA 77-SP-0124	M-35b	A.H. Smith Contractors (owned by a limited partnership)	Private	Muirkirk, Prince George's County, MD	Yes	Yes	Closed Sand & Gravel Pit	Yes	Rubble fill disposal site (leased)
WRA 82-SP-0137 88-SP-0297 89-SP-310-A 89-SP-0313	M-35c	Laurel Sand & Gravel (owned by a limited partnership)	Private	Muirkirk, Prince George's County, MD	Yes	Yes	Active Sand & Gravel Pit	Yes	Leased
Virginia Sites									
-	V-1	I-95 Regional Landfill	County	Lorton, Fairfax County, VA	Yes	Yes	Municipal Sanitary Landfill	No	Limited space. Due for closure in near future.
-	V-3	Rainwater Landfill	Private	Lorton, Fairfax County, VA	Yes	No	Active Rubble Fill	No	Not permitted to mix construction/demolition w/industrial waste.
-	V-5	Vulcan Stone Quarry	Private	Lorton, Fairfax County, VA	Yes	Yes	Active Stone Quarry	No	Not interested in residuals.
-	V-5b	Vulcan Stone Quarry	Private	Lorton, Fairfax County, VA	Yes	Yes	Flooded Stone Quarry	Yes	Possible co-disposal.
-	V-11	W.P. Baird Estate	Private	Springfield, Fairfax County, VA	No	No	Raw/Farm Land	No	Residential development.
-	V-20	Lynch Properties Inc.	Private	Colchester, Fairfax County, VA	No	Yes	Wooded raw land zoned residential	No	Zoned residential.

Legend

Symbol	Site Usage
M-xx	Maryland Site Identified in C, D, & M Report
V-xx	Virginia Site Identified in C, D, &M Report
M-xxb	Suffix indicates additional site in Maryland
MDE	Maryland Department of the Environment
WRA	Maryland Water Resources Administration

The minimum annual acreage required for **land application** (and mine/land reclamation) could not be provided by any of the seven short-listed sites (see Section 6.3 for acreages). Feasibility of this option is discussed, from an available-site standpoint, in Section 6.3.

The **manufacturing** option is in part predicated on residual use by the Cherakee Sanford Group, Inc. (formerly Maryland Clay Products) at site M-24. The Cherakee Sanford Group, Inc. is a clay products (brick) manufacturer located in a Beltsville, Maryland industrial park. The 22 acre facility had previously experimented with sanitary sludge from Washington Suburban Sanitary Commission creating a "biobrick".

Two additional options remain for site evaluation: Monofill, and Co-disposal with Dredge Spoils. Sites M-27, M-27b, M-27c, M-28, M-29, and M-35 were evaluated for **monofill** development. None of the sites in the December, 1979 Report could accommodate a moorage facility for use in **co-disposal with Dredge Spoils**. As mentioned in Section 4.6, Georgetown Waterfront and Blue Plains Wastewater Treatment Moorage Facility were selected as potential moorage facilities.

The secondary review identified seven potential disposal sites; Sites M-24, M-27, M-27b, M-27c, M-28, M-29, and M-35. Site M-24 was a potential manufacturing site, (Cherakee) and sites M-27, M-27b, M-27c, M-28, M-29, and M-35 were considered potential monofill sites. A tertiary review was undertaken for the remaining seven.

6.1.4 Tertiary Review

Review of the seven potential disposal sites was focused in three areas: 1) operational aspects, 2) social and cultural environment, and 3) environmental impacts. The operational aspects of a site would include such things as: current ownership, site address and use; available acreage; and expected future use (zoning). Social and cultural environment of a site recognizes compatibility with adjacent land usage. The environmental impacts of a site include : wetlands; floodplains; Chesapeake Bay critical areas; rare, threatened or endangered species; special or unique habitats; soils; water resources classification; and sole source aquifers. Exhibit 6-3 summarizes the tertiary review findings.

An additional criterion used to evaluate the six potential monofill sites was the assumptions made for preliminary development, including:

- Accommodate an estimated 355 C.Y./day of residual material to be disposed at 30% TSS.

TERTIARY REVIEW SUMMARY
EXHIBIT 6-3

SITE	LISTED SITES OWNERSHIP	LOCATION	CURRENT USE	ACREAGE	ZONING(FUTURE)	SURROUNDING LAND USE	WETLANDS
M-24	CHERAKEE SANFORD GROUP, INC. 1600 COLON ROAD SANFORD, N.C. 27330	7000 BLOCK MUIRKIRK ROAD BELTSVILLE, MD PRINCE GEORGES, CTY.	CLAY MINING & MANUFACTURING	22	LIGHT INDUSTRIAL INDUSTRIAL PARK	BELTSVILLE IND. PK. HOWARD UNIV. CEMETERY RESIDENTIAL	NO
M-25	W.D. EXCAVATING COMPANY 24024 FREDERICK RD. CLARKSBURG, MD 20734	URBANA PIKE & GREEN VALLEY RD. FREDERICK CTY.	RUBBLE LANDFILL	24	LIGHT COMMERCIAL RESIDENTIAL	REGIONAL PARK RESIDENTIAL INDUSTRIAL PARK	NO
M-27	BRANDYWINE ENTERPRISES 5800 SHERIFF RD FAIRMOUNTHEIGHTS, MD 20743	3000 BLOCK PATUXENT RIVER ROAD DAVIDSONVILLE, MD ANNE ARUNDEL, CTY.	SURFACE MINING	164	RESIDENTIAL AGRICULTURAL OPEN SPACE	SURFACE MINING & AGRICULTURE	OPEN WATERS 20-25%
M-27b	GENSTAR STONE PRODUCTS 11350 McCORMICK RD. HUNT VALLEY, MD 21031	3100 BLOCK PATUXENT RIVER RD. DAVIDSONVILLE, MD ANNE ARUNDEL, CTY.	SURFACE MINING	126	RESIDENTIAL AGRICULTURAL OPEN SPACE HEAVY IND.	SURFACE MINING & AGRICULTURE	OPEN WATERS 20%
M-27c	SOUTHSTAR LIMITED PARTNERSHIP CO. CHANEY ENTERPRISES P.O. BOX 548 WALDORF, MD 20604	3400 BLOCK PATUXENT RIVER RD. DAVIDSONVILLE, MD ANNE ARUNDEL, CTY.	SURFACE MINING	390	RESIDENTIAL AGRICULTURAL OPEN SPACE COMMERCIAL	SURFACE MINING & AGRICULTURE	OPEN WATERS 25%
M-28	1691 LIMITED PARTNERSHIP P.O. BOX 3032 CROFTON, MD 21114	CRAIN HWY. CROFTON, MD ANNE ARUNDEL, CTY.	WOODED SURFACE MINING	173	OPEN SPACE COMMERCIAL	COMMERCIAL OPEN SPACE RESIDENTIAL	YES 50%
M-29	DISTRICT OF COLUMBIA GOVERNMENT	12000 BLOCK OLD BALTIMORE PIKE BELTSVILLE, MD PRINCE GEORGES, CTY.	AGRICULTURE	143	OPEN SPACE	U.S.D.A. RESEARCH RESIDENTIAL IND. PARK	YES 5% STREAM THRU MID. OF SITE
M-35	1325 G. STREET LIMITED PARTNERSHIP-KONTERRA P.O. BOX 719 LAUREL, MD 20707	VAN DUSEN RD. - NORTH VIRGINIA MANOR RD. - EAST OLD GUNPOWDER RD. - WEST PRINCE GEORGES, CTY.	WOODED SURFACE MINING	1300+	PLAN UNIT DEVEL. RURAL RESIDENTIAL COMMERCIAL REGIONAL CENTER	RESIDENTIAL OPEN SPACE PARKS INDUSTRIAL PARK CEMETERY	YES 5-8% STREAM THRU MID. OF SITE

TERTIARY REVIEW SUMMARY
EXHIBIT 6-3

SITE	FLOODPLAINS	CRITICAL AREA	RARE AND ENDANGERED SPECIES	SPECIAL OR UNIQUE HABITATS (U.H.)	SOILS	STREAM CLASS	SOLE SOURCE AQUIFER	AERIAL PHOTOGRAPHS	COMMENT
M-24	NO	NO	UNLIKELY	NO	CHRISTIANA CLAY PIT	N/A	QUESTIONABLE (NO)	YES	UNCERTAIN QUANTITIES FOR MANUFACTURING
M-25	NO	NO	POSSIBLE	POSSIBLE NO (U.H.)	N/A	N/A	YES	NO SOIL SURVEY MAP	03/31/96 LINER & LEACHATE COLLECTION REQUIRED NOT REGISTERED W/MDE
M-27	PERIPHERAL 20-25%	NO	UNLIKELY	NO	GRAVEL, SAND	CLASS I	NO	YES	MONOFILL SITE 120+ ACRES POTENTIAL 20+ YR. DISPOSAL LIFE
M-27b	PERIPHERAL 20%	NO	UNLIKELY	NO	GRAVEL, SAND	CLASS I	NO	YES	MONOFILL SITE 100+ ACRES POTENTIAL 20+ YR. DISPOSAL LIFE
M-27c	PERIPHERAL 25%	NO	UNLIKELY	NO	GRAVEL, SAND	CLASS I	NO	YES	MONOFILL SITE 100+ ACRES POTENTIAL 20+ YR. DISPOSAL LIFE
M-28	YES	NO	POSSIBLE	NO POSSIBLE (U.H.)	MIXED ALLUVIAL GRAVEL, SAND	CLASS I	NO	YES	MONOFILL SITE <80 ACRES POTENTIAL < 20 YR. DISPOSAL LIFE
M-29	NO	NO	UNLIKELY	NO	CHRISTIANNA BIBB	N/A	NO	YES	MONOFILL SITE WETLAND SOILS REJECTED 1964-1969 FOR LANDFILL SITE.
M-35	YES INDIAN CRK.	NO	POSSIBLE	NO POSSIBLE	BELTSVILLE SASSAFRAS GRAVEL, SAND CROOM MATAPEAKE	CLASS I	NO	YES	MONOFILL SITE 1200+ ACRES 20+ YR. LIFE W.S.S.C. OWNS ADJACENT PROPERTY

- Operation of disposal site 260 working days a year.
- Provide a 20-year minimum, useful disposal life of the site.
- A 30-foot maximum fill height of the landfill.
- Maximum 3 horizontal to 1 vertical slopes of fill.
- Provide a maximum 500-foot buffer separation surrounding the fill from adjacent property lines.
- Assume a minimum 10 acres for perimeter roads, storm water management and leachate ponds, onsite structures for administration, maintenance, security, and weigh station.

Using these criteria and Dalecarlia production rates, a minimum 115 acre site(s) is necessary for a 20-year useful disposal life. Below is a summary of Exhibit 6-3 for each of the potential monofill sites as well as the estimated useful residual disposal life.

Site M-27, Brandywine Enterprises, is a 164 acre parcel. Approximately 20-25 percent of the site is restricted for development due to floodplains and wetlands. An estimated 120+ acres has potential for monofill development. The useful disposal life is expected to be 20+ years.

Site M-27b, Genstar Stone Products, has 126 acres. Twenty percent of the site is restricted by floodplains and wetlands. An estimated 100+ acres for monofill development, slightly less than a 20 year useful disposal life.

Site M-27c, Chaney Enterprises, is a 390 acre parcel. Approximately 25 percent of the site is restricted for development by floodplain and wetlands. An estimated 290+ acres has potential for monofill development. The useful disposal life is expected to be 20+ years. There appear to be no major environmental constraints affecting development of sites M-27, M-27b, and M-27c as a monofill residual disposal facility.

Site M-28, 1691 Limited Partnership (formerly John Rodgers property). The site is divided into two parcels totaling 173 acres. Over 50% of the site is located in the 100-year flood plain. There are wetlands along the Little Patuxent River. Assuming 80 acres are suitable for a monofill, the site would have useful disposal life of approximately 10 years.

Site M-29, District of Columbia (Muirkirk Property). The site totals 143 acres. The property is assigned to the University of D.C. The University of D.C.'s Agricultural Department uses the site for agricultural crops and associated structures. The site was proposed for a sanitary landfill, 1964-1969, but was rejected by both Prince Georges County and the State of Maryland. The State of Maryland has the first right of refusal should the D.C. government sell the property. The site is further devalued for

development having natural wetland soils, Bibb Soils, and a stream meandering through the center of the parcel. The sites useful disposal life is estimated at less than 20 years.

Sites M-35, M-35b, and M-35c are among seven parcels totaling more than 1300+ acres owned by the 1325 G Street Associates Limited Partnership (Konterra). The parcels are primarily used for surface mining of sand and gravel. There are no wetlands of critical state concern, however, there are wetlands and a 100-year flood plain along the streams that run through the site. Small "pothole" wetlands are indicated in some of the abandoned surface mining areas. A 20 year useful disposal life can be obtained from a portion of this site. Washington Suburban Sanitary Commission has property adjacent to the seven parcels, giving the Corp of Engineers a partner in site development, and usage.

6.1.4.1 Summary

In summary, four sites were identified as potential monofill sites (M-27, M-27b, M-27c, and M-35). Sites M-25, M-28 and M-29 could not accommodate the 20-year useful disposal life. Sites M-27, M-27b, M-27c, and M-35 would provide a 20 year useful disposal life and no major environmental constraints are apparent as this preliminary stage. All four sites are within a 25-mile radius of Dalecarlia and located on major secondary roads.

One site was identified as usable for manufacturing (M-24, Cherakee Sanford Group). There are no apparent environmental characteristics that would prevent the use of the site as disposal alternative.

No sites had enough acreage for land application (mine/land reclamation) disposal. And there were no sites suitable as potential rubble or construction and demolition landfill disposal facilities.

6.2 USE OF EXISTING CAPACITY (CONTRACT DISPOSAL)

Section 5.1 of this report introduced the site evaluation methodology used to determine feasibility for disposal options falling within the contract disposal management approach. Those disposal options include the following:

- Land application using the capabilities of private firms.
- Landfilling (by contract with a private or public sanitary landfill).
- Reuse in a manufacturing process.

It is expected that one or more procurements could be used to solicit competitive bids for a variety of contract disposal services. Because of the number of potential bidders, and the fact that selection would be made largely on the basis of cost, the feasibility determination for the contract disposal option was based on the availability of private capacity. For the contract-managed disposal options, feasibility was defined as the likelihood of continued available private capacity in a competitive environment. The following evaluation, therefore, is intended to answer the question: "Is it reasonable for the Aqueduct to assume that competitive disposal capacity will continue to be available by contract?"

It is important to note that the cost, and quality estimates have been based on telephone interviews with private companies. Costs in the solid waste disposal market is volatile, and changes in the marketplace, should be expected between issuance of this report and implementation of any strategies. Additionally, legal determinants for material classification, and the economic laws of supply and demand will cause variations in the actual costs and site suitability.

In order to make this feasibility evaluation, potential service providers were investigated for the three types of disposal listed above, namely landfilling, land application and manufacturing reuse.

6.2.1 Landfilling

Landfill operators within approximately 150 road miles of the Dalecarlia WTP were contacted, regarding their ability and willingness to accept alum residuals. In general, private landfill companies were interested in receiving the residuals. Publicly-owned landfills closer to the Dalecarlia WTP, both in Maryland and Virginia, have a variety of waste acceptance policies, which may affect their viability as disposal options. Exhibit 6-4 provides a summary of the information collected.

6.2.1.1 Private Landfill Survey

Private landfills operated by Browning-Ferris Industries (BFI) include those in King and Queen and Henrico Counties, Virginia. The King and Queen County facility, which is approximately 120 miles from Dalecarlia WTP, has an expected life exceeding 30 years. The Henrico County facility is closer to Dalecarlia WTP, and has an estimated remaining useable life of 12 to 15 years, but is not currently allowed to accept out-of-state waste materials. For the King and Queen County site, BFI has indicated that a tipping fee for the material, if delivered today, would be $28.00 per ton. They further stated they would be willing to haul the residuals from the Dalecarlia WTP to the landfill for an additional $22.00 per ton. The combined cost for hauling and disposal would be $50.00 per ton.

EXHIBIT 6-4

DALECARLIA RESIDUALS DISPOSAL STUDY
SUMMARY OF LANDFILL INFORMATION

COMMERCIAL LANDFILLS*

Landfill	Operator	Telephone No.	State, County	Landfill Life (yrs)	Approximate Mileage (one-way)	Haul Costs ($/ton)	Tipping Fee ($/ton)	Total Cost ($/ton)	Notes
King and Queen	BFI	(804) 222-7070	VA, King and Queen	30	120 miles	$22	$28	$50	
Old Dominion	BFI	(804) 222-7070	VA, Henrico	12 - 15	110 miles	$21	$30 - 40	$51 - 61	Can not accept sludge
Charles City County	Chambers	(410) 747-8861	VA, Charles City	20+	120 miles	$15	$28	$43	Will haul for approximately $14.50/ton
Modern	WMI	(717) 597-4056	PA, York		120 miles	$21	$38	$59	
Mountainview	WMI	(717) 597-4056	PA, Greencastle		100 miles	$14	$38	$52	
North Mountain	Chambers	(304) 754-9153	WV, Hedgesville		100 miles	$14	$44	$58	Can only accept 50 - 75 tons per day
Atlantic Waste Disposal	AWD	(804) 748-8690	VA, Sussex	50+	150 miles	$21	$28	$49	

PUBLIC LANDFILLS*

Landfill	Operator	Telephone No.	State, County	Landfill Life (yrs)	Approximate Mileage (one-way)	Haul Costs ($/ton)	Tipping Fee ($/ton)	Total Cost ($/ton)	Notes
Sandy Hill Brown Station Road	Prince George's County	(301) 883-5848	MD, Prince George's		30 miles	$9 - 12	$30	$39 - 42	Cannot commit to acceptance without policy review
I-95	Fairfax		VA, Fairfax	--	--	--	--	--	Cannot accept
Oaks	Montgomery County		MD, Montgomery	--	30 miles	$9 - 12	--	--	Will not accept

* Information is based on telephone contacts with landfill managers and operators. Subject to change.

Chambers Development Company (Chambers) operates two landfills near Richmond, in Charles City County and Amelia County. The Charles City County landfill has a remaining useable life greater than 20 years and is approximately 120 miles from Dalecarlia WTP. Chambers staff stated that if the materials were being produced today they could haul them from Dalecarlia and dispose of them for $43.00 per ton. The tipping fee at the Charles City County facility would be $28.00 per ton if the residual material was delivered. They are familiar with sludge material and are currently receiving "beneficial use credit" for biosolids which they are using as landfill cover at the Chambers landfill in Frostburg, Maryland.

Atlantic Waste Disposal operates a landfill with a greater than 50-year life, in Sussex County Virginia. This landfill would accept the materials for between $28.00 and $35.00 per ton. However, the hauling distance would be approximately 150 miles.

6.2.1.2 Municipal Landfills

The landfills closer to the Dalecarlia WTP are generally managed by neighboring counties. The counties have different waste acceptance capabilities and policies, but a prohibition on accepting out-of-county waste is common. However, those policies could change as counties adapt to new market conditions. The 1994 Supreme Court ruling on flow control of solid waste has significantly changed the tonnages being received at some landfills. Counties may, therefore, change waste acceptance policies if necessary for their landfills to continue to operate.

The I-95 landfill at Lorton, Virginia is operated by Fairfax County. It is closing the raw waste acceptance facility and in the future will accept only ash from the Resource Recovery Facility currently in operation at the site.

Montgomery County, Maryland operates a landfill which is approximately 20 miles from Dalecarlia WTP, that is currently accepting water treatment plant residuals. This material, which is similar to the Dalecarlia WTP residuals, is from the County's Rockville facility. At this time, acceptance of waste from outside the County is prohibited.

Prince George's County, Maryland operates two landfills which are approximately 30 miles from Dalecarlia WTP. While it's their current policy not to accept solid waste which has been generated outside of the County, it currently accept construction and demolition (C&D) debris regardless of source (because it is not defined by the County as solid waste). The tipping fee for C&D debris is adjusted to stay competitive with other landfills, and is currently $29.00 per ton. Indications are that they might be able to accept the residuals at a negotiated tipping fee. If the County is receptive, a "government to

government agreement" with the Aqueduct could be executed. County staff further indicated that after closure of the Sandy Hill Landfill, a recreational park will be developed on top of the closed landfill. If the residuals are acceptable as fill material, they may be useful in developing the park.

6.2.1.3 Summary of Landfill Results

Discussions with private landfill operators indicate that commercial landfills will probably continue to be available as disposal facilities for the expected quantities of residuals. Costs for disposal, including both hauling to the landfill and disposal tipping fee could be as low as $40 to $50 per ton if operations were to begin today (based on telephone discussions).

County governments in the vicinity of Dalecarlia WTP vary in their interest in and ability to accept residuals. Discussions with Prince George's County staff indicate that they might accept the residuals at a negotiated tipping fee. For this report, we have assumed that the tipping fee would be $30 per ton based upon the current $29 per ton fee.

6.2.2 Land Application

Land application is a widely-used method for disposal and beneficial reuse of treatment plant residuals. There are several projects in the region in which biosolids from wastewater treatments plants are applied to farm and forest land. This is particularly true in Maryland, where residuals are regulated as soil amendments instead of as waste materials.

The private firms contacted as part of this study are now performing similar work in the greater Washington metropolitan area. The projects discussed were full-service operations, in which the contractor is responsible for obtaining necessary permits, contracting with farmers for the receipt of the materials, hauling the materials from the facility to the application site, and applying the materials.

6.2.2.1 Survey of Land Application Companies

There are several companies which currently land apply water and wastewater treatment plant residuals. Some are subsidiaries or partners of larger waste management companies. The three firms contacted for this study were: Browning-Ferris Industries (BFI), BioGro (a subsidiary of Waste Management Inc.), and Mobile Dredging (a subsidiary of the Carylon Group). BioGro is currently land applying several hundred tons per day of biosolids from the Blue Plains WWTP, as well as

approximately 50 wet tons per day of water treatment plant residuals from Fairfax County Water Authority. BFI is also land applying several hundred tons of Blue Plains biosolids per day, and serves other customers in the area.

Two of the three companies contacted (BFI and BioGro) were willing to provide "ballpark" cost estimates for land application of alum residuals. Mobile Dredging was not willing to estimate the costs at this time due to the unknowns regarding where they would be spreading the materials, and hauling costs. All three companies indicate that their cost estimates will become more accurate as the planning and development process proceeds toward completion. Initial cost estimates range from $25 to 45 per wet ton.

These cost estimates agree substantially with independent cost estimates developed by Earth Systems Associates (ESA) for this study (see Appendix D). The ESA estimate was that the cost of land application of alum residuals would range from $30 to $48 per wet ton for disposal site within 50 miles of Dalecarlia.

In order to make a rough assessment of the continued viability of land application in the region, the Natural Resources Conservation Service (NRCS) was contacted (see Exhibit 6-5). According to its 1985 database on land use, over 1.2 million acres of woodlands and 730 thousand acres of croplands exist in Maryland counties which lie (all or part) within a 50-mile radius of the Dalecarlia WTP. According to the application rates estimated for the study by Earth Systems Associates, less than one per cent of either the forested or cropland acreage in Maryland would be required to land-apply Dalecarlia's alum residuals for a period of approximately 20 years. (The calculation was limited to Maryland because of the less-stringent regulations regarding land application.) Therefore, it is reasonable to assume that land availability will not limit the viability of land application of Dalecarlia WTP residuals as a disposal/reuse method. Of course, availability of land does not ensure permittability, good road access, zoning approvals, etc.

6.2.2.2 Summary

Land application appears to be a viable option for disposal of the alum residuals produced by the Dalecarlia dewatering facility. The companies contacted have experience with land application in the region, with similar materials, and the technology is not new. Two of the companies are backed by large waste management firms that have considerable experience in the solid waste business. However, the availability of sites for land application rests, in large part, on the ability of firms to continue to reach agreements with individual landowners, and on the current favorable regulatory policy in Maryland. This

EXHIBIT 6-5

DALECARLIA RESIDUALS DISPOSAL STUDY

SUMMARY OF LAND USE BY ACRES BY COUNTY
NATURAL RESOURCES CONSERVATION SERVICE
(1985 DATA BASE)

COUNTY	CROPS	PASTURE	WOODLAND
Maryland Counties			
Prince George's	32,811	4,000	115,875
Montgomery	79,000	24,000	98,091
Howard	32,800	21,600	50,240
Frederick	163,000	54,000	135,140
Charles	38,000	5,000	191,011
Anne Arundel	17,500	6,200	112,756
Carroll	136,100	43,200	84,967
Baltimore	62,700	29,800	122,661
Calvert	24,000	3,100	73,367
St. Mary's	46,000	7,500	132,125
Washington	105,200	48,100	96,680
TOTAL	**737,111**	**246,500**	**1,212,903**
Virginia Counties			
Loudoun	97,739	98,960	128,727
Fauquier	98,835	101,249	205,617
Stafford	19,948	5,965	136,711
King George	20,531	8.067	81,235
Fairfax	12,061	5,330	122,252
Prince William	32,604	33,039	105,975
TOTAL	**281,718**	**252,610**	**780,517**
COMBINED TOTAL	**1,018,829**	**499,110**	**1,993,420**

should be recognized in future planning for disposal, perhaps by executing a back-up contract for landfilling.

6.2.3 Manufacturing Reuse

As is the case with contract disposal via landfilling and land application, the feasibility of residuals reuse in manufacturing rests largely on the available private capacity in the region. For this study, two such firms were contacted: a brick manufacturer (Cherokee Sanford Group) and a topsoil blender (Earthgro Corporation). The Cherokee Sanford site was part of the specific site evaluations reported on in Section 6.1 (site M-24). This section evaluates the feasibility of each company as a dependable, on-going source of disposal or reuse capacity for Dalecarlia residuals.

6.2.3.1 Brick Manufacturing

Cherokee Sanford Group (formerly Maryland Clay Products) manufactures bricks using a variety of materials, including contaminated soils, at its Beltsville, Maryland facility. The company currently holds the appropriate permits to process contaminated soils. The facility is not currently permitted to accept and use other types of residuals. However, the company's representative stated that the capacity of the facility to accept and use alum-type materials is more than adequate to handle all of Dalecarlia WTP's annual solids generation. The representative further stated that the company is in the process of applying for appropriate permits.

6.2.3.2 Topsoil Blending

Earthgro Corporation, a topsoil blender in Pennsylvania, was contacted for this study to provide an indication of the feasibility of using alum residuals as a topsoil component. Earthgro requires that all components used pass the EPA's TCLP test, and charges $10 per wet ton to accept delivery of materials in the range of 25 to 30 percent TSS. Pilot test results indicate that Dalecarlia residuals would meet both requirements. The company is not in the hauling business, so separate transport arrangements would be necessary.

Earthgro is capable of using as much as 10,000 tons per year of residuals at the Pennsylvania facility, which is about 20 percent of the Dalecarlia WTP's annual residuals generation. Earthgro staff

mentioned the possibility of expanding into the area around Dalecarlia WTP, but did not give a time frame or any other specifics.

6.2.3.3 Summary

Both manufacturing processes hold some promise, if current obstacles (lack of proper permits, lack of local capacity) can be overcome. In addition, these operations are not primarily in the business of solids disposal (as are the land application and landfilling firms). It is reasonable, however, to include them in a procurement for solids disposal/reuse capacity, and they could conceivably play a role in disposal, especially if prices are competitive and backup capacity is available.

6.3 EVALUATION OF AVAILABLE ACREAGE (DALECARLIA-CONTROLLED LAND APPLICATION)

For the disposal option of Dalecarlia-controlled land application, an evaluation was undertaken to estimate approximate application rates, which would, in turn, determine the acreage required for a land application operation. That evaluation, included in this report as Appendix D, was conducted by Earth Systems Associates (ESA) and was based on data from the pilot test results, soils maps and other information on the region surrounding the facility. In addition, that evaluation assumed that the same acreage would be used for up to twenty years of repeated applications at the estimated rates (rather than developing loading rates that would require rotation of acreage over 20 years).

The ESA study estimated loading rates for forested and agricultural lands, as shown in the table below. Also shown is the total number of acres that would be required to land apply all of the Dalecarlia facility's expected annual production of 48,300 wet tons.

Land Use	Application Rate (wet tons/A)	Acres Required
Forest Land	13	3700
Crop Land	26	1900
Crop Land (high rate)	52	1000

The only site among the eight short-listed sites (see Section 6.1) large enough for land application, M-35, is a collection of parcels currently in use as a sand and gravel pit and stump dump, and only marginally large enough at 1300 acres. Therefore, the feasibility of finding a suitable site for

Dalecarlia-controlled land application was evaluated in terms of available federally-owned acreage near the facility.

6.3.1 Survey of Federally-Owned Acreage

Dalecarlia Water Treatment Plant is owned and operated by the Army Corps of Engineers, Washington Aqueduct Division, a Federal facility. A preliminary review of 15 Federal Armed Forces facilities, within the Baltimore-Washington D.C. area was conducted to see if the facilities could be available for disposal either by landfilling or land application and/or as a barge moorage facility. See Exhibit 6-6 for listing sites and survey results.

With the exception of Blossom Point Proving Ground, all of the facilities responded to the request by providing information. Most of the facilities provide their own water either from groundwater or surface sources. The exceptions are Andrews Air Force Base, Bolling Air Force Base, Washington Navy Yard, and Fort Belvoir. Andrews Air Force Base receives its water from the Washington Suburban Sanitary Commission. Bolling Air Force Base and Washington Navy Yard are supplied water from Washington D.C. (Dalecarlia Water Treatment Plant). Fort Belvoir receives water from the Fairfax County Water Authority. Four sites treat surface waters. Quantico Marine Corps Reservation and Fort Detrick dispose of their residuals in on-site landfills; neither facility is interested in accepting residuals from off-site sources. Aberdeen Proving Grounds and Fort Meade contract the disposal of their residuals to private contractors.

Of the Federal facilities that have sanitary landfills, none expressed an interest in accepting residuals for co-disposal or use as cover material; most of the facilities are trying to phase out landfill operations. When discussing land application of residual materials, none of the facilities contacted expressed a willingness to accommodate this operation. Therefore, a different approach to the use of federal lands was taken to see if there were potential acreages for land application.

A minimum acreage is needed to apply residuals either agriculturally (1,900 acres) or in forestation (3,700 acres) on an annual continuing basis. Total site acreage for land application was estimated for all fifteen facilities. The four largest facilities, A.P. Hill U.S. Army Reservation, Quantico U.S.M.C. Reservation, Aberdeen Proving Grounds - Edgewood Arsenal, and Fort Belvoir were subdivided into approximate total forested and agricultural acreage. Between the four facilities there is an estimated 100,000 acres of forest and 7,800 acres of agricultural property. (Three of the four are U.S. Army-controlled facilities). Therefore, about 24 percent of the federally controlled agricultural acreage

EXHIBIT 6-6
DALECARLIA RESIDUALS DISPOSAL STUDY
FEDERAL FACILITIES SUMMARY TABLE

SITE	APPROX. TOTAL SITE ACREAGE	APPROX. TOTAL FORESTED ACREAGE	APPROX. TOTAL (ACTUAL & POTENTIAL) AGRICULTURAL ACREAGE	DO THEY SUPPLY WATER	SOURCE OF WATER SUPPLY	AVAILABLE LANDFILL OR LAND APPLICATION	INTERESTED IN CO-DISPOSAL
ANDREWS AIR FORCE BASE	4400	-	-	NO	WSSC	NO	NO
BOLLING AIR FORCE BASE	N/A	-	-	NO	D.C.	NO	NO
FORT BELVOIR	9300	5580	-	NO	FAIRFAX COUNTY	YES	NO
FORT MEADE	5000	-	-	YES	SURFACE	NO	NO
INDIAN HEAD-NAVAL ORD.	3200	-	-	YES	WELL	YES	NO
PATUXENT RIVER NAVAL AIR STATION	6600	-	-	YES	WELL	NO	NO
ABERDEEN PROVING GROUNDS	40000	20000	7600	YES	SURFACE	NO	NO
QUANTICO USMC RESERV.	60000	17500	-	YES	SURFACE	YES	NO
A.P. HILL U.S. ARMY RESERV.	76000	57000	212	YES	WELL	YES	NO
FORT RITCHIE	700	-	-	YES	WELL	NO	NO
DAHLGREN NAVAL SURF. WEAPONS AREA	2800	-	-	YES	WELL	NO	NO
WASH. NAVY YARD	N/A	-	-	NO	D.C.	NO	NO
EDGEWOOD ARSENAL	included as part of Aberdeen	-	-	-	-	-	-
FORT DETRICK	1400	-	-	YES	SURFACE	YES	NO
BLOSSOM PT. PROVING GROUND	1300	-	-	**	**	**	**

** Blossom Point Proving Ground - Would not provide any information over the phone. Inquires must be made directly to the Navy in writing at the following address:

Capt. Cassidy
4555 Overlook Ave.
Washington, DC 20375-5320

in the four largest bases, or about 4 percent of the forested acreage, would be needed to sustain a land-application operation.

Five facilities, Washington Navy Yard, Patuxent River Naval Air Station, Aberdeen Proving Ground, Dahlgren Naval Surface Weapons Center and Indian Head Naval Ordnance Station were investigated concerning the availability of barge mooraging. Neither the Washington Navy Yard nor Aberdeen Proving Ground-Edgewood Arsenal have barge moorage facilities. Patuxent River Naval Air Station has the ability to accommodate barges displacing less than 12 feet of draft. Both the Dahlgren Naval Surface Weapons Center and Indian Head Naval Ordinance Station have the ability to handle barges, but as with Patuxent River Naval Air Station, formal inquiries must be directed to the Navy.

7.0 CANDIDATE OPTIONS FOR RESIDUALS DISPOSAL

The options remaining after the initial screening were investigated to determine the benefits and challenges associated with each. The options are: landfilling (commercial and public), land application (commercial and public), disposal with dredge spoils and use in manufacture of bricks and topsoil. Information was gathered and evaluated according to nine factors.

7.1 EVALUATION FACTORS

QUALITY FACTORS
Track Record (Experience)
Long-Term Potential
RISK FACTORS
Environmental Impacts
Site Suitability
Regulatory Risk
Dalecarlia Requirements
Institutional Constraints
Management Complexity
Time to Implement

Two *quality evaluation factors* were considered: previous experience and long-term disposal potential. An option with a good track record (one that has been used successfully for an extended period) was rated more favorably than a new or less proven option, which may or may not be economically or technically viable over time. Options were also evaluated for their long-term potential to accept residuals from Dalecarlia WTP. The minimum period considered adequate was 20 years.

Seven *risk factors* were identified. These risk factors included *environmental impacts* that could negatively affect the option. *Site suitability* was particularly significant in seeking landfill sites. *Regulatory risk* considerations depended on the disposal site location because the regulations are different from state to state. Any requirement for *additional facilities* to be built or provided at the

Dalecarlia WTP site were also considered. *Institutional constraints* included the anticipated difficulty in obtaining approval from other governmental agencies such as the District of Columbia, other branches of the military, other portions of the Federal government, etc. *Management complexity* addresses the difficulty or ease of managing each option, and the degree of involvement anticipated for the Aqueduct. The *time to implement* factor assessed whether the option could be operational at the time the dewatering facilities become operational in approximately 5 years.

7.2 RANKING SYSTEM

Points were assigned to compare the evaluation factors for each disposal option. A three-point system was used for ranking, with one point for low risk or good quality, depending on the option, and three points for high risk or poor quality (see Rating Criteria table below). Only whole numbers were used, and each factor was assigned a number. Therefore, the possible range of total ranking points for the nine evaluation factors was from 9 to 27, with the *lower total number of points indicating the more desirable options*. The ranking system was not strictly quantitative, but was intended to rank the options relative to each other according to defined criteria. The estimated cost range is included on the evaluation sheets, but was not assigned a separate ranking factor.

EVALUATION FACTORS FORMAT AND INTERPRETIVE KEY		
Ranking Factors	**Description**	**Rating Points (Range)**
Quality Factors		
Track Record	Past history of the disposal technology or approach	1-3
Long-Term Potential	Potentially available for 20 years or longer	1-3
Risk Factors		
Environmental Impacts	Potential negative impact, potential Aqueduct liability	1-3
Site Suitability	Availability of site, difficulty to develop/obtain	1-3
Regulatory Risk	Potential for regulatory limitations/obstacles	1-3
Dalecarlia Requirements	Additional improvements at plant	1-3

EVALUATION FACTORS FORMAT AND INTERPRETIVE KEY		
Ranking Factors	**Description**	**Rating Points (Range)**
Institutional Constraints	Inter-governmental cooperation, institutional agreements required	1-3
Risk Factors (cont.)		
Management Complexity	Level of Aqueduct involvement required to operate or manage	1-3
Time to Implement	How quickly operations can begin (baseline for implementation of dewatering facility: 5 years)	1-3
TOTAL POSSIBLE POINTS (Range)		**9 - 27**

RATING CRITERIA			
POINTS	1	2	3
QUALITY FACTORS	Good	Satisfactory	Poor
RISK FACTORS	Low	Moderate	High

7.3 RANKING OF DISPOSAL OPTIONS

7.3.1 Landfilling - Commercial Landfill (see Exhibit 7-1)

GENERAL:

Because commercial landfills exist and are likely to continue to operate within hauling distances from Dalecarlia WTP well into the future, it is reasonable to expect that this option will remain viable for at least 20 years (see Long-Term Potential, this section). Upon filling and closing of existing landfills, additional landfills will likely be developed to meet the requirement for continuing waste disposal.

As part of this study, we contacted the commercial landfills closest to the Dalecarlia WTP, finding seven within 150 miles of the facility.

Commercial landfills serving the Washington, D.C. area are primarily located in Virginia and are operated by the major waste disposal firms. Competition among private landfills helps to control

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-1

EVALUATION OF COMMERCIAL LANDFILLING

COST:		**$40 - $60 / Wet Ton**
RATING FACTORS		**RATING POINTS**
QUALITY FACTORS		
TRACK RECORD:	Good	1
LONG-TERM POTENTIAL:	Good, 20 + years of experience, will be follow-on landfills	1
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Liability assumed by landfill operator	1
SITE SUITABILITY:	Landfill developed by operator Several landfills available	1
REGULATORY RISK:	Low, liability assumed by landfill operator	1
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	Few	1
MANAGEMENT COMPLEXITY:	Contract disposal, perhaps contract for haul	1
TIME TO IMPLEMENT:	Procurement & negotiation Disposal Contract, Hauling Contract	1
TOTAL POINTS:		**9**

tipping fees. Landfills in Maryland are generally owned and operated by or for counties, and have waste acceptance policies which do not allow them to accept waste generated outside of the host county. There are no significant weather related constraints to continuous disposal.

COST: $40 - $60/wet ton (rounded)

The cost is based on tipping fee and hauling cost estimates provided by several of the major waste hauling companies (see Exhibit 6-5). The tipping fees range from $28 to $40 per ton, and transportation costs range from $15 to $22 per ton. The hauling distances range from 100 to 150 miles, one way. Cost estimates for hauling received from the commercial firms agree with calculated hauling costs discussed in Section 2.3 and Exhibit 2-6

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

Landfills are well established for use in disposal of waste materials, and the new federal regulations and improved landfill designs, which include liners and leachate collection systems, help control the environmental impact of landfilling.

Long-Term Potential: ***Ranking:*** 1 (Good)

Representatives of the commercial landfills contacted stated that their landfills have life expectancies ranging from greater than 20 years to greater than 50 years. Those companies whose landfills had only 20 years of expected life stated that they plan to develop new facilities prior to closing the existing facilities.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

The potential environmental impact from disposal of residual materials are further limited by placing the residuals in a lined landfill. The majority of the liability would be assumed by the landfill operator, although some liability such as future cleanup of the disposal site (if required) may remain with the Aqueduct, under CERCLA (see Section 3.2).

Site Suitability: ***Ranking:*** 1 (Low)

With the use of a commercial landfill, the determination of site suitability and permitting becomes the responsibility of the landfill owner, developer or operator.

Regulatory Risk: ***Ranking:*** 1 (Low)

Permits must be obtained and regulations must be complied with by the owner and operator of the landfill. Existing landfills have permits which allow residuals disposal without permit modification.

Dalecarlia Requirements: ***Ranking:*** 1 (Low)

No changes would be required to the currently planned facilities at the Dalecarlia WTP.

Institutional Constraints: ***Ranking:*** 1 (Low)

Few institutional constraints are anticipated. Commercial landfilling is widely practiced and is not expected to be difficult to implement from an institutional standpoint.

Management Complexity: ***Ranking:*** 1 (Low)

Management complexity for this option is expected to be low, requiring only a single contract with a waste disposal company to haul the residuals from the Dalecarlia WTP and dispose of them in a landfill. It may be possible to obtain a lower overall cost through a separate competitive bid for hauling, but this may increase the contract management efforts required by the Aqueduct staff.

Time to Implement: ***Ranking:*** 1 (Low)

Use of existing commercial landfills should require only completion of the bidding process and negotiation of one or more contracts. It should be possible to obtain landfill disposal by the time the dewatering facilities are constructed.

7.3.2 Landfilling - Public Landfill (see Exhibit 7-2)

GENERAL:

Several of the counties in Maryland near the Dalecarlia WTP now operate landfills to provide waste disposal capability for their residents. With the 1994 Supreme Court ruling on flow control, waste flow patterns have changed significantly and some Maryland counties are experiencing a loss of waste at their landfills. With the loss of waste, and accompanying loss of revenue, some counties may reconsider their waste acceptance policies and tipping fees and allow materials from outside of the county to be accepted at the landfills. This may make county-owned or operated landfills, which are closer to Dalecarlia WTP than commercial landfills, available for future use.

This option demonstrates potential, but large uncertainties exist at this time. Prince George's County personnel have expressed an interest, but are not able to commit now to accept materials that will be produced several years in the future. Permits for landfill expansion are currently in the review process. Other regions and counties may also be interested in the future. There are no significant weather related constraints to continuous disposal.

COST: $35 - $40/wet ton

The cost estimate is based on the current tipping fee for Construction and Demolition (C&D) debris being accepted at the Prince George's County, Maryland landfills, plus the estimated hauling costs. The C&D tipping fee has been adjusted by the County to remain competitive with other landfills, and is currently $29 per ton. The hauling distance is approximately 30 miles, and it is estimated that it would cost $9 to $11 per ton for hauling residuals to one of the Prince George County landfills. See Section 2.3 for discussion of hauling costs, and Exhibit 6-3 comparison with private landfill tipping fees.

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

County-operated landfills must comply with the same regulatory requirements as commercial landfills and, therefore, the technology is similarly well-established.

Long-Term Potential: ***Ranking:*** 2 (Satisfactory)

Although the County is expected to continue to provide disposal capacity for the residents, the lack of waste flow control or other factors may force them out of the landfill business.

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-2

EVALUATION OF PUBLIC LANDFILLING (Possibly Prince George's County)

COST:		**$35 - $40 / Wet Ton**
RATING FACTORS		**RATING POINTS**
QUALITY FACTORS		
TRACK RECORD:	Good	1
LONG-TERM POTENTIAL:	Prince George's County has two landfills, will continue to provide disposal for County. Other Counties may be interested	2
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Liability assumed by landfill operator	1
SITE SUITABILITY:	Suitability determined by County willingness to accept material. Possible use as fill.	1
REGULATORY RISK:	Low, liability assumed by landfill operator	1
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	Will require agreement with County	2
MANAGEMENT COMPLEXITY:	Contract for disposal, contract for haul	2
TIME TO IMPLEMENT:	Procurement & negotiation Disposal Contract, Hauling Contract	2
TOTAL POINTS:		**13**

This option has potential, but has large uncertainties at this time. Prince George's County personnel are interested but not able to commit at this time. They may either landfill the material if the landfill remains open, or use the residuals as general fill to build a park on top of landfill if the landfill is closed. Permits for landfill expansion are currently in the

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

The potential environmental impacts from disposal of residual materials are controlled by placing the residuals in a lined landfill. The liability would be shared with the landfill operator. As with other landfill options, the Aqueduct could be named in the future as a potentially responsible party if the landfill is declared a hazardous waste site (see Section 3.2).

Site Suitability: ***Ranking:*** 1 (Low)

County waste acceptance policies determine whether a permitted county-owned or operated site is available. Prince George's County also indicated an interest in possible use of material as fill material in completing a park to be built atop the closed landfill although the structural properties of the residuals may limit this use.

Regulatory Risk: ***Ranking:*** 1 (Low)

Permits must be obtained and regulations must be complied with by the owner and operator of the landfill. Existing landfills have permits which allow residual disposal without permit modification.

Dalecarlia Requirements: ***Ranking:*** 1 (Low)

No changes would be required to the currently planned facilities at Dalecarlia WTP.

Institutional Constraints: ***Ranking:*** 2 (Moderate)

An intergovernmental agreement would probably be required to allow tipping at a county landfill and to establish the tipping fee. Depending on the political and financial situation, approval of such an agreement could be time-consuming and difficult. The prohibition against disposal of out-of-county waste would have to be politically restructured to allow selective out-of-county waste disposal.

Management Complexity: ***Ranking:*** 2 (Moderate)

The management complexity is expected to be moderate, requiring a contract with a hauling company for transporting the residuals to the landfill, the intergovernmental agreement to establish the tipping fee, and monitoring of both contractual relationships.

Time to Implement: *Ranking:* 2 (Moderate)

Technically, arranging the disposal procurement through a bidding process and negotiation of one or more contracts should be straightforward. The political acceptance by the counties is a variable that is difficult to predict. If a county is interested in receiving the residuals, it should be possible to arrange landfill disposal by the time the dewatering facilities are constructed.

7.3.3 Landfilling - Aqueduct-Managed Monofill (see Exhibit 7-3)

GENERAL:

A monofill will allow the Aqueduct staff complete management control of a residual disposal site. The cost estimates in this report assume that the monofill landfill will include a lined disposal cell with a leachate collection system designed for a 20+ year useful disposal life. There are no significant weather related constraints to continuous disposal.

COST:	$80 to $85/wet ton (190 cy/day)	$50 to $55/wet ton (355 cy/day)

Cost could vary greatly depending on the market price for land acquisition and the quantity of daily residual material to be disposed. Cost per wet ton includes land acquisition, engineering and construction of lined disposal cells with a leachate collection system, transportation of residuals from Dalecarlia WTP to the disposal site, and daily administration/operations. Closure cost and post-closure care and maintenance are not included. Daily quantities of 190 and 355 cy/day were used for estimating unit cost, respectively. See Exhibit 7-4 and 7-5 for cost breakdown.

QUALITY FACTORS:

Track Record: ***Ranking:*** 2 (Satisfactory)

There are no local monofills strictly for water treatment plant residuals. Residuals disposal into sanitary landfills has been practiced over 15 years. With a proper disposal plan, a residual monofill could be permitted and operated.

Long-Term Potential: ***Ranking:*** 1 (Good)

Assuming no major changes in regulations, the Aqueduct staff would have the security of uninterrupted disposal service for a minimum 20 years. By combining other disposal options and/or development of new cells or sites, the disposal life of the monofill landfill can be even longer.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 2 (Moderate)

Liability assumed by Aqueduct. Chemical and physical characteristic test results indicate residuals have a low or no environmental contaminants threat. There are environmental impacts to be accommodated in the siting of any type of landfill.

Site Suitability: *Ranking:* 2 (Moderate)

A review of sites M-27, M-27b, M-27c, and M-35 denoted in the previous 1979 Corps study revealed that there could be enough acreage to accommodate in excess of a 20-year useful life. Preliminary environmental assessment indicates no detrimental characteristics for these sites. major transportation routes are accessible to the sites and are within a 25-mile radius of Dalecarlia WTP. Site M- 35 has the potential, due to its geography, for joint disposal with WSSC.

Regulatory Risk: *Ranking:* 2 (Moderate)

The disposal site zoning may have to be changed or altered to satisfy the requirements of the local jurisdictions for allowing such activity. The Maryland Department of Environment will require extensive pre-construction and post construction groundwater monitoring, the permitting process, including three phases of submittals will be required.

Dalecarlia Requirements: *Ranking:* 1 (Low)

No design changes will be required to the currently planned dewatering and loading facilities at Dalecarlia WTP.

Institutional Constraints: *Ranking:* 2 (Moderate)

Community opposition is anticipated for any landfill application. A change of zoning, if necessary, could be difficult to achieve. Public meetings will be required. Leachate disposal will have to be arranged and permitted by the Maryland Department of Environment.

Management Complexity: *Ranking:* 3 (High)

Monofill landfill daily operations would be managed by the Aqueduct staff creating a new management function. An alternative would be to contract for the daily operations by competitive bidding. The Aqueduct staff would then have oversight responsibility.

Time to Implement: *Ranking:* 2 (Moderate)

The land acquisition, permitting process, engineering and construction will take a minimum of 3 to 5 years. An interim disposal alternative may be required until the Aqueduct-owned monofill is operational.

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-3

EVALUATION OF LANDFILLING - AQUEDUCT MANAGED MONOFILL

COST: (Based on an Annual Quantity of 190 cy/day) **$80 - $85 / Wet Ton**

RATING FACTORS		RATING POINTS
QUALITY FACTORS		
TRACK RECORD:	Good for solid waste, unknown for residuals	2
LONG-TERM POTENTIAL:	Good, monofill life would exceed 20 years	1
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Liability assumed by Dalecarlia	2
SITE SUITABILITY:	Sites M-27, M-27b, M-27c, M-29 and M-35 may be favorable, must be owned by Dalecarlia. Site availability unknown	2
REGULATORY RISK:	Zoning may not be acceptable MDE must approve landfill	2
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	Must arrange leachate disposal - Expect community opposition - Acceptability of long-term contract	2
MANAGEMENT COMPLEXITY:	Dalecarlia operations would be more complex than by contract	3
TIME TO IMPLEMENT:	Time to develop similar to that required to develop dewatering facility	2
TOTAL POINTS:		**17**

EXHIBIT 7-4

Dalecarlia Residuals Disposal Study
Aqueduct-Owned Monofill Cost
(Based on an Annual Quantity of Residuals of 190 cy/day)

Development and Construction Cost:	$2,050,935/yr.*
Operational Cost:	$1,161,850/yr.
Truck Transportation:	$ 579,600/yr.
Land Acquisition:	$ 50,790 to 203,160/yr.**
Total Cost:	$3,843,175 to 3,995,545/yr.

* Based on 20 year financing at a 7 percent annual interest rate.

** Based on 20 year financing at a 7 percent annual interest rate. Land acquisition cost at $2,500 to $10,000/acre.

Unit Cost per wet ton: $\frac{\$3,843,175/yr. \text{ to } \$3,995,545/yr.}{(190\ cy/day)\ (260\ day/yr.)}$ = $78 to 81/ton

Rounded off to $80-$85/wet ton

Assumptions:

- Monofill is within a 50-mile radius of Dalecarlia WTP.
- 20-year disposal life for the landfill.
- 500-foot buffer surrounding the landfill cells.
- Roads, Maintenance and Administration Buildings, Guard and Scale House.
- Impervious liner cell with a leachate collection system.
- Onsite operational and maintenance staff of ten people.
- Acquisition of 105 acres.

EXHIBIT 7-5

Dalecarlia Residuals Disposal Study
Aqueduct-Owned Monofill Cost
(Based on an Annual Quantity of Residuals of 355 cy/day)

Development and Construction Cost:	$2,495,950/yr.*
Operational Cost:	$1,160,000/yr.
Truck Transportation:	$ 908,960/yr.
Land Acquisition:	$ 55,600 to $222,500/yr.**
Total Cost:	$4,620,510 to $4,787,410/yr.

* Based on 20-year financing at a 7 percent annual interest rate.

** Based on 20-year financing at a 7 percent annual interest rate. Land acquisition cost at $2,500 to $10,000/acre.

Unit Cost per wet ton: $\frac{\$4,620,510 \text{ to } \$4,787,410}{(355 \text{ cy/day})\ (260 \text{ day/yr.})}$ = $50 to 52/ton

Rounded off to $50-$55/wet ton

Assumptions:

- Monofill is within a 50-mile radius of Dalecarlia WTP.
- 20-year disposal life for the landfill.
- 500-foot buffer surrounding the landfill cells.
- Roads, Maintenance and Administration Buildings, Guard and Scale House.
- Impervious liner cell with a leachate collection system.
- On-site operational and maintenance staff of ten people.
- Acquisition of 115 acres.

7.3.4 Land Application - Commercial (see Exhibit 7-6)

GENERAL:

Commercial land application is a widely-used method for beneficially reusing residuals. Both water treatment plant and wastewater treatment plant residual materials are currently being land applied in Maryland. Two of the companies operating in the region are owned or affiliated with large waste disposal companies: Browning-Ferris Industries (BFI), and Waste Management. The third company, Mobile Dredging and Pumping Company, is part of the Carylon Corporation, which specializes in processing water treatment and wastewater treatment sludges.

Earth Systems Associates, Ltd. (ESA), a Georgia-based firm specializing in soils analysis and land application studies, reviewed the chemical and physical test results from the dewatering pilot test and reviewed the soils within a 50 mile radius of Dalecarlia WTP to provide additional information about the land application option. ESA provided an independent estimate of the land application rates for alum residuals, as well as an independent application-cost estimate. The ESA report is provided in Appendix D.

Offsite storage of up to 90 days production may be required to mitigate weather related constraints to land application.

COST: $25-$30/ton

Telephone discussions with representatives of BFI's and Waste Management's land application companies indicate that costs for hauling and disposal today would be approximately $25 to $30 per ton of material at 30 percent TSS. Land application costs are related to the percentage of solids. As the solids concentration decreases, the land application costs increase due to the cost of transporting a larger volume of materials. The cost estimate includes hauling the materials from the Dalecarlia WTP to land application sites and spreading the materials at the appropriate rates.

The ESA study reported that application costs vary depending on haul distance and local markets for equipment and labor, and recommended a planning cost estimate of $30 to $48 per wet ton. The ESA estimate is a conservative planning estimate, which is somewhat higher than estimates provided by representatives of companies that are currently competing for this type of work.

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-6

LAND APPLICATION - COMMERCIAL

COST:		**$25 - $30 / Wet Ton**
RATING FACTORS		**RATING POINTS**
QUALITY FACTORS		
TRACK RECORD:	15-18 years of experience	1
LONG-TERM POTENTIAL:	Unlimited, can reapply each year to same areas	1
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Liability assumed by contractor	1
SITE SUITABILITY:	Sites identified by contractor Requires 1% of farm or forest lands within 50 miles	1
REGULATORY RISK:	Low in Maryland, Uncertain in Virginia	1
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	Few, land application an accepted practice	1
MANAGEMENT COMPLEXITY:	Contract management, single contract or there may be a separate hauling contract	1
TIME TO IMPLEMENT:	Procurement & negotiation	1
TOTAL POINTS:		**9**

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

Companies contacted during this study, or their predecessors, have been land applying materials for over 15 years.

Long-Term Potential: ***Ranking:*** 1 (Good)

Company representatives were interested in Dalecarlia's residuals, even though the materials will not be produced for another 5 years. All three companies stated that there is sufficient farmland in Maryland to accommodate all of the materials that will be produced.

To verify that the land application company representatives were not being overly optimistic about the amount of land available, soil types in Maryland and Virginia and residual test results were studied by ESA to determine an estimated application rate. The ESA report (Appendix D), estimates that 13.3 wet tons of residuals could be spread over each acre of forest, and 26 wet tons could be spread over each acre of cropland of the soil types existing within a 50 mile radius of Dalecarlia WTP. With optimum crop management, this amount could be increased to 52 wet tons per acre. ESA further determined that the chemical analysis from the pilot tests indicates that the residuals can be reapplied annually to the same areas for at least 20 years. Therefore, the annual residual production of 48,300 wet tons would require approximately 3,700 forested acres, or from 1,000 to 1,900 acres of farmland.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

The test results indicate that the residuals may be considered a non-hazardous material. Application at or below rates at which the plants are able to absorb nitrogen should minimize or prevent nitrate contamination of groundwater. Liability for adverse environmental impacts would be shared with the contractor who selects the individual sites, determines the application rates, and applies the residuals to the land. The Aqueduct would retain part of the liability under CERCLA (Section 3.2) if future cleanup is required at these sites.

Site Suitability: ***Ranking:*** 1 (Low)

The suitability of fields to which the residuals will be applied will be determined by the land application contractor. The soil and crops in each field will need to be analyzed to determine the amount

of nitrogen required and the appropriate amount of residuals to apply, as well as the requirement for any other soil amendments.

The Natural Resources Conservation Service was contacted, and provided data that indicated that, in 1985, in the Maryland counties that lie partially or completely within a 50-mile radius of the Dalecarlia WTP, there are over 1,200,000 acres of woodlands and over 730,000 acres of croplands (see Exhibit 6-4). Land application of residuals will require not more than 3,700 forested acres or 1,900 acres of cropland. Therefore, the area required is less than 1 percent of either the forest or cropland that was available in 1985 in Maryland counties within 50 miles. Even assuming that development will reduce the total amount of cropland and forest that is available, sufficient acreages for land application appear to be available within Maryland, where the governing regulations are less stringent. A similar analysis for Virginia indicates that less than 1 percent of either the cropland or forest within 50 miles would be required. This suggests that it is likely that sufficient area for land application can be accessed by commercial land application contractors to accommodate the expected amount of residuals.

Regulatory Risk: ***Ranking:*** 1 (Low)

Land application of water treatment plant residuals in Maryland is regulated by the Department of Agriculture, as discussed in Section 3.0. Land application is widely practiced by a number of firms in the state. In Virginia, land application is regulated by DEQ, and only one project involving land application of water treatment plant residuals is in operation. With the continued success of the single Virginia operation, it is possible that additional projects will be allowed; however, the permitting process may take an extended amount of time to complete.

Dalecarlia Requirements: ***Ranking:*** 1 (Low)

No changes would be required to the currently planned facilities at Dalecarlia WTP.

Institutional Constraints: ***Ranking:*** 1 (Low)

No extensive institutional constraints are anticipated. Land application of residuals is not expected to be controversial, as long as rural areas continue to be available. Little coordination with other agencies is anticipated.

Management Complexity: ***Ranking:*** 1 (Low)

The management complexity is expected to be low, requiring a contract with a land application company to haul the materials from the plant to application or storage sites. It may be possible to obtain a lower overall cost through a separate competitive bid for the hauling contract. Having two separate contracts would increase the management efforts required from the Aqueduct staff, by adding the requirement to monitor two contracts and the potential requirement to coordinate materials pickups and deliveries.

Time to Implement: *Ranking:* 1 (Low)

Land application by a contractor should be easily and rapidly initiated, by completing a bidding process and negotiating a contract. Land application companies maintain contracts with landowners who are willing to receive materials, and it should be possible to begin land application of the materials shortly after contract execution.

7.3.5 Land Application - Aqueduct-Managed on Federal Lands (see Exhibit 7-7)

GENERAL:

Aqueduct-managed land application is basically the same as commercial land application, with an increased management role and control by the Aqueduct staff. This option assumes that some federally-controlled forests, such as Ft. Belvoir or Quantico, could be found within 50 miles of Dalecarlia WTP and used at no cost to the Aqueduct. Storage pads may also be required at the disposal sites to allow for periods when materials cannot be spread due to weather or other conditions. It is anticipated that a land application company would be contracted to spread the residuals; however, the Aqueduct staff would contract for hauling the materials to the site and all functions other than spreading (including finding suitable sites and arranging for their use).

This option can also be considered as a back-up plan in the event that other disposal methods become unavailable. It might be prudent to maintain a list of sites on federally-controlled lands which could be used if the need arises.

COST:

The hauling and spreading costs should be in the same general range as a long-term contract. Site identification and evaluation costs would also be incurred by the Aqueduct staff. Land application companies indicated that their cost to spread materials on forested lands would be $18 to $20 per ton. This study has calculated that transportation costs for 25 to 50 miles from the plant would range from approximately $7 to $10 per ton. Combined cost for transportation and spreading then would be approximately $25 to $30 per ton.

QUALITY FACTORS:

Track Record: *Ranking:* 1 (Good)

Companies contacted during this study or their predecessors have been land applying materials for over 15 years.

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-7

EVALUATION OF AQUEDUCT MANAGED LAND APPLICATION

COST:		**$25 - $30 / Wet Ton**
RATING FACTORS		**RATING POINTS**
QUALITY FACTORS		
TRACK RECORD:	15-18 years of experience	1
LONG-TERM POTENTIAL:	Unlimited, can reapply each year to same areas	1
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Liability assumed by Dalecarlia	1
SITE SUITABILITY:	Federally controlled sites within 50 miles Need 3,700 acres forest or 1,900 acres farmland	1
REGULATORY RISK:	Low in Maryland, Uncertain in Virginia	1
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	Coordination with other Federal agencies that control required acreage	2
MANAGEMENT COMPLEXITY:	Contract management for spreading contract, and hauling contract, coordinating use of sites	2
TIME TO IMPLEMENT:	Procurement & negotiation for spreading contract, hauling contract interagency coordination	2
TOTAL POINTS:		**12**

Long-Term Potential: ***Ranking:*** 1 (Good)

The company representatives contacted were interested in spreading the residuals on a short-term as well as long-term basis. They could also arrange hauling to government-determined sites if requested. Residuals can potentially be reapplied annually to the same areas on federally-controlled property for at least 20 years, based on the ESA study, Appendix D.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

Significant liability for any adverse environmental impacts would be largely assumed by the Aqueduct, with some liability resting with the agency that owns or controls the land, and the residuals spreading and hauling firms. However, the pilot test's lab results and the ESA study indicated that residuals could be applied without harming the environment. It is not anticipated that environmental impacts would occur due to land application of residuals according to the pilot test results.

Site Suitability: ***Ranking:*** 1 (Low)

Federally-controlled sites were surveyed to determine the amount of forestland and cropland that might be available for land application. The data obtained is included in Exhibit 6-5. Several federal facilities in the area have sufficient acreage. The residuals produced each year could be spread over the same 3,700 forested acres, or from 1,000 to 1,900 acres of farmland, for at least 20 years.

Regulatory Risk: ***Ranking:*** 1 (Low)

Land application of water treatment plant residuals in Maryland is regulated by the Department of Agriculture, as discussed in Section 3.0. Land application is widely practiced by a number of firms in the State. In Virginia, land application is regulated by DEQ, and only one project involving land application of water treatment plant residuals is in operation. With continued success of the single Virginia project, it is possible that additional projects will be allowed; however, the permitting process may take an extended amount of time to complete. As manager of the project, the Aqueduct would have the responsibility of obtaining and maintaining all required permits for the operation.

Dalecarlia Requirements: ***Ranking:*** 1 (Low)

No changes would be required to the currently planned facilities at Dalecarlia WTP.

Institutional Constraints: ***Ranking:*** 2 (Moderate)

More intergovernmental cooperation is required with this option than with land application by a private contractor to privately-owned property. To obtain the required governmental coordination, additional management efforts by the Aqueduct staff would be necessary. This would include informing other agencies about the need for the program, the potential benefits from the nitrogen in the residuals, and assurances that the materials will not degrade the environment. These steps will likely be necessary to receive approval for the use of federally-controlled sites.

Management Complexity: ***Ranking:*** 2 (Moderate)

Management complexity for this option is expected to be moderate with potentially two contracts to administer: one for spreading and another for hauling, and to coordinate the flow of materials. The hauling contractor must meet the needs of the spreading contractor, and all operations will need to be coordinated with the facility providing the land. Coordinating site access for some military sites may be more difficult due to security requirements, further increasing the management complexity.

Time to Implement: ***Ranking:*** 2 (Moderate)

Contracting land application services on Aqueduct-provided land should be easily initiated, within a 3- to 6-month time frame, by completing a bidding process and negotiating a contract, provided that sites have been previously identified and their use approved. However, arrangements must be made for federal land availability. It should be possible to coordinate facility use and obtain land application service by the time the dewatering facilities are constructed.

This option could also be accomplished by in-house forces using equipment purchased by the Aqueduct. Discussions with the Aqueduct staff have indicated that it would be unlikely that they would do the land application, therefore this ranking was based on a contract operation which would maintain Aqueduct staff management and control.

7.3.6 Barging to Dredge Disposal Area - Blue Plains (see Exhibit 7-8)

GENERAL:

Dewatered residuals at approximately 30 percent Total Suspended Solids (TSS) content would be transported by truck from Dalecarlia WTP to Blue Plains Wastewater Treatment Plant's Potomac River barge moorage facility. Residuals would then be loaded onto barges for transporting to a dredge spoil disposal location.

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-8

EVALUATION OF BARGING TO DREDGE DISPOSAL AREA - BLUE PLAINS DOCK SITE - 30% TSS

COST: (Based on an Annuay Quantity of 190 cy/day) **$75 - $85 / Dry Ton**
$20 - $25 / Wet Ton

RATING FACTORS		RATING POINTS
QUALITY FACTORS		
TRACK RECORD:	Good for disposal of dredge spoils	1
LONG-TERM POTENTIAL:	Good, Poplar Island site life greater than 10 years assume dredge spoils site will always be available	1
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Low	1
SITE SUITABILITY:	Blue Plains dock site acceptable Disposal site may be risky	2
REGULATORY RISK:	Low, providing disposal permit issued	1
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	Blue Plains approval to use barge dock site and disposal site approval	2
MANAGEMENT COMPLEXITY:	Contract hauling, contract barging, Blue Plains contract for use of site, Contract for disposal	2
TIME TO IMPLEMENT:	Poplar Island ready 1997 or 1998 Disposal Contract, Hauling Contract	2
TOTAL POINTS:		**14**

EXHIBIT 7-9

Dalecarlia Residual Disposal Study
Evaluation of Disposal of Dewatered Residuals with Dredge Spoils
From Blue Plains at 30% Solids
(Based on an Annual Quantity of 190 cy/day)

Development and Installation:	$ 53,200/yr.*
Truck Transportation:	$ 400,900/yr.
Contract Barge Disposal Hauling:	$ 500,000/yr.
Disposal Tipping Fees:	$ 144,900-$241,500/yr.
Total Cost:	$1,099,000-$1,195,600/yr.

* Based on 20-year financing at a 7 percent annual interest rate.

Unit Cost per wet ton: $\frac{\$1,099,000 \text{ to } \$1,195,600}{(190 \text{ cy/day})\ (260 \text{ day/yr.})}$ = $22 tp $24/ton

Rounded off to $20-$30/wet ton

Unit Cost per dry ton: $\frac{\$1,099,000 \text{ to } \$1,195,600}{(190 \text{ cy/day}\ (.30)\ (260 \text{ day/yr.})}$ = $74 to $81/dry ton

Assumptions:

- Blue Plains Wastewater Treatment Plant is within a 25-mile radius of Dalecarlia WTP.
- Modifications and renovations to the Blue Plains Moorage Facility minimum.
- Barge Disposal will be handled by contract at one 2,000-ton barge biweekly.
- Disposal Tipping Fees includes the cost for on-site assistance of unloading barges (hydraulically).

EXHIBIT 7-10

Dalecarlia Residuals Disposal Study
Evaluation of Disposal of Dewatered Residuals with Dredge Spoils
From Blue Plains at 30% Solids
(Based on an Annual Quantity of 355 cy/day)

Development and Installation:	$ 53,200/yr.
Truck Transportation:	$ 691,600/yr.
Contract Barge Disposal Hauling:	$1,040,000/yr.
Disposal Tipping Fees:	$ 296,400-$494,000/yr.
Total Cost:	$2,081,200-$2,278,800/yr.

* Based on 20-year financing at a 7 percent annual interest rate.

Unit Cost per wet ton: $\frac{\$2,081,200 - \$2,278,800}{(355\ cy/day)(260\ day/yr.)}$ = $23-$25/ton

Rounded off to $20-$25/wet ton

Unit Cost per dry ton: $\frac{\$2,081,200 - \$2,278,800}{(355\ cy/day)(.30)(260\ day/yr.)}$ = $75-$82/ton

Rounded off to $75-$85/dry ton

Assumptions:

- Blue Plains Wastewater Treatment Plant is within a 25-mile radius of Dalecarlia WTP.
- Modifications and renovations to the Blue Plains Moorage Facility minimum.
- Barge Disposal will be handled by contract at one 2,000-ton barge per week.
- Disposal tipping fees includes the cost for on-site assistance of unloading barges (hydraulically).

COST:	(190 cy/day)	(355 cy/day)
	$20-$30/wet ton	$20- 25/wet ton
	$75-$85/dry ton	$75-$85/dry ton

Cost analysis include truck transportation of residuals from the Dalecarlia WTP to Blue Plains, loading onto barges, transporting by water to a dredged spoils disposal site, disposal of the residuals, and associated disposal fees. Daily quantities of 190 cy/day and 355 cy/day were used for estimation of unit cost, respectively. A dry ton unit cost, was included to compare disposal costs with a Georgetown loading facility transporting a slurry residual. See Exhibit 7-9 and 7-10 for cost breakdown.

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

Barging of dredge spoils, wastewater biosolids and materials cargo has been ongoing for greater than 15 years.

Long-Term Potential: ***Ranking:*** 1 (Good)

The Poplar Island Restoration Project is expected to have a useful disposal life of 10 to 15 years. The Maryland Port Administration and the Corps of Engineers are evaluating potential future sites for dredged materials. Historically, a dredge spoils disposal site has been continuously available.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

The moorage facility at Blue Plains exists and barging is a widely-accepted practice for transportation. A disposal facility will already have obtained basic permits and will need only federal and state approval for the additional type of material.

Site Suitability: ***Ranking:*** 2 (Moderate)

The Blue Plains Wastewater Treatment Plant already has an accessible moorage facility. A disposal facility will need to be located and access negotiated with the owner (private, Maryland Port Administration, or Norfolk Corps of Engineers).

Regulatory Risk: ***Ranking:*** 1 (Low)

Disposal permit modification will be needed.

Dalecarlia Requirements: *Ranking:* 1 (Low)

No design changes will be required to the currently planned dewatering and loading facilities at Dalecarlia WTP.

Institutional Constraints: *Ranking:* 2 (Moderate)

An agreement will be required with the Washington D.C. government, owner of Blue Plains Wastewater Treatment Plant, for the moorage facility usage. A disposal location and stated usage will need to be negotiated.

Management Complexity: *Ranking:* 2 (Moderate)

Management of contracts will be necessary for truck transportation of residuals from Dalecarlia WTP to Blue Plains. Blue Plains site use, barging and disposal of residuals.

Time to Implement: *Ranking:* 2 (Moderate)

A request for proposal will be required as will negotiation of contracts. Any modifications required for Blue Plains Moorage Facility should be minimum. Poplar Island Restoration Project is expected to be operational by late 1997 or early 1998.

7.3.7 Barging to Dredge Disposal Area - Georgetown (see Exhibit 7-11)

GENERAL:

Slurry residuals at a 2.5 percent± solids content would be transported through a force main pipeline from Dalecarlia WTP along the former Baltimore and Ohio Rail right-of-way, now a hiker/biker trail to a Georgetown Waterfront moorage facility. Residuals would then be transported by tanker barge to a dredge spoil disposal location.

COST:	(190 cy/day) $355 to $365/dry ton	(355 cy/day) $295 to $305/dry ton

Cost analysis include construction of a force main pipeline with a pumping station at Dalecarlia, a moorage facility along the Georgetown Waterfront, transporting of slurry residuals by tanker barge from Georgetown Waterfront to a dredged spoils disposal site, disposal of residuals and associated disposal fees. Daily quantities of 190 cy/day and 355 cy/day were used for estimating unit cost,

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-11

EVALUATION OF BARGING TO DREDGE DISPOSAL AREA - GEORGETOWN SITE - 2.5 % TSS (Slurry)

COST: (Based on an Annual Quantity of 190 cy/day) **$355 - $365 / Dry Ton**
$105 - $110 / Wet Ton*

RATING FACTORS		RATING POINTS
QUALITY FACTORS		
TRACK RECORD:	Good for disposal of dredge spoils	1
LONG-TERM POTENTIAL:	Good, Poplar Island site life greater than 10 years assume dredge spoils site will always be available	1
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Low	1
SITE SUITABILITY:	NPS, Georgetown Master Plan, Community opposition may be high Disposal site may be difficult to obtain	2
REGULATORY RISK:	Low, providing disposal permit issued	1
DALECARLIA REQUIREMENTS:	Planned dewatering facility not required	1
INSTITUTIONAL CONSTRAINTS:	NPS approval for pipeline, Georgetown Master Plan approval, and disposal site approval	3
MANAGEMENT COMPLEXITY:	Pipeline operation, contract barging, Barge procurement, Contract for disposal No readily available disposal alternative	2
TIME TO IMPLEMENT:	Poplar Island ready 1997 or 1998 Disposal Contract, Barge and Barging Contract	2
TOTAL POINTS:		**15**

* Converted to 30% solids for comparison.

EXHIBIT 7-12

Dalecarlia Residuals Disposal Study
Evaluation of Disposal of Slurry Residuals with Dredge Spoils
From Georgetown at 2.5% Solids
(Based on an Annual Quantity of 190 cy/day)

Force Main Pipeline Construction:	$ 452,750/yr*
Pumping Station Construction:	$ 129,635/yr.*
Moorage Facility Construction:	$ 210,415/yr.*
Tanker Barges:	$3, 869,700/yr.*
Contract Barge Disposal Hauling:	$1,872,000/yr.
Disposal Tipping Fees:	$ 148,200-$251,940/yr.
Total Cost:	$6,682,700 - $6,786,440/yr.

* Based on 20-year financing at a 7 percent annual interest rate.

Unit Cost per dry ton:

$$\frac{\$6{,}682{,}700 \text{ to } \$6{,}786{,}440}{(190 \text{ cy/day})(0.3)(260 \text{ day/yr.})} = \$451 \text{ to } \$458/\text{ton}$$

Rounded off to $450-$460/dry ton

Minus $1,400,000/yr. For no construction of Dewatering Facility

$$\frac{\$1{,}400{,}000/\text{yr.}}{(190 \text{ cy/day})(0.3)(260 \text{ day/yr.})} = \$95/\text{dry ton}$$

Rounded off to $355-$365/dry ton

Assumptions:

- Force main pipeline will run along the 4.5-mile hiker/biker trail from Dalecarlia WTP to the Key Bridge.
- The pumping station will be operational 8 hours per day.
- The moorage facility at Georgetown will be a permanent structure.
- Two 1 million gallon tanker barges will be purchased for the disposal of the residual slurry.
- Tanker barge disposal will be handled by contract at two and a half trips per week.
- Disposal tipping fees includes the cost for on-site assistance of unloading barges (hydraulically).

EXHIBIT 7-13

Dalecarlia Residuals Disposal Study
Evaluation of Disposal of Slurry Residuals with Dredge Spoils
From Georgetown at 2.5% Solids
(Based on an Annual Quantity of 355 cy/day)

Force Main Pipeline Construction:	$ 452,750/yr.*
Pumping Station Construction:	$ 129,635/yr.*
Moorage Facility Construction:	$ 210,415/yr.*
Tanker Barges:	$5,804,500/yr.*
Contract Barge Disposal Hauling:	$2,620,800/yr.
Disposal Tipping Fees:	$ 296,400 - $503,880/yr.
Total Cost:	$9,514,500 - $9,722,000/yr.

* Based on 20-year financing at a 7 percent annual interest rate.

Unit Cost per dry ton:

$$\frac{\$9{,}514{,}500 \text{ to } \$9{,}772{,}000}{(355 \text{ cy/yr.})(0.3)(260 \text{ day/yr.})} = \$344 - \$353/\text{ton}$$

Rounded off to $345-$355/dry ton

Minus $1,400,000/yr. For no construction of Dewatering Facility.

$$\frac{\$1{,}400{,}000/\text{yr.}}{(355 \text{ cy/day})(0.3)(260 \text{ day/yr.})} = \$50/\text{dry ton}$$

Rounded off to $295 - $305/dry ton

Assumptions:

- Force main pipeline will run along the 4.5-mile hiker/biker trail from Dalecarlia WTP to the Key Bridge.
- The pumping station will be operational 8 hours per day.
- The moorage facility at Georgetown will be a permanent structure.
- Three 1 million gallon tanker barges will be purchased for the disposal of the residual slurry.
- Tanker barge disposal will be handled by contract at three and a half trips per week.
- Disposal tipping fees includes the cost for on-site assistance of unloading barges (hydraulically).

respectively. A dry ton unit cost was used to compare disposal costs with the Blue Plains Wastewater Treatment Plant Moorage facility. See Exhibit 7-12 and 7-13 for cost breakdown.

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

Barging of dredge spoils has been ongoing for greater than 15 years.

Long-Term Potential: ***Ranking:*** 1 (Good)

The Poplar Island Restoration Project is expected to have a useful disposal life of 10 to 15 years. The Maryland Port Administration and the Corps are evaluating potential future sites for dredge spoils. Historically, a dredge spoils site has been continuously available.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

The moorage facility can possibly be built on existing Washington, D.C. public works property and pumped directly into a tanker barge. A disposal facility will already have obtained basic disposal permits and will need only federal and state approvals for this additional type of material.

Site Suitability: ***Ranking:*** 2 (Moderate)

The National Park Service controls the Baltimore and Ohio Hiker/Bike trail, the Georgetown Master Plan may need to be amended, and community opposition against the use of the Hiker/Biker trail and Georgetown Waterfront should be expected. A disposal facility will need to be identified and access negotiated with the owner (private, Maryland Port Administration/Corps of Engineers, or Norfolk Corps of Engineers).

Regulatory Risk: ***Ranking:*** 1 (Low)

Disposal permit modification will need to be issued.

Dalecarlia Requirements:

The dewatering and loading facilities planned for a 30 percent ± residual solid will not be required with an annual savings of $ 1,400,000 for 20 years. Disposal of slurry residuals will reduce the dewatering facility requirements and cost.

Institutional Constraints: *Ranking:* 3 (High)

Negotiations for the force main pipeline right-of-way will be required with the National Park Service, moorage facility location will have to go through the Washington, D.C. Master Planning board. A disposal location and an agreement will need to be negotiated.

Management Complexity: *Ranking:* 2 (Moderate)

Initial management for force main pipeline and moorage facility construction. Contract management for barging and disposal of residuals. Monitoring of force main pipeline and booster pumping station operations.

Time to Implement: *Ranking:* 2 (Moderate)

Negotiations with the National Park Service, Georgetown Master Plan Board and Community Groups are expected to be time consuming. A design and construction time period of at least 2 years will be required. Poplar Island Restoration Project is expected to be operational by late 1997 or early 1998.

7.3.8 Manufacturing

7.3.8.1 Background

Several manufacturing options identified in previous studies were investigated as part of this study to identify options which could provide a beneficial use for the residual materials.

7.3.8.2 Brick Manufacturing (see Exhibit 7-14)

GENERAL:

One option identified in a previous study was a brick manufacturing company (Cherokee Sanford Group, formerly Maryland Clay Products) that might be able to use the residuals as an ingredient in making bricks. Discussions with representatives of the company revealed the company has permits for decontaminating soils that are highly contaminated, such as soils exposed to petroleum products, but do not have the permits for processing residuals. The company is interested in processing the residual materials and is applying to the Maryland Department of the Environment (MDE) for the appropriate permits. The representative stated that the company is capable of processing "significantly more" than the 48,000 cubic yards of residuals expected to be produced annually at Dalecarlia WTP.

DALECARLIA RESIDUALS DISPOSAL STUDY

EXHIBIT 7-14

EVALUATION OF BRICK MANUFACTURING REUSE DISPOSAL

COST: **$12 - $35 / Wet Ton**

RATING FACTORS		RATING POINTS
QUALITY FACTORS		
TRACK RECORD:	Good	1
LONG-TERM POTENTIAL:	Satisfactory	2
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Low	1
SITE SUITABILITY:	Site has been in use for numerous years 25 mile hauling distance	1
REGULATORY RISK:	Moderate	2
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	None	1
MANAGEMENT COMPLEXITY:	Low	1
TIME TO IMPLEMENT:	Low	1
TOTAL POINTS:		**11**

COST: $12 - $35/wet ton

A Cherokee Sanford representative estimated the tipping fee to be between $5 and $28 per ton. A more concise estimate can be made when residual material becomes available for their examination. They are located approximately 25 miles from Dalecarlia WTP which would add hauling cost (calculated at $7 per ton).

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

The company representative contacted indicated they have been manufacturing bricks from contaminated soil for "several years," and the alum residual material should not present problems.

Long-Term Potential: ***Ranking:*** 2 (Satisfactory)

After the permit for processing residuals is received, brick manufacturing is expected to provide a continuing opportunity for reuse of residuals.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

Placing residuals in brick would immobilize any contaminants which may be present.

Site Suitability: ***Ranking:*** 1 (Low)

Suitability of the site must be determined by the brick manufacturer. Site has been in use for manufacturing bricks for numerous years.

Regulatory Risk: ***Ranking:*** 2 (Moderate)

The regulatory risk would be assumed by the brick company, which would be responsible for obtaining and complying with required permits. If a permit from MDE to process residuals (industrial by-products) is not received this option is not viable.

Dalecarlia Requirements: ***Ranking:*** 1 (Low)

No changes would be required to the currently planned facilities at Dalecarlia WTP.

Institutional Constraints: ***Ranking:*** 1 (Low)

Few institutional constraints are anticipated. Brick manufacturing would be an acceptable use of the residuals and is not expected to be controversial. Little or no coordination with other agencies should be required.

Management Complexity: ***Ranking:*** 1 (Low)

Management complexity for this option is expected to be low, requiring only a single contract for hauling the residuals from the Dalecarlia WTP and using them to manufacture bricks. It may be possible to obtain a lower overall cost through a separate competitive bid for hauling, but this would increase the contract management efforts required.

Time to Implement: ***Ranking:*** 1 (Low)

Initiation of this option should be quite rapid, if adequate capacity and a solid back-up disposal option are assured.

7.3.8.3 Topsoil Blenders (see Exhibit 7-15)

GENERAL:

Blending residuals material with other soils to produce high quality topsoil is another beneficial reuse. Including residuals in a topsoil takes advantage of the water-holding ability and the nitrogen contained in the residuals.

COST: $30 - $35/wet ton

One company was contacted that is interested in using the residuals as an ingredient in blended topsoil. They are accepting similar materials for a tipping fee of $10 per ton. They are not capable of processing all the residuals which will be produced, and can process only about 20 percent of the expected annual production. They are also located over 100 miles away from Dalecarlia WTP which would add hauling cost (calculated at $20 to $25 per ton).

DALECARLIA RESIDUAL DISPOSAL STUDY

EXHIBIT 7-15

EVALUATION OF MANUFACTURING REUSE - TOPSOIL BLENDERS

COST: **$30 - $35 / Wet Ton***

RATING FACTORS		RATING POINTS
QUALITY FACTORS		
TRACK RECORD:	Good	1
LONG-TERM POTENTIAL:	Process potential good, production capacity may increase in future	2
RISK FACTORS		
ENVIRONMENTAL IMPACTS:	Low	1
SITE SUITABILITY:	Suitability limited by capacity and 110 mile hauling distance	3
REGULATORY RISK:	Low	1
DALECARLIA REQUIREMENTS:	Planned residuals loading facility	1
INSTITUTIONAL CONSTRAINTS:	None	1
MANAGEMENT COMPLEXITY:	Facility only able to accept 10% of annual production Multiple partial options would significantly increase management requirements	3
TIME TO IMPLEMENT:	Currently able to process small portion of production	1
TOTAL POINTS:		**14**

* Costs for comparison only, because the facility cannot accept all residuals produced. This option may have better potential in the future, if additional soil blenders can be found. Currently this option is not desirable due to the limited capacity for disposal. Several small disposal options should be considered only if options which can process all of the residuals produced are no available.

QUALITY FACTORS:

Track Record: ***Ranking:*** 1 (Good)

The company representative contacted indicated that companies have been blending topsoil for more than 10 years, and they have been using alum sludges from water treatment plants for "several years."

Long-Term Potential: ***Ranking:*** 2 (Satisfactory)

Blending topsoil appears to have a long-term future. The company contacted indicated a desire to move into the metropolitan Washington, D.C. area sometime in the future, but provided no specific dates.

RISK FACTORS:

Environmental Impacts: ***Ranking:*** 1 (Low)

Companies participating in blending topsoil monitor the chemical and physical properties of the products to ensure product marketability.

Site Suitability: ***Ranking:*** 3 (High)

This one company must be considered unsuitable because it does not have sufficient capacity to process all of the residuals expected. The long hauling distance to the facility further decreases the suitability of this option.

Regulatory Risk: ***Ranking:*** 1 (Low)

The regulatory risk would be assumed by the blending company, which would be responsible for obtaining necessary permits and complying with appropriate product regulations.

Dalecarlia Requirements: ***Ranking:*** 1 (Low)

No changes would be required to the currently planned facilities at Dalecarlia WTP.

Institutional Constraints: ***Ranking:*** 1 (Low)

Few institutional constraints are anticipated. Topsoil blending would be an acceptable use of the residuals and is not expected to be controversial. Little or no coordination with other agencies should be required.

Management Complexity: *Ranking:* 3 (High)

The inability of a single topsoil blender to use all of the residuals expected to be produced prevents this from being a viable option. This volume limitation would require the Aqueduct staff to identify several topsoil blenders each of which could process a portion of the residuals, to manage disposition of all of the residuals. If significant topsoil blending capacity is developed closer to Dalecarlia WTP, this option should be reconsidered.

Time to Implement: *Ranking:* 1 (Low)

Initiation of this option should be quite rapid if a market which can process all materials produced can be identified.

7.3.8.4 Summary

Manufacturing opportunities present a desirable option which cannot be confirmed at this time. The two identified possible manufacturing re-uses for residuals depend upon either a permit approval for brick manufacturing or the increase in market area for a topsoil blending operation. Either of these options represent a "higher-use" than landfilling and also may result in a lower overall cost for "disposal" of the residuals. Additional investigation in the manufacturing uses for residuals are warranted prior to beginning residual production.

7.3.9 Summary of Disposal Option Rankings

Option rankings are provided on a single sheet as Exhibit 7-16. Total ranking points ranged from a low of 9, the lowest possible, to a high of 17. Cost estimates were not used as a ranking factor, but are included on the summary sheet.

In addition to those options identified in previous studies and more thoroughly investigated by this study, additional disposal alternatives may surface in the future. For example, the possibility of disposing the residual materials at a waste-to-energy residual disposal facility came to light while this report was being prepared. No additional information is available other than wastewater treatment biosolids are being processed at the Fairfax County waste to energy facility. It is likely that other disposal opportunities may be forthcoming in the future.

Exhibit 7-16
Dalecarlia Residuals Disposal Study
Final Short-List Criteria

		QUALITY FACTORS		RISK FACTORS							
Option	Cost/Unit (Estimated)	Track Record	Long-Term Potential	Environmental Impacts	Site Suitability	Regulatory Risk	Dalecarlia Requirements	Institutional Constraints	Management Complexity	Time to Implement	Total Points
LAND APPLICATION											
-Commercial	$25 - $30 / TON	GOOD 1	GOOD 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	9
-Aqueduct Managed	$25 - $30 / TON	GOOD 1	GOOD 1	LOW 1	LOW 1	LOW 1	LOW 1	MODERATE 2	MODERATE 2	MODERATE 2	12
LANDFILLING											
-Commercial	$ 40 - $60 / TON	GOOD 1	GOOD 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	LOW 1	9
- Public	$ 35 - 40 / TON	GOOD 1	SATISFACTORY 2	LOW 1	LOW 1	LOW 1	LOW 1	MODERATE 2	MODERATE 2	MODERATE 2	13
- Aqueduct-Owned Monofill	$ 80 - $85/ TON (at 190 CY/DAY)	SATISFACTORY 2	GOOD 1	MODERATE 2	MODERATE 2	MODERATE 2	LOW 1	MODERATE 2	HIGH 3	MODERATE 2	17
BARGING											
- Blue Plains	$20 - $25 / WET TON $75 - $85 / DRY TON (at 190 CY/DAY)	GOOD 1	GOOD 1	LOW 1	MODERATE 2	LOW 1	LOW 1	MODERATE 2	MODERATE 2	MODERATE 2	13
- Georgetown 2.5% TSS	$105 - $110/ TON $355 - $365 / DRY TON (at 190 CY/DAY)	GOOD 1	GOOD 1	LOW 1	MODERATE 2	LOW 1	DEWATERING NOT REQUIRED	HIGH 3	MODERATE 2	MODERATE 2	13
MANUFACTURING											
- Brick Manufacturing	$ 12 - 35 / TON	GOOD 1	SATISFACTORY 2	LOW 1	LOW 1	MODERATE 2	LOW 1	LOW 1	LOW 1	LOW 1	11
- Topsoil Blenders *	$ 30 - 35 / TON	GOOD 1	SATISFACTORY 2	LOW 1	HIGH 3	LOW 1	LOW 1	LOW 1	HIGH 3	LOW 1	14

* No single company available to process all residuals produced

7.4 SUMMARY OF RATIONALE FOR ELIMINATION OF OPTIONS

Upon detailed analysis of the above listed options two options have been eliminated: the option of barging non-dewatered slurry from a dock site in the Georgetown area of Washington, D. C. to a dredge spoils disposal area, and monofilling. Dredge disposal of slurry was eliminated due to the anticipated difficulty in coordinating such a use with numerous local and federal agencies, coupled with the calculated high cost of developing the required pipeline and special barges. Monofilling was also eliminated because of its high cost, technical and management complexity. The remaining viable options are listed in Exhibit 7-17.

7.5 SHORT-LISTED OPTIONS

The short-list of viable options as presented in Section 7.4 are grouped into three management approaches (refer to Section 5.0). The include contract disposal, Dalecarlia-controlled disposal and disposal via partnership. (See Summary of Options by Management Approach, Exhibit 5-1.)

7.5.1 Contract Disposal

The contract disposal option includes reuse as well as disposal management methods, the common element being the management via contract. All types of contract disposal and reuse (landfilling, land application, and manufacturing) could be included in a single procurement. This option would probably include transport and hauling by a contractor, whereby transportation could be contracted separately, and/or performed by the Aqueduct. (See Appendix E for sample RFP's and private hauling contracts).

7.5.2 Disposal via Partnership

Cooperative governmental efforts include co-disposal of dewatered residuals with dredge spoils at a Corps or Maryland Port Authority (MPA) operated site. This would require the cooperative efforts of the Corps or MPA dredge spoils site to accept the materials, and the Blue Plains WWTP to provide access to a barge docking site.

EXHIBIT 7-17

SUMMARY OF VIABLE ALTERNATIVES BY MANAGEMENT APPROACH

MANAGEMENT APPROACH	TECHNOLOGY	RATING*	ESTIMATED COST RANGE**
1. Contract Disposal	Land Application (Private)	9	$25-30/ton
	Sanitary Landfill (Private)	9	$40-50/ton
	Sanitary Landfill (Public)	13	$35-40/ton
	Manufacturing (Brick)	11	$12-35/ton
2. Aqueduct-Controlled Disposal	Land Application	12	$25-30/ton
3. Disposal via Partnership	Disposal of Dewatered Residuals with Dredge Spoils	13	$20-25/ton

Notes:

* Low ratings indicate higher feasibility.

** Cost estimates based on preliminary contacts with potential contractors. Actual negotiated costs may vary.

7.5.3 Aqueduct-Controlled Disposal

The third option includes those programs with a greater level of management (including ownership) by the Aqueduct. These would provide the greatest degree of control over disposal options but require the most complex level of management by the Aqueduct staff.

Section 8 outlines a preliminary implementation plan for each of the final short-listed options. Contract disposal options are treated as a group because of the likely similarity of implementation approach.

8.0 IMPLEMENTATION PLANS

The complexity of each implementation plan is dictated by the disposal option selected. This section outlines implementation options for each of the three most-viable options, short-listed in Section 7.0. These include:

- Contract disposal
- Aqueduct-controlled disposal
- Disposal via partnership

The most complex plan would be the development of a barging operation and the least complex would be to contract for disposal. The following sections provide information about the processes involved, and a schedule to implement each option.

It should be emphasized that the schedules in this section are preliminary. Actual time periods will depend on the actions of the various regulatory agencies. The planning steps and sequencing are valid for the scenarios presented, but the time estimates will probably require adjustment. Similarly, actual costs may vary significantly from the estimates in this report, according to details of final system design and field conditions.

8.1 CONTRACT DISPOSAL

If the contract disposal option is pursued, the following implementation steps would be necessary.

8.1.1 IFB Development

Step one would be to prepare an Invitation for Bid (IFB), and draft contract requirements. The IFB must identify the degree of service that is desired, and answer the following questions: Would transportation of materials be included in the contract, or would transportation be contracted separately? Would any type of disposal or reuse be prohibited? Would any type of disposal or reuse be preferred over other methods? How long a period will the contract cover? (A five year period is usually required to amortize equipment costs).

Also necessary in the IFB is a clear identification of the amount and type of material to be disposed. The prospective contractors will need to know the quantity of residuals that will be produced,

how production will vary through the year, what hours of operation will be allowed, what methods of loading will be provided, and what equipment and personnel will be required to accomplish the loading. For transportation of materials they will need to know any routing requirements or prohibitions. The IFB must contain all information necessary to allow the bidder to identify the total cost of providing disposal services.

Once the IFB and contract requirements have been drafted and reviewed, step two would be to provide a draft copy to potential bidders, to obtain their comments. Prospective vendors may be able to identify ideas or methods that should be considered or additional information that is required to improve the overall quality of bids that will be received. After responding to the comments, the IFB and contract can be publicly advertised. Prospective bidders for contract disposal would include all landfills in the area, both commercial and county-operated, waste hauling and disposal companies, land application contractors, brick manufacturers, and topsoil blenders.

8.1.2 Bid Evaluation and Award

After receiving and evaluating bids, potential vendors can be interviewed and an award (or awards) made. After contract execution, the Aqueduct staff's responsibility would be to monitor the contractor to verify that the terms of the contract are satisfactorily being met. If needs change or if vendor performance is unsatisfactory, the contract must state the conditions that could cause the contract to be renegotiated upon its annual renewal or a new procurement conducted.

8.1.3 Schedule

An estimate of the time required to initiate the disposal contract is:

ACTION	TIME REQUIRED
Prepare IFB	4 months
Release IFB and Receive Bids	2 months
Evaluate Bids	1 month
Negotiate contract (s) and Issue Notice to Proceed	4 months

To determine when actions need to be initiated, the need date for disposal operations is determined and the time requirements are used to work backwards to determine starting dates for each action. It is assumed that the disposal operations will begin when the dewatering facilities become

operational (for this report's purposes, May 1999 was used). To support disposal operations beginning in May 1999, allowing the selected contractor 2 months preparation time would require that the contract be awarded by March 1999. If a total of 11 months is required to prepare the IFB, advertise the IFB and receive bids, evaluate bids and to negotiate and award the contract, then IFB preparation should begin no later than April 1998 (see Exhibit 8-1).

8.1.4 Cost Estimate

For the disposal contract option, costs have been determined from several sources: landfill operators, land application companies, and a manufacturing company.

Costs estimated by commercial land application companies were in the range of $25 to $30 per ton for transportation from the Dalecarlia WTP and spreading the residuals. This included all arrangements with landowners and determining land application rates.

Cost estimates for commercial landfilling of the materials ranged from $40 to $60 per ton based on tipping fee and hauling cost estimates provided by several of the major waste disposal companies. Tipping fees range from $28 to $40 per ton, and transportation costs range from $15 to $22 per ton.

The estimated cost of disposal in public landfills is $35 to $40 per ton, based on the current tipping fee for C&D debris at the Prince George's County, Maryland landfills ($29/ton), plus the estimated hauling costs of $9 to $11 per ton.

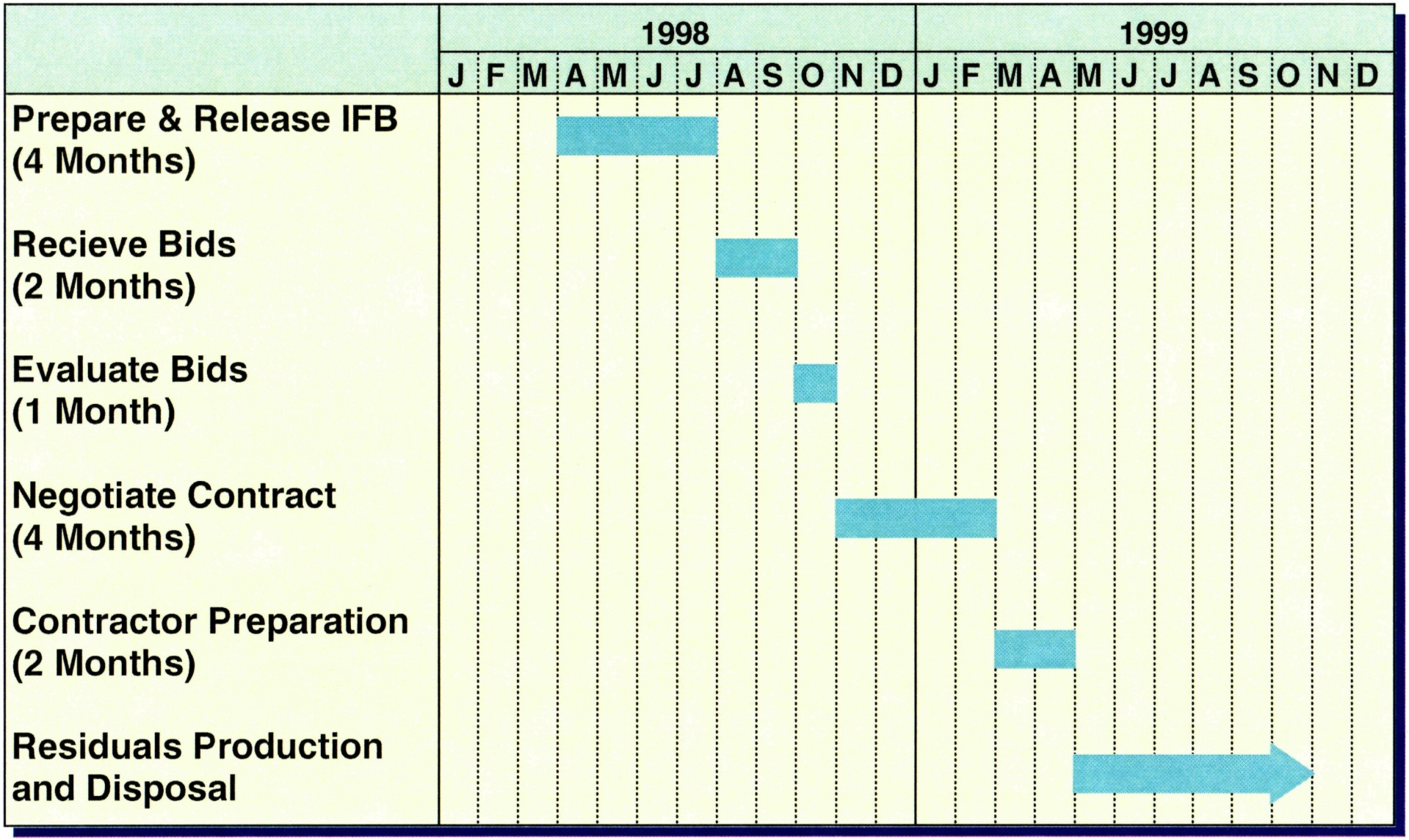
The cost to use the materials in manufacturing was estimated to be $30 to $35 per ton, including hauling.

OPTION	DISPOSAL AND HAULING COST ($ / TON)
Commercial Land Application	$25 - $30
Commercial Landfill	$40 - $60
Public Landfilling *	$35 - $40
Manufacturing **	$30 - $35

* Possible option depending on waste acceptance policies.
** Possible future option if processing capacity increases.

Exhibit 8-1

Contract Disposal Implementation Schedule



8.2 CO-DISPOSAL WITH DREDGE SPOILS - DEWATERED RESIDUALS

The complexity of implementation increases with this more complex option. Two contracts will be required for transportation of the residuals, one for hauling by truck and another for hauling by barge. Approval for use of two sites will also be required, one for the disposal site and another for the barge docking site.

8.2.1 Implementation Process

The requirement for obtaining approval to use two sites increases the potential for fatal flaws as well as the complexity of implementing and managing this option. Prior to entering into any discussions or agreements with contractors to transport the materials, it would be prudent to have approval to use a disposal site and a barge docking site. Unlike other options, alternative disposal sites are not easily identified. It is assumed that the Corps will continually operate disposal sites for dredge spoils, developing new sites as existing sites are closed. The possibility that a policy decision may not allow accepting materials other than dredge spoils, places this option at risk.

Another coordination item required prior to IFB development or release is obtaining a suitable docking site for loading the material onto the barges. The use of the dock at the Blue Plains WWTP appears to be feasible; however, changes in site utilization by Blue Plains could also put this option at risk.

The IFB for trucking the materials from Dalecarlia WTP to the barge loading dock site will be similar to trucking for disposal or land application. The IFB must identify the amount of material to be transported, and the variation to the material production, the operational schedule at Dalecarlia WTP and at the barge dock, and routing requirements or prohibitions. The IFB should contain everything the proposer needs to know to make the best cost estimate for the required tasks.

In developing the IFB for barging the materials to the disposal site, similar information will be required. The quantity of materials to be barged, and the production quantity variation through the year will need to be known. The method of loading materials and unloading the material at the disposal site must also be determined, as well as the responsibility for developing, maintaining and operating those facilities. If special barges are required for this operation, the cost of developing them may put this option at risk. Due to limited duration contracts, it may be difficult for a contractor to recover equipment costs for special use equipment, in less than a 5-year contract period. For developing specialized equipment additional provisions may be required.

Coordinating the operating schedules of the two contractors would probably be the responsibility of the Aqueduct staff.

8.2.2 Schedule

An estimate of the time required to accomplish actions is:

ACTION	TIME REQUIRED
Obtain approval to use dredge spoils disposal area - Corps	6 to 24 months
Obtain approval to use barge docking site - Blue Plains WWTP	6 to 18 months
Prepare Barging IFB	6 months
Prepare Trucking IFB	2 months
Release IFB and receive bids	2 months
Evaluate bids	1 month
Negotiate contract (s)	4 months

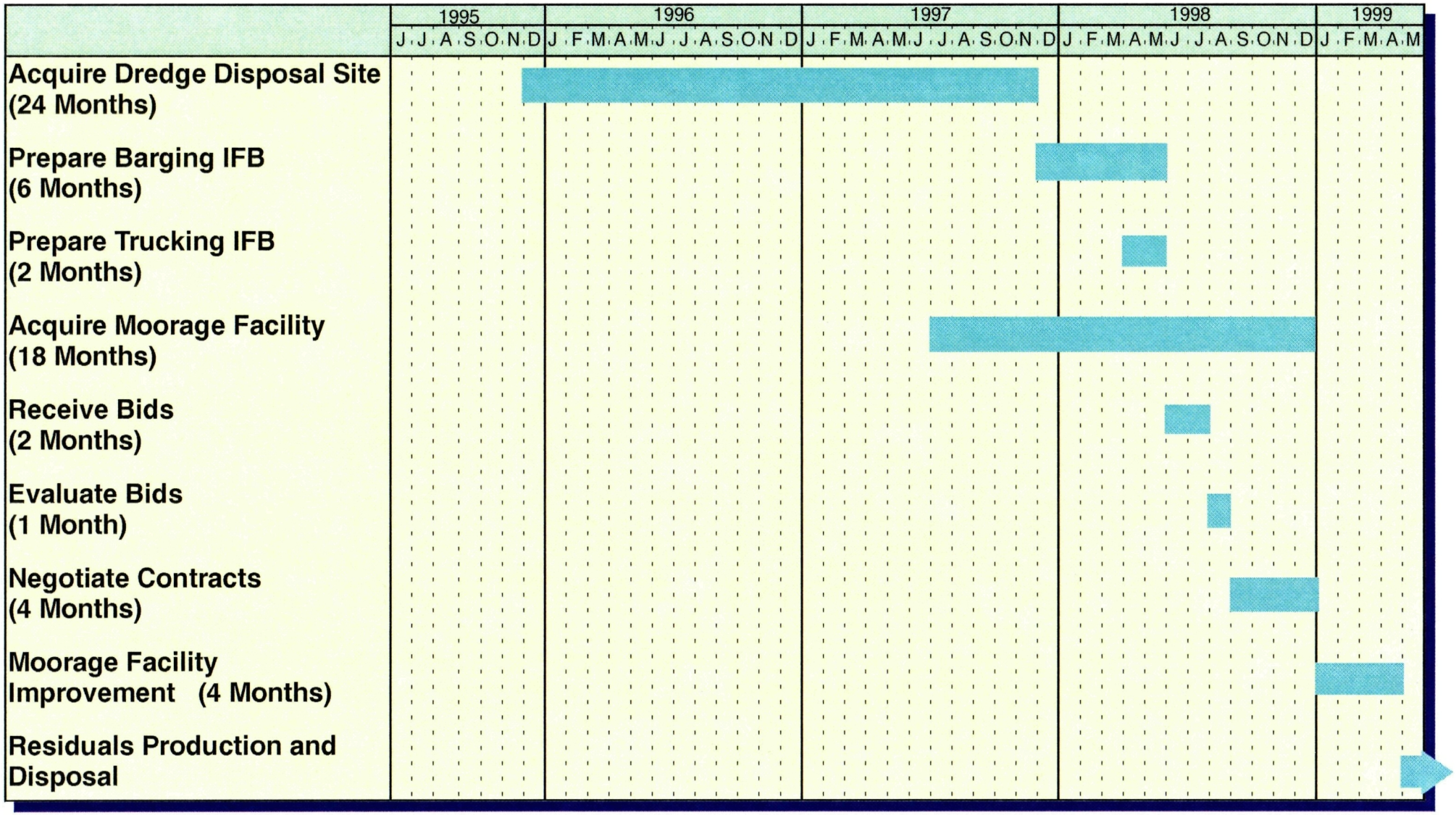
To determine when actions need to be initiated, the same start date for dewatering operations (May 1999) as in the previous scenario has been assumed. To support disposal operations at that time, and providing the contractor 4 months preparation time to allow for development of barge docking and loading facilities, the contract should be awarded by January 1999. If 4 months are required to negotiate the contracts, the negotiation should begin in September 1998 with receipt of bids. To allow 2 months for bidders to prepare and submit their bids and 1 month to evaluate bids, the IFBs need to be advertised in June 1998. If 2 months are required to prepare the trucking IFB, work on it should begin in April 1998. To allow 6 months to prepare the barging IFB, work should begin December 1997. To ensure that use of the disposal site will be available prior to beginning work on the IFB, an approval from the Corps would be required in November of 1997 (see Exhibit 8-2).

8.2.3 Cost Estimate

$20 to $25 per ton.

Exhibit 8-2

Dredge Solids Disposal Implementation Schedule



8.3 AQUEDUCT-CONTROLLED DISPOSAL: LAND APPLICATION

8.3.1 IFB Development

The implementation process for this option would be similar to the process for contract disposal in many ways. Again, the first step would be to prepare the IFB, and draft contract principles. The IFB must identify the degree of service that is desired. Would transportation of materials be included in the contract, or would transportation be contracted separately or provided by the Aqueduct? Would the contractor identify the land application sites or would the Aqueduct provide the sites? Would the contractor be expected to determine application rates and schedules, or would the Aqueduct staff make those determinations? How long a period will the contract cover?

Also necessary in the IFB is a clear identification of the amount and type of material to be disposed. The contractor will need to know how much material will be produced, how production will vary during an operating year , and what operating hours will be required at Dalecarlia WTP. If the Aqueduct will provide the land application sites, the contractor will need to know what hours will be available for spreading the materials, and what special procedures might be required if the provided site is on a military installation. The contractor will need to know what methods of loading will be provided both at Dalecarlia WTP and at the application site, or if equipment and personnel to accomplish the loading will be required.

Once the IFB has been drafted and reviewed, it may be provided to potential bidders for comment. After incorporating appropriate comments, the IFB can be released to all potential bidders, and advertised to the public.

8.3.2 Bid Evaluation and Award

After receiving and evaluating bids, selected bidders can be interviewed and contracts can be negotiated. After reaching agreement, the Aqueduct staff's responsibilities would include several actions. Staff would identify and schedule site use and application rates, unless these functions were made a contractor responsibility. If separate contracts were negotiated for spreading and hauling, the Aqueduct staff may need to coordinate delivery schedule and location with the two contractors. Staff would also monitor the contractors to verify that the terms of the contracts are being met and that the service meets the needs. If needs change, the contracts can be renegotiated upon annual review, or new IFB's prepared.

8.3.3 Schedule

An estimate of the time required to accomplish the above tasks is:

ACTION	TIME REQUIRED
Obtain approval to use land application site - federal property	6 to 12 months
Obtain approval to use land application site - private property	3 to 6 months
Prepare and release IFB	6 months
Receive bids	2 months
Evaluate bids	1 month
Negotiate contract (s)	4 months

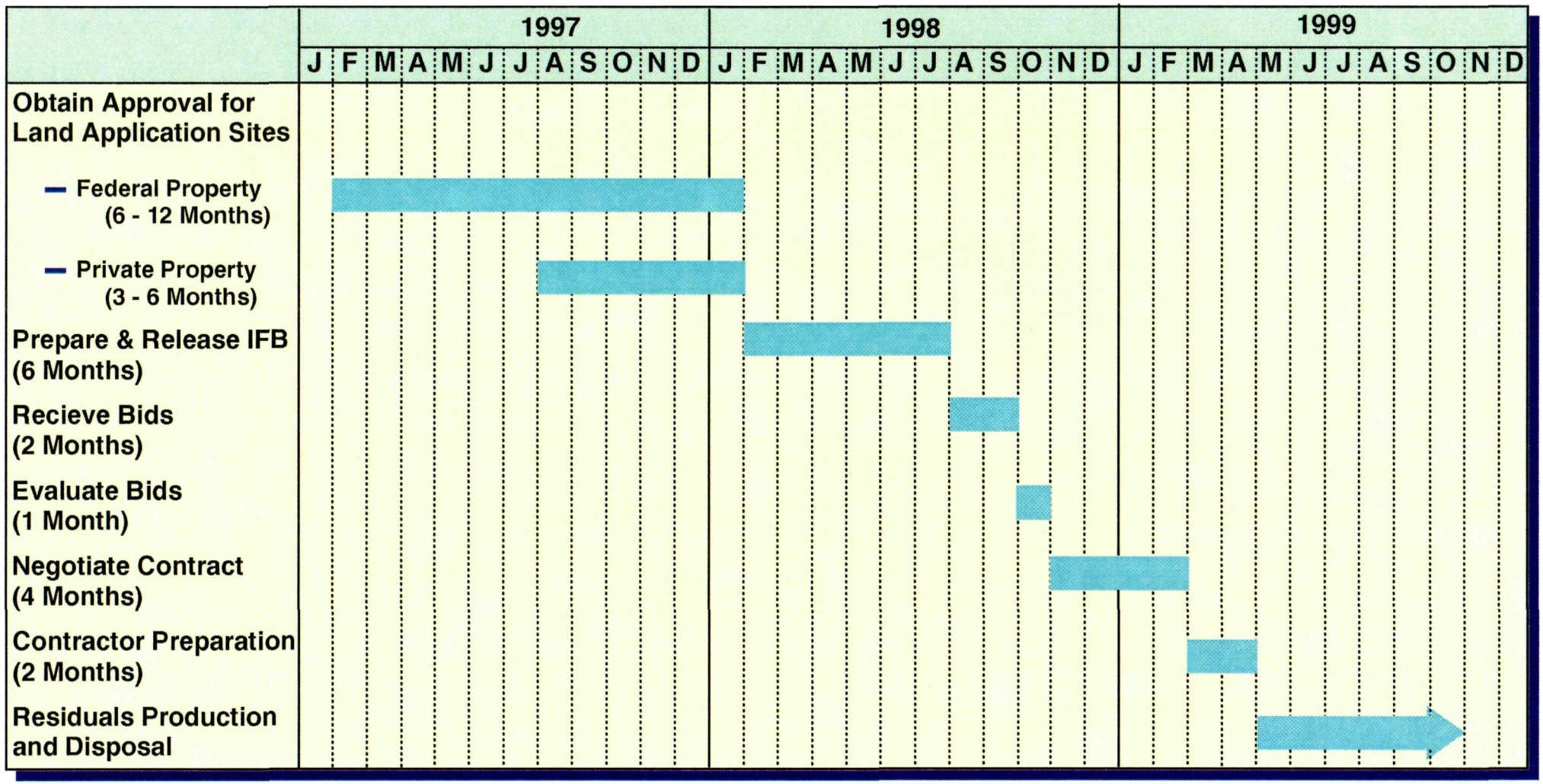
To determine when actions need to be initiated, the same need date (May 1999) as in the previous scenario has been assumed. To support disposal operations beginning in May 1999, allowing the contractor 2 months preparation time, would require that the contract be awarded by March 1999. If 4 months are required to negotiate the contract, the negotiation should begin in November 1998, after bids are received. To allow 2 months for potential bidders to prepare their bids and 1 month to evaluate bids, the IFBs would need to be advertised in August 1998. If 6 months are required to prepare and coordinate the IFB, and to allow draft review by potential bidders, work should begin in February 1998. If 12 months will be required to coordinate use of federal properties, the site approval discussions should begin in February 1997 to obtain approval for site use prior to beginning work on the IFB. August 1997 would be the time to begin site use discussions, if it is certain that the process would require only 6 months (see Exhibit 8-3).

8.3.4 Cost Estimate

Costs for an Aqueduct-managed land application program were estimated to be approximately the same as long-term land application as $25 to $30 per ton. Land application companies indicated that their cost just to spread materials on forested lands would be $18 to $20 per ton. Transportation costs for 25 to 50 miles from the plant would range from approximately $7 to $10 per ton. This option assumes that some federally-controlled forestland could be found within 50 miles of Dalecarlia, such as Ft. Belvoir or Quantico. Additional staff effort would be required to identify and coordinate site use,

Exhibit 8-3

Aqueduct - Owned Land Application Implementation Schedule



coordinate transportation and spreading activities, and to determine application rates for each site. The overhead costs for these types of activities have not been included in this estimate.

APPENDIX A

CONTACT LIST FOR DISPOSAL STUDY		
Name	**Organization**	**Phone Number**
Scott Riley	Whiteford Environmental	410-879-0563
Bruce Gilbert	Great Lakes Construction Co.	216-524-2970
Robert Hopkins	Md. Dept. of Agriculture Chemist Section	410-841-2721
Jeffrey Rein	Md. Dept. of Environment, Chief	410-631-3752
Barry Schmidt	Md. Dept. of Environment Program Admin. - Waste Management	410-631-3318
Hedy Alavi	Md. Dept. of Environment Waste Management	410-631-3318
Ching-Tzone Tien	Md. Dept. of Environment Industrial Permits	410-631-3662
Alvin Bowles	Md. Dept. of Environment Hazardous Waste Program	410-631-3343
-----	Pa. Dept. of Natural Resources Bureau of Waste Management	717-787-7381 or 9870
Don Mcenvoy	W.S.S.C	301-206-8324
Molly Gary	Dept. Nat. Resources Minerals, Oil and Gas Division	410-974-3874
Ed Larrimore	Dept. Nat. Resources Chief - Minerals, Oil and Gas Division	410-974-3874

CONTACT LIST FOR DISPOSAL STUDY		
Name	**Organization**	**Phone Number**
Melvin Tyree	W. Va. Dept. Environmental Planning Bureau of Waste Management	304-588-6350
Clifton Browning	W. Va. Dept. Envir. Planning Water Resources Admin. Land Application of Sludges	304-558-2108
Gary Viola	W. Va. Dept. Envir. Planning Water Resources Admin. Environmental Health Engineering	304-558-2981
Bill Harold	W. Va. Dept. Envir. Planning Water Resources Admin. Environmental Health Engineering	304-558-2981
Michael Vitagliano	W.S.S.C.	301-206-8355
Paul Sellew	Earthgro	1-800-736-7645
Mark Kulling	Earthgro	610-268-3006
Dick Hine	Potts & Callahan	410-483-2486
Bill Cook	Potts & Callahan	410-483-2486
Patrick Brennan	Bio Gro Systems	410-224-0022
Lyle Jarrett	Environmental Agronomics	410-749-8468
Paul Payne	Cherokee Sanford President	301-419-2214 410-813-2444

CONTACT LIST FOR DISPOSAL STUDY		
Name	**Organization**	**Phone Number**
Don Agee	Cherokee Sanford	301-419-2217
Marc Schwartz	Fairfax County Water Authority Chief Engineering	703-698-5600 ext.379
David Dise	Fairfax County Water Authority Purchasing Agent	703-698-5600 ext.236
Walter Bailey	Blue Plains W.W.T.P. Manager	202-645-6301
Frank Hammonds	Maryland Port Administration Poplar Island Project Manager	410-631-1102
Bob Smith	Md. Environment Service Environmental Dredging Poplar Island, Project Manager	410-974-7261
Art Knudsen	Mc Allister Marine Towing of Baltimore	804-245-5836
William C. Muir	Environmental Protection Agency Environmental Assessment Branch	215-597-2541
Rick Schaeffer	Fruehauf trailers	410-547-1110 ext. 228
Harvey Beal	Peterbilt-Beal GMC	410-682-3300
Kevin Blum	International Truck	410-465-4455
Elda Zyran	U.S. Army Corp of Engineers Human Resource Center	410-859-5098

CONTACT LIST FOR DISPOSAL STUDY		
Name	**Organization**	**Phone Number**
Robin D. Depot	Northeast Md. Waste Disposal Authority	410-333-2730
Brian Buccigrossi	Chambers	410-667-9519
George Hudnet	BFI	410-850-7589
Steve Tomczewski	Wheelabrator	410-234-0808
Phil Auld	Waste Management	410-796-6141
Alan Stephens	Empire	717-562-1600
Marge Zimmer	U.S. Army Corp of Engineers Contract Branch	410-962-0188
Dial Mc Pherson	U.S. Army Corp of Engineers Equal Opportunity Employment Center	410-859-0828
Ms. Dolores J. Strausser	Chief - Hauling Permits Section Office of Traffic and Safety Md. State Highway Admin. Md. State Police Commercial Enforcement Division	410-787-4082
------	Md. State Police Commercial Enforcement Division	410-974-2042
------	Anne Arundel County Solid Waste Division	410-222-6109
Jerry Siewieski	Baltimore County Waste Management	410-887-3745

CONTACT LIST FOR DISPOSAL STUDY		
Name	**Organization**	**Phone Number**
Dan Williams	Calvert County Bureau of Solid Waste	410-326-0210
Mr. Mehaw	Frederick County Dept. of Solid Waste	301-694-1848
Carter Stanton	Kent County Dept. of Public Works	410-778-7439
Bob Wilson	Montgomery County Solid Waste Division	301-840-2370
_____	Queen Anne County Dept. of Public Works	410-778-5902
Charles Kavunaugh	Somerset County Solid Waste Division	410-651-9641
Dennis Fleming	Charles County Solid Waste Management	301-932-3460
Steve Zies	Washington County	301-791-3101
Steve Hudgins	Howard County Solid Waste	410-313-6444
Bob Fletcher	Prince George County Refuse Disposal	301-883-5838
Bob Daniels	Md. Dept. of Environment Solid Waste Division	410-631-3364
Gene Walzl	City of Hagerstown Hagerstown Water Dept.	301-790-0979

CONTACT LIST FOR DISPOSAL STUDY		
Name	**Organization**	**Phone Number**
Ed Huff	Baltimore City Water Dept.	410-396-0287
Whitman, Requardt and Associates	City of Wilmington Water Dept.	------
Whitman, Requardt and Associates	Harford County	------
Whitman, Requardt and Associates	Frederick County	------
Whitman, Requardt and Associates	Ocean City Ocean City, Maryland	------
Whitman, Requardt and Associates	City of Brunswick Brunswick, Maryland	------
Whitman, Requardt and Associates	City of Annapolis Annapolis, Maryland	------
Whitman, Requardt and Associates	City of Frederick Frederick, Maryland	------
John Fondersmith	Washington D.C. Planning Office	202-727-6492
John Parsons	National Park Service	202-619-7025
Richard Bryant	Piscataway Creek Disposal Site	301-336-3600
Craig Seltzer	USACOE Norfolk District	804-441-7390
Bob Blama	USACOE Dredging	410-962-6068
John Romeo	UASCOE Permitting of Private Projects	410-962-6079
Bob Damecker	Md. DNR Recreational Dredging	410-974-3666
Andy Hanas	Md. DNR Waterway Improv. Program	410-643-8407

4DS.CONTACT.LIS

APPENDIX B

APPENDIX B

Resource Information for Truck Hauling Costs

Assumptions:

Dewatering Facility

- Dumptrailers will be loaded, covered, and transferred to an onsite staging area by a permanent "hostler" during the normal dewatering facility operating shift five days per week.

- A transfer tractor is dedicated to the onsite dewatering facility with backup from onsite vehicle pool.

- Mechanical maintenance and fueling for the tractors, dump trucks and dumptrailers are performed during the non-hauling hours. A mechanic is available during the hauling shift, for onsite and offsite emergency response.

- Vehicles are maintained and fueled at the existing Dalecarlia maintenance facility.

- Road drivers are responsible for picking up and delivery of trailers to the Dalecarlia staging area. Drivers perform pre-exit equipment checks.

- No weighing facilities provided at the Dalecarlia site. (Will prevent load limit compliance verification prior to departure).

Disposal Site

- Weigh scales are used for solids inventory reporting from Dalecarlia Plant and for payment at private landfills. Trucks are weighed entering and leaving the disposal site.

- Minimal time spent dumping of the disposal residual.

- Truck and tire washing on site prior to departure.

Miscellaneous

- Two dump trailers per tractor are required to maximize road driver availability.
- Emergency Backup personnel are available for relief duties of truck drivers. Staffing availability is 0.823.
- A 15% down time factor is used for vehicles availability (0.85).

Roundtrip Time - less than 25 miles

6.5 mile - urban route time from Dewatering Facility to Capitol Beltway 30 minutes
(distance 6.5 miles @ 15 mph = 25 minutes round off to 30 minutes)

15 mile - time on Interstate, primary roadway ..... 20 minutes
(distance 15 mile @ 45 mph = 20 minutes)

3.5 mile - time from Interstate, primary roadway on a secondary road leading to disposal site ..... 10 minutes
(distance 3.5 miles @ 30 mph = 7 minutes, round off to 10 minutes)

- (1) time for weighing at weigh scales, (2) drive and dumping at disposal location, (3) washing truck off before exiting disposal site, reweigh(4) time, and miscellaneous duties; total time ..... 30 minutes

TOTAL TIME ..... 90 minutes
1 hr. 30 minutes
Roundtrip time for 50± mile total ..... 2 hrs. 30 min.

lunch break ..... 30 minutes
fuel and equipment check, load truck ..... 20 minutes
breaktime ..... 15 minutes

Total Time ..... 3 hrs. 35 min.
Second round trip ..... 2 hrs. 30 min.
Third round trip ..... 2 hrs. 30 min.

TOTAL TIME FOR DAY ..... 8 HR. 35 MINUTES
(minimum 2 trips/day)

Possible 8 hr. scheduled Shift

Roundtrip time - 50 mile radius

6.5 mile - urban route time from Dewatering Facility to Capitol Beltway ▸ 30 minutes
(distance 6.5 miles @ 15 mph = 26 minutes, round off to 30 minutes)

35 mile - time on Interstate, primary roadway . . . . . 50 minutes
(distance 35 mile @ 45 mph = 47 minutes, round off to 50 minutes)

8.5 mile - time from Interstate, primary roadway on a secondary road leading to disposal site (distance 8.5 miles @ 30 mph = 17 minutes, round off to 20 minutes) . . . . . 20 minutes

- (1) time for weighing at weigh scales, (2) drive and dumping at disposal location (3) washing truck off before exiting disposal site, (4) time for miscellaneous duties; Total time . . . . . 30 minutes

TOTAL TIME . . . . . 2 hrs. 10 minutes

Roundtrip time for 100± mile total . . . . . 3 hrs. 50 minutes

lunch break . . . . . 30 minutes
fuel and equipment check A.M., load truck . . . . . 20 minutes
break time A.M. . . . . 15 minutes

TOTAL TIME . . . . . 4 hrs. 55 minutes

Second Round trip . . . . . 3 hrs., 50 minutes

TOTAL TIME FOR DAY . . . . . 8 hrs. 45 minutes
(minimum 2 trips/day)

9 hr. scheduled Shift

Roundtrip Time - 100 mile maximum radius

6.5 mile - urban route time from Dewatering Facility to Capitol Beltway ..... 30 minutes
(distance 6.5 miles @ 20 mph = 20 minutes round off to 30 minutes)

85 mile - time on Interstate, primary roadway ..... 120 minutes
(distance 85 miles @ 45 mph = 113 minutes round off to 120 minutes)

8.5 mile - time from Interstate, primary roadway on a secondary road leading to disposal site ..... 25 minutes
(distance 8.5 miles @ 30 mph = 17 minutes round off to 25 minutes)

- (1) time for weighing at weigh scales, (2) drive and dumping at disposal location, (3) washing truck off before exiting disposal site, (4) time for miscellaneous duties; total time ..... 30 minutes

TOTAL TIME ..... 3 hrs. 25 minutes

Roundtrip time for 200± mile total ..... 6 hrs. 20 minutes

lunch break ..... 30 minutes
breaktime ..... 15 minutes
fuel and equipment check ..... 20 minutes

TOTAL TIME FOR DAY ..... 7 hrs. 25 minutes
(assume 1 trip/day)

8 hr. scheduled shift

Roundtrip Time - 150 mile maximum radius

6.5 mile - urban route time from Dewatering Facility to Capitol Beltway ..... 30 minutes
(distance 6.5 miles @ 20 mph = 20 minutes round off to 30 minutes)

130 mile - time on Interstate, primary roadway ..... 180 minutes
(distance 130 miles @ 45 mph = 173 minutes round off to 180 minutes)

8.5 mile - time from Interstate, primary roadway on a secondary road leading to disposal site ..... 25 minutes
(distance 8.5 miles @ 30 mph = 17 minutes round off to 25 minutes)

- (1) time for weighing at weight scales, (2) drive and dumping at disposal location, (3) washing truck off before exiting disposal site, (4) time for miscellaneous duties; total time ..... 30 minutes

TOTAL TIME ..... 4 hrs. 25 minutes

Roundtrip time for 300± mile total ..... 8 hrs. 20 minutes

lunch break ..... 30 minutes
breaktime ..... 15 minutes
fuel and equipment check ..... 20 minutes

TOTAL TIME FOR DAY ..... 9 hrs. 25 minutes
(assume 1 trip/day)

10 hr. scheduled shift

Maximum Allowable Gross Vehicle Weights ..... 80,000 lbs.

Tractor (driver, fuel, etc.) ..... 18,000 lbs.
Dump Trailer (pushback plate, watertight gate) ..... 15,000 lbs.
Maximum Allowable Payload ..... 47,000 lbs.
($80^k - 18^k - 15^k = 47^k$)

sludge cake - $\frac{70lb}{cy} = \frac{1890lb}{cy}$

therefore; $\frac{47{,}000lb}{1890\ lb/cy}$ = 25 cy. Dump Trailer ..... Use 20 C.Y. Dump Trailer
(constraint by weight)

Maximum Allowable Gross Vehicle Weights ..... 60,000 lbs.

Dump Truck (driver, fuel, etc.) 20,000 lbs.
Maximum Allowable Payload 40,000 lbs.
($60^k - 20^k = 40^k$)

sludge cake - $\frac{70lb}{cy} = \frac{1890lb}{cy}$

therefore; $\frac{40{,}000lb}{1890lb/cy}$ = 21 c.y.

However, standard 10-wheel dump truck can only carry 12-14 c.y.,
therefore use ..... 12 c.y.
(constraint by volume)

Cost Basis for Hauling
(In-House Operations)

Item	Unit Basis	Cost
10-Wheel Dump Trucks	Ea.	$90,000-120,000 ▸ $105,000
Tractor and Dump Trailers	Ea.	$100,000-130,000▸$110,000
Tractors Only	Ea.	$75,000-78,000 ▸ $77,000

- Tailgates are watertight seal
- Pushback plate for unloading dump trailers

Operating and Maintenance Team	Unit Basis	Cost
Driver (Number determined by hauling mode & shift)	Salary $10.35 to $11.95/hr	$11.15/hr.
Mechanics (3-minimal/Dewatering Site)	Salary $14.00 to $14.94/hr.	$14.47/hr.
Laborers (disposal site)	Salary $8.03 to $8.73/hr.	$8.38/hr.
Operators (disposal site)	Salary $12.75 to $15.70/hr.	$14.23/hr.

Variable Cost 10-Wheel Dump Truck		Cost
a.	fuel @ $1.05/gal.; 6 MPG	$0.175/mi.
b.	oil @ $1.00/qt; 2 qt/10,000 mi.	$0.0002/mi.
c.	tires @ $360/ea/35,000 mi. ea x 10 truck tires	$0.103/mi.
d.	brakes @ $1,500/Veh./40,000 mi.	$0.038/mi.
e.	repair and insurance @ 10% capital cost over 5 years assume 50,000 mi./yr. x $105,000/5 yr.@ .10/50,000 mi./yr.	$0.042/mi.
	Total Variable Cost	$0.36/mi.

Variable Cost Tractor and Dump Trailer		Cost
a.	fuel @ $1.05/gal./5 MPG	$0.21/mi.
b.	oil @ $1.00/qt.; 2 qt./10,000 mi.	$0.0002/mi.
c.	tires @ $360/ea./85,000 mi. ea. x 8 trailer tires	$0.034/mi.
d.	tires @ $360/ea.35,000 mi. ea. x 10 tractor tires	$0.103/mi.
e.	brakes @ $1,500/Veh./40,000 mi.	$0.038/mi.
f.	repair and insurance @ 10% capital cost over 5 years. Assume 50,000 mi./yr. $110,000/5 yr. @ .10/50,000 mi./yr.	$0.044/mi.
	Total Variable Cost	$0.43/mi.

Centrifuge Dewatered Residuals

(Based Upon Peak Capacity @ 355 C.Y./Day and
Annual Quantity @, 190 C.Y./Day)

(Assumed 30% Solids Content)

Disposal Site Distance	Scheduled Shift	No. Loads/Day		No. Vehicles Needed (w/15% Contingency		
	(Hrs.)	Dump Truck	Tractor/ Trailer	Dump trucks	*Tractors	Dump trailers
Less than 25-mile radius - (2 Loads/Veh.)						
Peak Cap.	8	32	19	18	13	22
Annual Quantity	8	16	10	9	7	12
26-50 mile radius - (2 Loads/Vehicle)						
Peak Cap.	10	32	19	18	13	22
Annual Quantity	10	16	10	9	7	12
51-100 mile radius - (1 Load/Vehicle)						
Peak Cap.	8	32	19	37	23	22
Annual Quantity	8	16	10	18	13	12
101-150 mile radius (1 Load/Vehicle)						
Peak Cap.	10	32	19	37	23	22
Annual Quantity	10	16	10	18	13	12

Estimated Trucking Cost

(Based Upon Annual Quantity - 190 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
Less than 25 mile radius		
Capital Cost		
· 9 trucks @ $105,000/ea.	$945,000	
· 7 trucks @ $77,000/ea.		$ 539,000
· 12 dump trailers @ $33,000/ea.		$ 396,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 236,250	-$ 233,750
· Total 9 year cost	$ 708,750	$ 701,259
· Average annual cost of capital investment	$ 78,750/yr.	$ 77,917/yr.
Operating and Maintenance Cost		
· 9 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 208,728/yr.	
· 7 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 162,344/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· Variable cost @ $0.36/mi. @ 100 mi./day @ 9 trucks @ 260 day/yr.	$ 82,240/yr.	
· Variable cost @ $0.43/mi. @ 100 mi./day @ 7 trucks @ 260 day/yr.		$ 78,260/yr.
· Total annual cost for O & M	$ 381,261/yr.	$ 330,897/yr.
Total Annual Cost for Transportation	$ 460,011/yr.	$ 408,814/yr.

Estimated Trucking Cost

(Based Upon Annual Quantity - 190 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
26-50 mile radius		
Capital Cost		
· 9 trucks @ $105,000/ea.	$ 945,000	
· 7 trucks @ $77,000/ea.		$ 539,000
· 12 dump trailers @ $33,000/ea		$ 396,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 236,250	-$ 233,750
· Total 5 year cost	$ 708,750	$ 701,250
· Average annual cost of capital investment	$ 141,750/yr.	$ 140,250/yr.
Operating and Maintenance Cost		
· 9 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 208,728/yr.	
· 9 drivers @ $16.73/hr. @ 260 hr./yr.	$ 39,148/yr.	
· 7 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 162,344/yr.
· 7 drivers @ $16.73/hr. @ 260 hr./yr.		$ 30,449/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· 2 mechanics @ $21.71/hr. @ 260 hr./yr.	$ 11,290/yr.	$ 11,290/yr.
· Variable cost @ $0.36/mi. @ 200 mi./day @ 9 trucks @ 260 day.yr.	$ 168,480/yr.	
· Variable cost @ 0.43/mi. @ 200 mi./day @ 7 trucks @ 260 day/yr.		$ 156,520/yr.
· Total annual cost for O & M	$ 517,939/yr.	$ 450,896/yr.
Total Annual Cost for Transportation	$ 659,689/yr.	$ 591,146/yr.

Estimated Trucking Cost

(Based Upon Annual Quantity - 190 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
51-100 mile radius		
Capital Cost		
· 18 trucks @ $105,000/ea.	$1,890,000	
· 13 trucks @ $77,000/ea.		$1,001,000
· 12 dump trailers @ $33,000/ea.		$ 396,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 472,500	-$ 349,250
· Total 5-year cost	$1,417,500	$1,047,750
· Average annual cost of capital investment	$ 283,500/yr.	$ 209,550/yr.
Operating and Maintenance Cost		
· 18 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 417,456/yr.	
· 13 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 301,496/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· Variable cost @ $0.36/mi. @ 200 mi./day @ 18 trucks @ 260 day/yr.	$ 336,960/yr.	
· Variable cost @ $0.43/mi. @ 200 mi./day @ 13 trucks @ 260 day/yr.		$ 290,680/yr.
· Total annual cost for O & M	$ 884,709/yr.	$ 682,469/yr.
Total Annual Cost for Transportation	$1,128,209/yr.	$ 892,019/yr.

Estimated Trucking Cost

(Based Upon Annual Quantity - 190 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
101-150 mile radius		
Capital Cost		
· 18 trucks @ $105,000/ea.	$1,890,000	
· 13 trucks @ $77,000/ea.		$1,001,000
· 12 dump trailers @ $33,000/ea.		$ 396,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 472,500	- $ 349,250
· Total 4-year Cost	$1,417,500	$1,047,750
· Average annual cost of capital investment	$ 354,375/yr.	$ 261,938/yr.
Operating and Maintenance Cost		
· 18 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 417,456/yr.	
· 18 drivers @ $16.73/hr. @ 520 hr./yr.	$ 156,593/yr.	
· 13 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 301,496/yr.
· 13 drivers @ $16.73/hr. @ 520 hr./yr.		$ 113,095/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· 2 mechanics @ $21.71/hr. @ 520 hr./yr.	$ 22,578/yr.	$ 22,578/yr.
· Variable Cost @ $0.36/mi. @ 300 mi./day @ 18 trucks @ 260 day/yr.		$ 505,440/yr.
· Variable Cost @ $0.43/mi. @ 300 mi./day @ 13 trucks @ 260 day/yr.		$ 436,020/yr.
· Total Annual Cost for O & M	$1,192,360/yr.	$ 963,482/yr.
Total Annual Cost for Transportation	$1,546,735/yr.	$1,225,420/yr.

Estimated Trucking Cost

(Based Upon Peak Capacity - 355 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
Less than 25 mile radius		
Capital Cost		
· 18 trucks @ $105,000/ea.	$1,890,000	
· 13 trucks @ $77,000/ea.		$1,001,000
· 22 dump trailers @ $33,000/ea.		$ 726,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 472,500	-$ 431,750
· Total 9 year cost	$1,417,500	$1,295,250
· Average annual cost of capital investment	$ 157,500	$ 143,917
Operating and Maintenance Cost		
· 18 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 417,456/yr.	
· 13 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 301,496/yr.	
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· Variable cost @ $0.36/mi. @ 100 mi./day @ 18 trucks @ 260 day/yr.	$ 168,480/yr.	
· Variable cost @ $0.43/mi. @ 100 mi./day @ 13 trucks @ 260 day/yr.		$ 145,340/yr.
Total annual cost for O & M	$ 676,229/yr.	$ 537,129/yr.
Total Annual Cost for Transportation	$ 833,729/yr.	$ 681,046/yr.

Estimated Trucking Cost

(Based Upon Peak Capacity - 355 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
26-50 mile radius		
Capital Cost		
· 18 trucks @ $105,000/ea.	$1,890,000	
· 13 trucks @ $77,000/ea.		$1,001,000
· 22 dump trailers @ $33,000/ea		$ 726,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 472,500	-$ 431,750
· Total 5 year cost	$1,417,500	$1,295,250
· Average annual cost of capital investment	$ 283,500/yr.	$ 259,050/yr.
Operating and Maintenance Cost		
· 18 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 417,456/yr.	
· 18 drivers @ $16.73/hr. @ 260 hr./yr.	$ 78,297/yr.	
· 13 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 301,496/yr.
· 13 drivers @ $16.73/hr. @ 260 hr./yr.		$ 56,547/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· 2 mechanics @ $21.71/hr. @ 260 hr./yr.	$ 11,290/yr.	$ 11,290/yr.
· Variable cost @ $0.36/mi. @ 200 mi./day @ 18 trucks @ 260 day.yr.	$ 336,960/yr.	
· Variable cost @ 0.43/mi. @ 200 mi./day @ 13 trucks @ 260 day/yr.		$ 290,680/yr.
· Total annual cost for O & M	$ 832,713/yr.	$ 648,723/yr.
Total Annual Cost for Transportation	$1,116,213/yr.	$ 907,773/yr.

Estimated Trucking Cost

(Based Upon Peak Capacity - 355 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
51-100 mile radius		
Capital Cost		
· 37 trucks @ $105,000/ea.	$3,885,000	
· 23 trucks @ $77,000/ea.		$1,771,000
· 22 dump trailers @ $33,000/ea.		$ 726,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 971,250	-$ 624,250
· Total 5-year cost	$2,913,750	$1,872,750
· Average annual cost of capital investment	$ 582,104/yr.	$ 374,550/yr.
Operating and Maintenance Cost		
· 37 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 858,104/yr.	
· 23 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 533,416/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· Variable cost @ $0.36/mi. @ 200 mi./day @ 37 trucks @ 260 day/yr.		$ 692,640/yr.
· Variable cost @ $0.43/mi. @ 200 mi./day @ 23 trucks @ 260 day/yr.		$ 514,280/yr.
· Total annual cost for O & M	$1,550,744/yr.	$1,047,696/yr.
Total Annual Cost for Transportation	$2,133,494/yr.	$1,422,246/yr.

Estimated Trucking Cost

(Based Upon Peak Capacity - 355 C.Y./Day
for Centrifuge Dewatered Residuals)

	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
101-150 mile radius		
Capital Cost		
· 37 trucks @ $105,000/ea.	$3,885,000	
· 23 trucks @ $77,000/ea.		$1,771,000
· 22 dump trailers @ $33,000/ea.		$ 726,000
· Less Salvage Value @ an assumed 25% (300,000 miles)	-$ 971,250	- $ 624,250
· Total 4-year Cost	$2,913,750	$1,872,750
· Average annual cost of capital investment	$ 728,438/yr.	$ 468,188/yr.
Operating and Maintenance Cost		
· 37 drivers @ $11.15/hr. @ 2080 hr./yr.	$ 858,104/yr.	
· 37 drivers @ $16.73/hr. @ 520 hr./yr.	$ 321,885/yr.	
· 23 drivers @ $11.15/hr. @ 2080 hr./yr.		$ 533,416/yr.
· 23 drivers @ $16.73/hr. @		$ 200,091/yr.
· 3 mechanics @ $14.47/hr. @ 2080 hr./yr.	$ 90,293/yr.	$ 90,293/yr.
· 2 mechanics @ $21.71/hr. @ 520 hr./yr.	$ 22,578/yr.	$ 22,578/yr.
· Variable Cost @ $0.36/mi. @ 300 mi./day @ 37 trucks @ 260 day/yr.		$1,038,960/yr.
· Variable Cost @ $0.43/mi. @ 300 mi./day @ 23 trucks @ 260 day/yr.		$ 771,420/yr.
· Total Annual Cost for O & M	$2,331,820/yr.	$1,617,797/yr.
Total Annual Cost for Transportation	$3,060,258/yr.	$2,085,985/yr.

SUMMARY

Estimated Trucking Cost

(Based Upon Annual Quantity - 190 C.Y./Day)

Centrifuge Dewatered Residuals	Hauling Vehicle Option	
	20-C.Y. Tractor & 12-C.Y. Dump Truck	Dump Trailer
Less than 25 mile radius		
· Annual trip miles @ 100 mi./day @ 9 trucks @ 260 day/yr.	234,000 mi./yr.	
· Annual trip miles @ 100 mi./day @ 7 trucks @ 260 day/yr.		182,000 mi./yr.
· Total annual cost for transportation	$ 460,011/yr.	$ 408,814/yr.
· No. haul loads/year 190 c.y./day x 260 day/yr. ÷ 12 c.y./Truck		4117 loads
· No. haul loads/year 190 c.y./day x 260 day ÷ 20 c.y./Truck		2470 loads
· Cost/truck trip	$ 111.75/truck load $ 9.50/c.y.	$ 165.50/truck load $ 8.50/c.y.
26-50 mile radius		
· Annual trip miles @ 200 mi./day @ 9 trucks @ 260 day/yr.	468,000 mi./yr.	
· Annual trip miles @ 200 mi./day @ 7 trucks @ 260 day/yr.		364,000 mi./yr.
· Total annual cost for transportation	$ 659,689/yr.	$591,146/yr.
· No. haul loads/year 190 c.y./day x 260 day ÷ 12 c.y./truck	4117 loads	
· No. haul loads/year 190 c.y./day x 260 day ÷ 20 c.y./truck		2470 loads
· Cost/truck trip	$ 160.25/truck load $ 13.50/c.y.	$ 239.35/truck load $ 12.00/c.y.

51-100 mile radius

· Annual trip miles @ 200 mi./day @ 18 trucks @ 260 day/yr.		936,000 mi./yr.
· Annual trip miles @ 200 mi./day @ 13 trucks @ 260 day/yr. 676,000 mi./yr.		
· Total Annual Cost for Transportation	$1,128,209/yr.	$ 892,019/yr.
· No. hauls/year 190 c.y./day x 260 day/yr. ÷ 12 c.y./Truck		4117 loads
· No hauls/year 190 c.y./day x 260 day/yr. ÷ 20 c.y. Truck		2470 loads
· Cost/truck load	$ 274.05/truck load $ 23.00/c.y.	$ 361.15/truck load $ 18.00/c.y.

101-150 mile radius

· Annual trip miles @ 300 mi./day @ 18 trucks @ 260 day/yr. 1,404,000 mi./yr.		
· Annual trip miles @ 300 mi./day @ 13 trucks @ 260 day/yr. 1,014,000 mi./yr.		
· Total Annual Cost for Transportation	$1,546,735/yr.	$1,225,420/yr.
· No hauls/year 190 c.y./day x 260 days/yr. ÷ 12 c.y./Truck		4117 loads/yr.
· No. hauls/year 190 c.y./day x 260 days/yr. ÷ 20 c.y./truck		2470 loads/yr.
· Cost/truck load	$ 375.70/truck load $ 31.50/c.y.	$ 496.15/truck load $ 25.00/c.y.

SUMMARY

Estimated Trucking Cost
(Based Upon Peak Capacity - 355 C.Y./Day)

Centrifuge Dewatered Residuals	Hauling Vehicle Option	
	12-C.Y. Dump Truck	20-C.Y. Tractor & Dump Trailer
Less than 25 mile radius		
· Annual trip miles @ 100 mi./day @ 18 trucks @ 260 day/yr.	468,000 mi./yr.	
· Annual trip miles @ 100 mi./day @ 13 trucks @ 260 day/yr.		338,000mi./yr.
· Total annual cost for transportation	$ 833,729/yr.	$ 681,046/yr.
· No. haul loads/year 355 c.y./day x 260 day/yr. ÷ 12 c.y./Truck	7692 loads	
· No. haul loads/year 355 c.y./day x 260 day ÷ 20 c.y./Truck		4615 loads
· Cost/truck trip	$ 108.40/truck load $ 9.00/c.y.	$ 147.60/truck load $ 7.50/c.y.
26-50 mile radius		
· Annual trip miles @ 200 mi./day @ 18 trucks @ 260 day/yr.	936,000 mi./yr.	
· Annual trip miles @ 200 mi./day @ 13 trucks @ 260 day/yr.		676,000 mi./yr.
· Total annual cost for transportation	$1,116,213/yr.	$907,773/yr.
· No. haul loads/year 355 c.y./day x 260 day ÷ 12 c.y./truck	7692 loads	
· No. haul loads/year 355 c.y./day x 260 day ÷ 20 c.y./truck		4615 loads
· Cost/truck trip	$ 145.10/truck load $ 12.00/c.y.	$ 196.70/truck load $ 10.00/c.y.

51-100 mile radius

· Annual trip miles @ 200 mi./day @ 37 trucks @ 260 day/yr.	1,924,000 mi./yr.	
· Annual trip miles @ 200 mi./day @ 23 trucks @ 260 day/yr.		1,196,000 mi./yr.
· Total Annual Cost for Transportation	$2,133,474/yr.	$1,422,246/yr.
· No. hauls/year 355 c.y./day x 260 day/yr. ÷ 12 c.y./Truck	7692 loads	
· No hauls/year 355 c.y./day x 260 day/yr. ÷ 20 c.y. Truck		4615 loads
· Cost/truck load	$ 277.40/truck load $ 23.00/c.y.	$ 308.20/truck load $ 15.50/c.y.

101-150 mile radius

· Annual trip miles @ 300 mi./day @ 37 trucks @ 260 day/yr.	2,886,000 mi./yr.	
· Annual trip miles @ 300 mi./day @ 23 trucks @ 260 day/yr.		1 ,794,000 mi./yr.
· Total Annual Cost for Transportation	$3,060,258/yr.	$2,085,985/yr.
· No hauls/year 355 c.y./day x 260 days/yr. ÷ 12 c.y./Truck	7692 loads/yr.	
· No. hauls/year 355 c.y./day x 260 days/yr. ÷ 20 c.y./truck		4615 loads/yr.
· Cost/truck load	$ 397.86/truck load $ 33.00/c.y.	$ 452.00/truck load $ 22.50/c.y.

APPENDIX C

FAX NUMBER: 410-841-2765

Return two copies to:
Maryland Department of Agriculture
State Chemist Section
50 Harry S Truman Parkway
Annapolis, MD 21401

_____ 19___

APPLICATION FOR REGISTRATION OF SOIL CONDITIONERS

Application is hereby made for the registration of ____ soil conditioner(s) sold in packages of 10 lbs. or less ($30 per product) and of ____ soil conditioner(s) sold only in bulk or packages larger than 10 lbs. ($15 per product) for a period beginning with the actual date of registration and ending January 31, 19, ____ in the State of Maryland. We agree to pay semi-annually an inspection fee of 25¢ per ton on all soil conditioner(s) distributed in bulk or in packages over 10 lbs. Make checks payable to the Maryland Department of Agriculture.

PRODUCT NAME	COMPOSITION	Distribution (X)		
		10 lbs. or Less	Over 10 lbs.	Over 10 lbs Only
Total Products				
		$30ea.		$15ea.

Firm Name and Address Appearing on Label:

Firm .....

Address .....

City, State and Zip .....

Submitted by:

Firm .....

Address .....

City State and Zip .....

Attention .....

Phone( ) .....

(Applicant not to fill in below this line)

CERTIFICATE OF REGISTRATION

The above products are registered in the State of Maryland for a period beginning with the actual date of registration and ending January 31, 19 ____ when sold, offered or exposed for sale under the product name and guarantees as described.

Authorized Signature

Date 19-24	Account Amt. 26-33	Maker 34-67	Check No. 58-65	Date 66-71	Check Amt 73-80

CHEM.PEST.WM DEC 12, 1994 11:15AM #588 P.02

WILLIAM DONALD SCHAEFER, *Governor*
ROBERT L. WALKER, *Secretary*
LEWIS R. RILEY, *Deputy Secretary*

The Wayne A. Cawley, Jr. Building
50 HARRY S. TRUMAN PARKWAY
ANNAPOLIS, MARYLAND 21401
Baltimore/Annapolis (410) 841-5700
Washington (301) 261-8106
Facsimile (410) 841-5914

STATE OF MARYLAND
DEPARTMENT OF AGRICULTURE

OFFICE OF PLANT INDUSTRIES AND PEST MANAGEMENT

MEMORANDUM

TO: Warren R. Bontoyan

FROM: Charles W. Puffinberger

DATE: June 9, 1993

SUBJECT: Guidelines for Registration of Products Containing Water Treatment Sediments

This memo is to establish guidelines for the process for registration under the Maryland Commercial Fertilizer Law of a soil conditioner or fertilizer product containing water treatment sediments (WTS), also referred to as "water treatment sludge" or "alum sludge". Based on laboratory analyses, WTS are comprised mostly of soil and dead plant matter that are precipitated out of water sources by the addition of aluminum and/or iron compounds. The resulting WTS are primarily inorganic materials, with a low concentration, if any, of nutrients (<1% nitrogen), organic matter (<6%), heavy metals, volatile organic compounds, pesticides, etc.

Due to the unique nature of WTS additional factors must be considered, and conditions or requirements must be specified, relating to registration of WTS products, as follows:

1. When primary nutrient concentration is less than 1%, and there is no ability to guarantee concentration at the unit level, the WTS product must be considered for registration as a soil conditioner, not as a fertilizer;

2. The registrant must make a claim that the WTS product performs as a soil conditioner, or as a fertilizer if claims are made referring to primary or secondary plant nutrients, and provide documentation to MDA, upon request, for any claim;

3. The registrant must provide MDA with a recent routine laboratory analysis report for the WTS product to be registered indicating toxicity characteristic leaching procedure (TCLP) results; and

4. The registrant also must:

a. Submit to MDA a completed application form for registration of each product (source);

b. Submit to MDA documentation that there is no industrial plant or other facility (pulp and paper mill) discharging into the water source before treatment at the water treatment facility an effluent that may adversely affect the WTS product;

c. Notify MDA of the location and time of application of a WTS product, prior to application;

d. Provide to MDA, upon request, or allow MDA to collect, a sample of any WTS product for analysis;

e. Submit to MDA a monthly report on application of each WTS product, including:

(1) Site or location of application;
(2) Method of application;
(3) Application rate of WTS product;
(4) Application rate of lime, if required;
(5) Total amount of nitrogen applied; and
(6) Total tonnage (wet weight) of WTS applied.

f. Prepare for each site of application an approved nutrient management plan.

g. Submit to MDA a semiannual statement of the tonnage of each soil conditioner (WTS product) distributed and pay the inspection fee of 25 cents per ton, on a wet weight basis;

h. Meet all other requirements of the Maryland Commercial Fertilizer Law and regulations pertaining to distribution of soil conditioners or fertilizers.

5. Registration by MDA of a WTS product as a soil conditioner or fertilizer does not imply approval of the application method used or the rate of application and does not preclude the registrant from complying with any State or local regulations or ordinances relating to air quality (odor), water quality, zoning, or transport, etc.

CWP:sd

FROM CHEM.PEST.WM DEC 12, 1994 11:16AM #588 P.04

APPENDIX D

PRELIMINARY FEASIBILITY EVALUATION

RESIDUALS LAND TREATMENT

Dalecarlia Water Treatment Plant
U.S. Army Corps of Engineers
Baltimore District, Washington Aqueduct Division

Whitman, Requardt and Associates
Baltimore, Maryland

In Association With:

Malcolm Pirnie, Inc.
Newport News, Virginia

MARCH 1995

EARTH SYSTEMS ASSOCIATES, LTD.
Soil, Water and Waste Management Consultants

PRELIMINARY FEASIBILITY EVALUATION

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Newport News, Virginia

Prepared By

Earth Systems Associates, Ltd.
Athens, Georgia

MARCH 1995

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1. PURPOSE

The Washington Aqueduct Division of the U.S. Army Corps of Engineers operates the Dalecarlia Water Treatment Plant and Georgetown Reservoir. Non-hazardous solids, or residuals, are produced as a byproduct of the water treatment process. Residuals consist of organic and inorganic solids naturally found in reservoir water and constituents from the coagulant material (primarily iron and aluminum compounds) used to remove the solids during the treatment process. These solids must be disposed of in an environmentally sound manner.

A study by Whitman, Requardt and Associates and Malcolm Pirnie, Inc. is underway to identify cost-effective disposal alternatives. Land treatment of residuals is one disposal alternative to be evaluated in this process. The purpose of the following evaluation is to provide preliminary information on the feasibility of land treatment for Dalecarlia residuals.

Land treatment is accomplished by applying the residuals to land at a rate based on the agronomic requirements of the crop. Plant nutrients contained in the residuals are effectively recycled in this manner. Land treatment design is based on the non-degradation constraint which states that each residual constituent shall be applied at such a rate or over such a time period that land and water resources are not irreversibly converted to a future unproductive condition or environmentally degraded. Use of such a strong constraint parallels environmental regulatory intent (see for example 40 CFR Part 503 for land application of municipal biosolids) and provides for long term and successful treatment (Overcash and Pal, 1979).

Land treatment of residuals is being practiced in several states and is supported by research conducted by the American Water Works Association (AWWARF, 1990).

2. DESIGN CONSTRAINTS

Factors determining feasibility of residuals land treatment include:

- residuals characteristics;
- availability, location, and characteristics of suitable soils; and
- cost of preparation and application.

Malcolm Pirnie will develop cost estimates for residual dewatering and loading facilities and they will not be considered here. The following assumptions are made to provide a framework for assessing land treatment feasibility.

2.1 Residuals Characteristics

Residual characteristics most important to residual land treatment design are the concentrations of plant nutrients and pollutant metals. Nutrient overloading can cause ground water degradation and some metals have the potential to accumulate to biotoxic levels in soil. In general, annual applications of residuals are limited by plant nutrients and cumulative applications are limited by metals loading. A design characterization based on residuals analyses (Whitman, Requardt and Assoc., 1995) is presented in Table 1. Except for the common earth elements aluminum, iron and manganese, metals concentrations are low. Plant nutrient content is significant, but is low compared to commercial fertilizers. Liming value (CCE) is very low at 0.15% (Table 1). For comparison, typical liming amendments range from 50% to 70% CCE.

Residuals have been shown to have very low pathogen content (AWWARF, 1990) and it is assumed that pathogens will not limit handling options or site suitability. Residuals solids content determines volume and handling characteristics. For the purposes of this investigation, an average solids content of 30% is assumed.

2.2 Suitable Area

Due to economic and operational constraints, the land application areas must be within 50 miles of the Dalecarlia WTP. The suitability criteria for soils is discussed in Section 3.

Table 1. Design residuals characteristics for the Dalecarlia WTP.

Parameter	**Residuals Concentration** mg/kg (except as noted)
Total solids (%)	30
Calcium carbonate equivalent (CCE)	1,400
Organic matter (%)	24
C:N ratio[1]	15
Nutrients	
Organic nitrogen	7,500
Ammonia nitrogen	490
Nitrate-nitrogen	10
Total nitrogen	8,000
Plant available nitrogen (PAN)[2]	3,000
Phosphorus	1,000
Potassium	2,000
Calcium	8,000
Magnesium	3,000
Sulfate	200
Metals	
Aluminum	100,000
Arsenic	15
Barium	300
Cadmium	< 1
Copper	< 62
Chromium	73
Iron	46,000
Lead	18
Manganese	1,300
Nickel	30
Selenium	< 0.3
Silver	2
Zinc	130

[1] based on organic matter content
[2] in the first year after application; based on 30% of organic-N plus ammonia-N and nitrate-N
[3] Municipal sludge may not be land applied if pollutant exceeds these values (EPA; 40 CFR Part 503)

2.3 Operating Season

Operating season is year-round, although field operations may have to be suspended for extended periods due to inclement weather and frozen soil in some portions of the area considered. The growing season is April through November and soil is frozen only to shallow depths in the winter. Storage must be provided for inclement weather periods. An estimate of storage volume required is developed in Section 5.

3. REGIONAL SOIL SUITABILITY

Site suitability for land treatment depends on several factors including access, current and past land use, and soils. An estimate of suitable soil area in each major physiographic province in the region follows.

3.1 Suitability Criteria

Soils suitable for land treatment are:

- deep and well drained;
- coarse-loamy to fine textured;
- found on slopes less than 15% for agriculture and less than 30% for forests;
- not heavily eroded or rocky; and
- outside of the 100-year flood plain.

Based on a review of SCS soils information for the region and the above criteria, the percentage of area with suitable soils was estimated. These estimates are subdivided based on physiographic region. It should be noted that the areas cited do not account for development. Sites suitable for land treatment have characteristics which are also desirable for residential and commercial development, thus the extent of development must also be deducted. Most of the soil surveys in the Maryland and Virginia counties near Washington, D.C. were developed in the 1950's and 60's. Few of these surveys have been updated, thus an accurate estimate of current use is not available through this source. The occurrence of land treatment suitable soils is described below and summarized in Table 2.

3.2 Atlantic Coastal Plain

Coastal Plain areas are gently rolling and occur along the Potomac River, Chesapeake Bay, and associated rivers. The primary limitations of soils in these areas are drainage and texture. Approximately 15% of the soils are in wetlands associated with coastal marsh and an additional 30% are subject to flooding or have poor drainage or seasonal high water tables that create soil conditions which may limit residuals treatment capability. Five to ten percent of the soils consist of deep, excessively drained sands which are limited

Table 2. Summary of area suitable for land treatment use based on soil characteristics.

Physiographic Province	Suitable Soils Area		Counties	
	Cropland	Forest	Maryland	Virginia
Coastal Plain	30%	40%	Prince Georges Frederick Charles Baltimore Anne Arundel	Fairfax Stafford King George
Piedmont	25%	40%	Baltimore	Fairfax Loudon Stafford Prince William Fauquier Rappahanock Culpepper Orange Spotsylvania Frederick
Blue Ridge & Applachian Mtn.	10%	35%	Washington	London Fauquier Frederick Clarke Warren Rappahanock

due to drought and low retention capacity for residuals constituents. Of the remaining 50%, approximately 10% of the area is too steep or eroded for forest applications and 20% is too steep or eroded for agricultural operations. Based on these estimates, approximately 30% of the Coastal Plain is suitable for agricultural applications and 40% for forest applications. Most of the Coastal Plain soils with limited drainage occur along the rivers and on low Coastal Plain terraces. In general drainage is less limiting on high Coastal Plain terraces and a larger percentage of suitable soil occurs here.

3.3 Piedmont

The Piedmont province in Maryland and Virginia is gently rolling to hilly with broad shallow stream valleys. The primary limitations of Piedmont soils for land treatment are excessive slope, erosion, and flooding in stream valleys. Approximately 25% of the area is

too steep for agriculture and five to ten percent is prone to flooding. Of the remaining 65%, 35-40% is moderately to severely eroded and considered marginal for forest application and unsuitable for agricultural land treatment use. Approximately 25% of Piedmont soils are suitable for agricultural land treatment and as much as 40% may be suitable for forest systems. The best Piedmont land treatment sites are located on broad upland ridges and gently sloping side slopes.

3.4 Blue Ridge and Appalachian Mountains

This province is characterized by steep mountain slopes and narrow stream valleys. The primary limitations for land treatment are steep slopes, shallow soils, and flooding in stream valleys. Only about 10% of the soils are considered suitable for agricultural land treatment. Approximately 35% are suitable for forest land treatment. The remaining 65% is too steep (40%), eroded (15%) or prone to flooding (10%). This region is farthest from the residuals source. Due to proximity and area of suitable soils, this region is considered least likely to have sites suitable for disposal of Dalecarlia WTP residuals.

In addition to the physiographic provinces discussed, portions of the Great Limestone Valley also occur in the region. Areas of suitable soils are expected to be similar to that of the Piedmont.

3.5 Soil Chemistry

Two important chemical properties of soils for land treatment are mineralogy and reaction (pH). These characteristics affect the assimilation of pollutant metals. In general, assimilation capacity increases with increasing pH, organic matter, and clay content. Ideal soils for both agricultural crop production and land treatment are medium to fine textured and strongly acid to slightly acid (pH of 5.0 to 6.5 S.U.). Fine textured soils have more cation exchange sites for retention of metals and other ions. Forest soils have higher organic matter than agricultural soils which also provides retention sites for metals. Organic matter compensates somewhat for the lower pH's found in forest soils. Extremely acid soils (pH less than 4.5) and sandy soils are undesirable.

Soil acidity can be corrected by liming. Coarse textured (sandy) soils have a lower cation exchange capacity and higher leaching potential than finer textured soils. Thus, deep sands of the Coastal Plain were excluded from consideration. Agricultural soils that have loamy to clayey textures and moderately to slightly acid pH, and forest soils with similar texture and strongly to moderately acid pH are best. Soils with these characteristics are typical of land treatment suitable soils in the Piedmont and Coastal Plain regions. Agricultural soils are generally most productive at a slightly acid pH. Standard agricultural practice includes routine liming to maintain slightly acid to neutral soil reaction conditions, a condition favorable for assimilation of residuals metals.

4. RESIDUALS LOADING

The residuals loading rate dictates the land area required for disposal. The loading rate is based on crop nutrient uptake potential and the assimilative capacity of the site for non-essential residuals constituents. The loading rates developed below are for planning purposes only. A site-specific loading must be developed for implementation.

4.1 Assimilative Capacity Assumptions

Land treatment assimilative capacity is determined by the land limiting constituent (LLC). The LLC is the residual constituent which requires the most land area for assimilation. Based on Table 1 and experience with similar amendments, nitrogen is assumed to be the constituent limiting annual applications. Nitrate-nitrogen has an EPA maximum contaminant limit for ground water of 10 mg/L, thus nitrogen loading is limited to protect ground water quality. Nitrogen in residuals is composed mostly of organic forms which are released to plants over a period of weeks to years. The amount of plant available nitrogen (PAN) is used to calculate maximum annual loading. The PAN loading depends on how many years the site will be used. For one-time applications, the PAN is estimated at 0.3% as shown in Table 1. For repeated annual applications, the PAN is assumed to be equal to the total nitrogen or 0.8%. A higher concentration of PAN is assumed for repeated annual applications because PAN from residuals applications in previous years must be includ In any given year, the total PAN available should not exceed the average total nitrogen concentration of 0.8%.

Cumulative loadings are limited by metals which tend to accumulate in the soil. Based on general land treatment knowledge and characteristics in Table 1, the potentially most limiting metals are arsenic, aluminum and manganese. Based on a maximum cumulative arsenic loading of 37 lbs/ac (40 CFR Part 503), and an annual application of 8 dry tons/ac arsenic would not limit applications for over 100 years. Regulatory limits for cumulative loading of aluminum and manganese have not been established. However, availability of aluminum and manganese is closely tied to soil pH which varies from site to site. Based on typical soil conditions and a planning period of 20 years, these constituents should not limit applications, assuming soil acidity is managed for good crop production.

If the residuals are to be used as a liming amendment, calcium and/or magnesium will have to be added (residuals calcium carbonate equivalent, or CCE, is <1%; Table 1). The loading rate in this case would be determined by the amount of lime added to residuals and the active acidity to be neutralized in the soil. Active acidity varies widely from site to site. For the purposes of planning, we will assume a maximum loading rate for liming is the same as dictated by nitrogen.

4.2 Crop Type

Agricultural crops are more intensively managed than forest crops and consequently are capable of higher nitrogen uptake. Annual nitrogen uptake for row and hay crops ranges from 125 to 350 lb/ac/yr depending on species, growing conditions and cultural practice. Under good growing conditions, field crops such as barley, grain sorghum, and wheat will be in the lower part of the range while hay crops with multiple annual harvests like fescue, orchardgrass and ryegrass are in the high end of the range. Corn and soybeans have mid-range nitrogen uptake. For design purposes, a conservative rate of 125 lb/ac/yr is selected to represent the worst case scenario. Thus, for good growing conditions and a high nitrogen uptake crop such as orchardgrass, the nitrogen (and residuals) loading could be increased to as much as two times the design rate.

Forest crops require less intensive management, but have lower nutrient assimilative capacity. Although nitrogen uptake in forest stands can be high, as much as 200 lb/ac/yr, a significant portion of this is recycled to the soil through litter fall. Net uptake rarely exceeds 100 lb/ac/yr and can be much less, however, a significant amount of nitrogen is also retained in stable soil forms. For planning purposes, a net nitrogen uptake and retention capacity of 65 lbs/ac/yr is selected to estimate maximum forest loadings.

4.3 Cultural Practice

Agricultural crops will require supplemental fertilization and annual harvests to maintain assimilative capacity. Local agricultural practices are typically compatible with residual application operations and can be integrated for increased efficiency. Liming to maintain soil pH will vary with crop grown and soil type. A program for supplemental liming must therefore be site specific and addition of lime to residuals at the WTP to maintain a uniform or elevated liming value is not recommended.

Forest crops will be harvested much less frequently. However, the stand must be maintained in a fully stocked and vigorously growing condition to insure assimilation. This may require some supplemental fertilization. Forest fertilization will be required infrequently, however, this process will require specialized expertise and equipment that may not be available locally. Silvicultural systems with short rotations (30-40 years) and utilizing artificial regeneration to insure full stocking are more favored for land treatment.

4.4 Maximum Annual Loading

The maximum annual residuals loading for planning purposes assumes the worst case scenario which is repeated annual applications on the same site. Plant available nitrogen in residuals is assumed to be 0.8% or about 16 lbs N/dry ton.

Based on the conservative design crop nitrogen uptake rates developed in Section 4.2, the loading rate is calculated as follows:

Agricultural Site: (125 lb/ac)/(16 lb/dry ton) = 7.8 dry ton/ac

Forest Site: (65 lb/ac)/(16 lb/dry ton) = 4.0 dry ton/ac

For one-time applications, the loading rate may be as much as 2.6 times the above rates. The range of potential loading rates based on general crop type is presented in Table 3

Table 3. Range of potential residuals application rates based on residuals nitrogen content and crop nitrogen uptake.

Crop	Application Rates	
	Annual	**One-time**
Agricultural	7.8 - 15.6 dry tons/ac 26 - 52 wet tons/ac	20.3 dry tons/ac 67.7 wet tons/ac
Forest	4 dry tons/ac 13.3 wet tons/ac	10.4 dry tons/ac 34.7 wet tons/ac

5. STORAGE REQUIREMENTS

Storage is required for periods of inclement weather and operating contingencies. It is possible to apply residuals at any time during the year, however, there will be extended periods in the winter and spring where wet or frozen soils will preclude field operations. Based on the number of days with temperatures below freezing and with precipitation greater than 0.5 inch, it is assumed that 60 days storage is required for inclement weather. An additional 30 days is added for operating contingencies such as equipment breakdowns. Thus, a total storage volume of 90 days average residuals production is recommended for planning. This estimate may be revised based on actual site conditions and cultural practices selected. A 90-day storage volume is considered adequate for agricultural systems and conservative for forest systems.

6. RESIDUALS APPLICATION

Application methods will vary depending on crop, terrain, available equipment and cost. For planning purposes, it is assumed that residuals will be dewatered to a moisture content of 30% with a solid consistency that can be handled with various spreader devices.

6.1 Methods

For agricultural sites, access is not limited and conventional manure spreaders can be used to broadcast residuals on the fields. Following application, the residuals can be disced in or left on the surface in the case of hay fields. For forest systems, access is limited, and a four-wheel drive application vehicle with blower or other device capable of distributing residuals over a larger area is required. The residuals are left on the forest floor to disintegrate and decompose in the litter.

Residuals can be transported to application sites in dump trucks and loaded into the applicator vehicle with a front-end loader.

6.2 Cost

Based on a solids content of 30%, one dry ton is equal to 3.3 wet tons or about 800 gallons. Solids application costs vary widely ranging from $0.03 to $0.06 per gallon depending on haul distance and local markets for equipment and labor. These rates are equivalent to $24 to $48 per wet ton or $80 to $160 per dry ton. The costs quoted above are based on utilizing a private contractor for hauling and application and includes application recordkeeping costs. For planning purposes a range of $100 to $160 per dry ton is recommended. Application to sites with good access and located close to the residuals source would be in the lower end of the range while areas with poorer access and /or long haul distance would have costs in the higher end of the range. No site management or monitoring costs are included in these estimates.

7. SUMMARY

Based on a preliminary review of Dalecarlia WTP residuals characteristics and general characteristics of soils in a 50 mile radius of the WTP, criteria were developed for evaluating the feasibility of the land treatment alternative for residuals disposal. Estimates of soil suitability, maximum residuals loading rates, storage requirements, and application costs were included.

Soils of the Coastal Plain and Piedmont physiographic areas located closest to the WTP were judged to have the greatest potential for residuals land application. Approximately 30% of the Coastal Plain areas have soils suitable for an agricultural land treatment system with an additional 10% suitable if a forest crop is used. In the Piedmont, approximately 25% of the soils are suitable for an agricultural system with an additional 10% suitable if a forest crop is used. These estimates do not account for existing development which is substantial since these soils have characteristics that are also ideal for residential and commercial development.

Residuals loading was estimated assuming that metals were not limiting and that nitrogen will dictate annual loading rates. Maximum design loading rate was estimated at 4.0 dry tons/acre for forest sites and 7.8 dry tons/acre for agricultural sites. To accommodate inclement weather and operating conditions, a storage volume equal to 90 days average residuals production is recommended.

The cost of application including hauling, and recordkeeping was estimated to be in a range of $100 to $160 per dry ton ($30 to $48 per wet ton) for sites located within 50 miles of the residuals source.

8. REFERENCES

American Water Works Association Research Foundation. 1990 Land Application of water treatment sludges: impact and management. AWWA Publication No. 1P-7.5-90566-6/90-CM.

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Overcash, M R. and D. Pal. 1979. Design of land treatment systems for industrial waste theory and practice. Ann Arbor Science Publishers, Inc Ann Arbor, Mi

Whitman, Requardt and Assoc 1995 Dewatering equipment pilot study summary of test results. Whitman Requardt and Assoc . Baltimore, MD and Malcolm Pirnie, Inc , Newport News, VA.

APPENDIX E

APPENDIX E

Fairfax County Water Authority - RFP

Blue Plains W.W.T.P. - RFP

Chester Water Authority - RFP

BFI Disposal Contract for Residuals Management

Biogrow (Wheelabrator Clean Water Systems, Inc.) Disposal Contract for Residuals Management

David E. Dise 703-698-5600
Purchasing Manager X237

FAIRFAX COUNTY WATER AUTHORITY

REQUEST FOR PROPOSALS

October 12, 1993

RFP No.	93-18
For:	Management and Disposal of Solids Corbalis Water Treatment Plant
Proposal Due Date:	October 28, 1993
Delivery Address:	Fairfax County Water Authority Purchasing Department 8560 Arlington Boulevard Fairfax, Virginia 22031
Mailing Address:	Fairfax County Water Authority Purchasing Department P.O. Box 1500 Merrifield, Virginia 22116-0815
Purchasing Contact:	David E. Dise Purchasing Agent (703) 698-5600, ext 236

RECEIVED
JAN 25 1995
WILLIAMS, KEGUARDT
AND ASSOCIATES

FAIRFAX COUNTY WATER AUTHORITY

RFP NO. 93-18
MANAGEMENT AND DISPOSAL OF SOLIDS
CORBALIS WATER TREATMENT PLANT

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October 12, 1993

FAIRFAX COUNTY WATER AUTHORITY
RFP NO. 93-18
MANAGEMENT AND DISPOSAL OF SOLIDS
CORBALIS WATER TREATMENT PLANT

SECTION 1 - SPECIFIC PROVISIONS

1. DETAILED SCOPE

1.1 The purpose of this Request for Proposals (RFP) is to select a firm with which to negotiate a contract for management and disposal services to load, transport and directly or indirectly land apply solids from the Fairfax County Water Authority Corbalis Water Treatment Plant. The contract period for these services will be for three years, with provisions for an additional two years extension in one year increments by mutual agreement.

1.2 This is Phase 2 of a two-phase selection process. Only those proposals from applicants qualified under Phase 1 of the selection process will be opened and evaluated for consideration for negotiation and award of any Contract for solids management and disposal services.

1.3 Phase 2 includes the evaluation of proposals to determine the offeror with capabilities and programs that best meet the requirements of the Authority for provision of the services. The successful offeror will be required to provide a Performance and Payment Bond in the amount of 100 percent of the estimated total contract. Both bonds shall be in a form acceptable to the Authority.

1.4 The Authority shall not be liable for any costs incurred by offerors in connection with the preparation, submission, review and evaluation of proposal material and any findings and determinations made therefrom.

2. LOCATION OF PLANT

2.1 The Corbalis Water Treatment Plant is located at 1250 Holly Knoll Drive, Herndon, Virgina 22070.

3. SUBCONTRACTS

3.1 All subcontractors for solids loading and transportation shall be subject to prior approval by the Authority.

3.2 All subcontracts for solids disposal (application) shall be approved by the Authority and shall list the Authority as having the option of taking over the Contract if the Contractor defaults on his Contract with the Authority.

4. PROPOSAL SECURITY

4.1 Proposals must be accompanied by a proposal guarantee of not less than five percent (5%) of the amount of the non-binding estimated cost for 12 months of operation, and may be in the form of a certified check or casher's check, or a Bid Bond made payable to the Authority.

4.2 Such bond or check shall be submitted with the understanding that it shall guarantee that the offeror will not withdraw the proposal during the evaluation and negotiation period of one hundred and 90 days following the opening of proposals; that if the proposal is accepted, he will enter into a formal Contract with the Authority, and that the Performance Bond and Certificate of Insurance will be given; and that in the event of the failure to enter into said Contract and give said Bond and Certificate of Insurance within ten (10) days after he has received notice of acceptance of the proposal, the offeror shall be liable to the Authority for the full amount of the proposal guarantee as representing the damage to the Authority on account of the default of the offeror in any particular hereof.

5. PERFORMANCE BOND

5.1 The Contractor shall provide the Authority with a performance bond in the amount of 100 percent of the Contract amount for 12 months of operation. The bond will be security for the faithful performance of the Contractor and for payment of all persons performing labor and furnishing materials in connection with the Contract.

5.2 Bond shall be annually renewable at an amount equal to 100 percent of the greater of the following two amounts:

(1) Contract price for the first 12 months of operation.

(2) Total payments to the Contractor for the previous 12 months of operation.

5.3 The bond shall be kept in force and effect during the life of the Contract.

6. TERMINATION FOR CONVENIENCE

6.1 The Contract may be terminated for convenience with 360 days written notice by the Authority or the Contractor.

7. TERMINATION FOR CAUSE

7.1 The Authority shall have the right to terminate the Contract, with cause, at any time upon seven days written notice to the Contractor. The Contractor shall receive compensation for any satisfactory work performed through the date of such termination; provided, however, that upon receipt of notice of termination, the Contractor shall, as soon as practicable, suspend all work within its control (including services provided by subcontractors or special consultants, if any) and shall not incur any additional expense for which it seeks compensation and, provided further, that daily compensation for services provided during the period between notice of termination and termination shall in no event exceed the average daily compensation paid to the Contractor for services providing during the calendar month immediately preceding notice of termination. Following termination for cause, all finished and unfinished documents, data, plans, studies and reports prepared by the Contractor under the Contract shall, at option of the Authority, become its property.

8. CONTRACTOR DEFAULT

8.1 It is agreed that the Authority has the right to declare the Contractor in default if the:

(1) Contractor is bankrupt or insolvent

(2) Contractor fails to begin work as required within the period agreed upon and allotted for commencement of operations.

(3) Contractor fails to make prompt payments for material, labor or to subcontractors.

(4) Work under the Contract is abandoned or is not prosecuted with reasonable speed

(5) Contractor fails, refuses or neglects to prosecute the work.

CONTRACTOR DEFAULT - continued

(6) Force of workmen or quality or quantity of equipment is not sufficient to insure completion of the work.

(7) Contractor fails to renew the Performance Bond or other insurance policies required herein.

8.2 If the Contractor is found in default, the Authority shall provide written notice to the Contractor and his sureties.

8.3 The written default notice shall set forth the ground or grounds upon which the default is declared and the Contractor must discontinue the work.

9. LIQUIDATED DAMAGES

9.1 It is agreed between the parties that time is of the essence in this Contract and that there will be on the part of the Authority considerable monetary damage in the event the Contractor shall fail to commence and maintain full solids disposal operations within the time fixed.

9.2 The amount of the liquidated damages shall be $2,500 per every calendar day that time consumed in starting operations exceeds the starting date stated in the Notice to Proceed, and for each day thereafter, in which the Contractor does not remove the solids from the Water Treatment Plant site.

9.3 The liquidated damages shall, in no event, be considered as a penalty or otherwise than as the liquidated and adjusted damages to the Authority because of the delay and the Contractor and his surety agree that the stated sum per day for each such day of delay shall be deducted and retained out of the monies which may become due hereunder and if not so deductible the Contractor and his surety shall be liable therefor.

10. NOTICE TO AUTHORITY REQUIRED FOR SUBSTANTIAL CHANGE IN FINANCIAL CONDITION OR PERSONNEL

10.1 If the offerer experiences a substantial change in his financial condition or personnel prior to the completion of Phase Two, the offerer shall notify the Authority of the change in writing at the time the change occurs.

10.2 Failure to notify the Authority of any substantial change in financial condition or personnel may constitute grounds rescinding selection or award of a contract under Phase Two.

11. EVALUATION CRITERIA

11.1 GENERAL

Proposals will be evaluated on the findings resulting from review and evaluation of information submitted in accordance with the requirements of Section 5 of the RFP. Criteria for evaluation include but not necessarily limited to the following:

11.2 PROJECT PLANNING

a. Completeness of proposal solids management and disposal plan.

b. Documented experience with indirect (marketing) disposal methods.

c. Adequacy of solids storage and disposal sites.

d. Demonstrated understanding and meeting of all regulatory agency requirements applicable to this Project.

11.3 PROJECT ORGANIZATION

a. The offerer's organization and planning ability must reflect at least two years experience for the key personnel on similar type work and in similar capacity as proposed for this Project.

b. Qualifications of proposed subcontractors and personnel.

c. Minority participation.

d. Marketing personnel.

11.4 PROJECT MANAGEMENT

a. Comprehensive detail and scope of public relations program.

b. Comprehensive detail and scope of marketing program.

c. Complete compliance with loading rates and reporting requirements.

d. Compliance with all regulatory requirements.

11.5 PROJECT IMPLEMENTATION

a. Timetable that best meets Authority solids disposal needs.

b. Adequate personnel and equipment on hand to meet proposed program.

c. Sufficient permits and agreements for solids storage and disposal areas.

d. Marketing potential.

11.6 ESTIMATED COST

a. Total estimated cost to the Authority.

11.7 PROPOSAL EVALUATION CRITERIA

Proposals will be ranked by applying weighing factors as follows:

		Weighing Factors
A.	Project Planning	15%
B.	Project Organization (Including Minority Business Participation)	15%
C.	Project Management	15%
D.	Project Implementation	20%
E.	Estimated Cost	35%
	Total	100%

* * * * * * * * * * * * * * * * *

October 12, 1993

FAIRFAX COUNTY WATER AUTHORITY

RFP NO. 93-18
MANAGEMENT AND DISPOSAL OF SOLIDS
CORBALIS WATER TREATMENT PLANT

SECTION 2 - TECHNICAL PROVISIONS

1. SOLIDS QUANTITIES AND CHARACTERISTICS

1.1 GENERAL

The solids management and disposal program will be required to accommodate both dewatered solids with various quantities and combinations of silt, alum, polymer, powdered activated carbon (PAC) and lime. Dewatered solids at the Corbalis Water Treatment Plant (Plant) are mainly river silt with alum added as a coagulant. During short periods of time each year, PAC is applied in the treatment process to control finished water taste and odor levels. The settled solids are dewatered using lime or polymer as a conditioner and perlite as filter precoat. The Plant currently uses lime as a solids conditioner but may convert to the use of polymers or a combination of lime and polymers as a solids conditioner during the period of this Contract. Dewatered solids shall be disposed of either directly or indirectly by land application in accordance with all local, state and federal regulations. Direct land application includes actual application of the dewatered solids to appropriately permitted land by the Contractor. Indirect land application includes marketing the dewatered solids for ultimate land application by others. For direct application, the final land application disposal site(s) shall be obtained by the contractor in accordance with all local, state and federal regulations. For indirect application, all marketing and other requirements required to comply with all local, state and federal regulations shall be obtained by the Contractor. The final management plan for dewatered solids disposal may be a combination of both direct and indirect disposal.

The estimated characteristics of the dewatered solids are summarized here:

A. <u>Lime Conditioned Solids</u>

Total solids content by weight	25 - 50%
Calcium carbonate equivalency	10 - 30%
Aluminum content	2.7 - 3.8%
pH	7.5 - 12.5

B. Polymer Conditioned Solids

Total solids content by weight	30 - 50%
Calcium carbonate equivalency	0 - 1%
Aluminum	3.0 - 4.8%
pH	7.0 - 7.5%

Dewatered solids which contain PAC can be expected to be black in color, but will have the same general characteristics as the lime and polymer conditioned solids listed above.

1.2 SOLIDS QUANTITIES

It is estimated that the average annual solids quantity produced by the Plant will range from 40 to 340 wet tons per day (2,000 lbs/ton) during the Contract period. The quantity throughout a year is estimated to average on the order of 49 wet tons per day. The maximum annual quantity is estimated to be 20,000 wet tons.

The solids being produced by the Plant have been determined to be non-hazardous, based upon Toxicity Characteristic Leachate Procedure (TCLP) testing. Copies of TCLP test results from recent dewatered solids samples from the Plant for the lime conditioned solids were included as Exhibit A in the RFQ 92-9.

The characteristics listed above are expected to be typical of the solids to be typical of the solids to be disposed by land application or other approved methods. However, the Authority does not guarantee that all of the solids will meet all of the quantities or characteristics listed herein. The lime conditioned solids are registered as a trademark by the Maryland Department of Agriculture, under the name "pH Plus".

2. GENERAL OPERATIONS

2.1 The Contractor selected for the services will be required to provide the services generally in accordance with the following:

- Receive dewatered solids from the existing outdoor concrete storage pad or other solids holding areas located on the Plant site.

- Blend dewatered solids which contain PAC with other dewatered solids as required for solids disposal.

- Obtain and pay for all required disposal permits required from local, State and Federal regulatory agencies.

  Remove dewatered solids temporarily stored on site and transport off site.

- Land apply or dispose of by other approved method all dewatered solids removed from the site.

- Provide all labor, equipment and services for all on site and off site activities and operations necessary for complete management and disposal services.

2.2 The Contract shall be based on the Contractor providing services for the disposal of lime conditioned solids. The Authority shall have the option to convert the Contract to the disposal of polymer conditioned solids in the future. The procedure to convert the Contract to the disposal of polymer conditioned solids shall be as follows:

- The Contractor would be provided with a minimum of 6 months written notice that the Authority intends to convert the Contract to the disposal of polymer conditioned solids.

- The Authority shall coordinate with the Contractor to switch the Contract from polymer conditioned solids back to lime conditioned solids after the disposal of polymer conditioned solids has begun.

3. DESCRIPTION OF SERVICES

Management and disposal services include the following:

3.1 MANAGEMENT SERVICES

3.1.1 DEVELOPMENT OF DISPOSAL PLAN

a. For Direct Disposal

- Identify disposal sites and permission/permits for use to be able to implement the program not later than January 1, 1994.

- Develop loading, transport and disposal plan including storage provisions conforming to regulatory agency requirements.

b. For Indirect (Market) Disposal

- Identify market
- Develop loading, transport and handling plan conforming to regulatory agency requirements.

3.1.2 COORDINATION WITH REGULATORY AGENCIES

- Identify and contact all regulatory agencies having jurisdiction.
- Identify all applicable rules, regulations and other requirements.
- Demonstrate acceptance of proposed program by regulatory agencies having jurisdiction.

3.1.3 DEVELOPMENT OF MONITORING AND REPORTING REQUIREMENTS

- The objective of the information and assistance programs is to generate interest in the acceptance of the dewatered solids disposal program.
- Identify all applicable monitoring and reporting requirements.
- Develop system of monitoring and reporting.

3.1.4 DEVELOPMENT AND IMPLEMENTATION OF INFORMATION AND ASSISTANCE PROGRAMS

- Identify interested public, user and other groups.
- Establish information and assistance programs (input and output) for land application program.

- Identify market potential.
- Develop marketing plan.

3.2 DISPOSAL SERVICES

3.2.1 LOADING AND TRANSPORT

- Furnish all equipment and personnel required to load dewatered solids from the concrete storage pad located at the plant site into appropriate vehicles for transportation off the plant site.
- The Contractor's use of the plant site shall be restricted to the concrete storage pad and the access road to the concrete storage pad.
- The plant site will be under construction during the Contract period. The solids disposal Contractor shall coordinate his operations with the operations of other contractors working on the plant site.

3.2.2 DEWATERED SOLIDS

- Dewatered solids shall not be stored at the plant site for extended periods of time. Dewatered solids shall not be stored at the plant site beyond 90 days. The Authority may provide the Contractor with written notice to start solids removal operations when solids have been stored at the plant site in excess of 70 days. The Contractor shall promptly proceed to start the removal of the dewatered solids from the plant site after the Authority provides him notice to start.
- The Authority shall have the option to remove solids which have been stored at the site more than 30 days after written notice because the Contractor has failed to perform. The Authority's costs for loading, transportation and disposal of solids removed from the plant site because of the Contractor's failure to perform will be deducted from monies due to the Contractor and if not so deductible the Contractor and his surety shall be liable therefor.

- Dewatered solids stored at the site shall not exceed 6,000 wet tons. The Authority may provide the Contractor with written notice that the solids stored at the site exceed 5,000 wet tons and that the Contractor shall start solids removal operations within 14 days from the date of notice. The Contractor shall promptly proceed to begin the removal of dewatered solids from the plant site after the Authority provides him with notice to start. The Authority shall have the option to remove solids which have been stored at the plant in excess of 6,000 wet tons because the Contractor has failed to perform.
  The Authority's cost for loading, transportation and disposal of solids removed from the plant site because of the Contractor's failure to perform will be deducted from monies due the Contractor, and if not so deductible the Contractor and his surety shall be liable therefor.

  - Applicant shall secure all required temporary solids storage sites located off the plant site and all permits required to store solids during non-disposal periods.

  - Temporary solids storage sites shall comply with all local ordinances and regulations and State and Federal regulatory requirements.

3.2.3 DISPOSAL METHOD

a. Direct Disposal

- Contractor shall dispose of the dewatered solids by land application or other approved method for farming and agricultural purposes as approved by local, State and Federal Agencies. Disposal methods shall comply with all environmental protection laws, ordinances, rules and regulations.

- Contractor shall secure all necessary permits for the transportation, storage and land application of dewatered solids as required by any local, State and Federal regulatory agencies.

- Contractor shall obtain all agreements with landowners, provide all equipment, materials, labor and services necessary to dispose of all dewatered solids furnished by the plant for disposal.

- Dewatered solids shall be applied at loading rates not to exceed those approved by the regulatory agencies and landowners.

- Solids and soil samples shall be collected and tested as required by the regulatory agencies.

b. Indirect (Market) Disposal

- Contractor shall dispose of the dewatered solids by marketing to the general public or specific third parties. Disposal methods shall comply with all environmental protection laws, ordinances, rules and regulations.

- Contractor shall obtain all necessary approvals for the packaging, transportation, storage and marketing of dewatered solids as required by any local, State and Federal regulatory agencies.

3.2.4 MINIMUM LAND REQUIREMENTS

- Contractors shall secure land sites for storage and disposal which have a total effective area in excess of the area required for the maximum annual solids quality.

- Sufficient permits shall be maintained in hand at all times for 12 months of operation.

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October 12, 1993

FAIRFAX COUNTY WATER AUTHORITY

RFP NO. 93-18
MANAGEMENT AND DISPOSAL OF SOLIDS
CORBALIS WATER TREATMENT PLANT

SECTION 3 - GENERAL PROVISIONS

1. TERM OF CONTRACT

   1.1 The term of the contract resulting from this RFP shall be for a period of three years.

2. OPTION TO RENEW

   2.1 A contract resulting from this RFP may be extended by mutual consent for an additional two years in one year increments. Written notice to extend for each of the two option years must be provided at least sixty days prior to the end of the year immediately preceding the option year.

3. EQUAL EMPLOYMENT OPPORTUNITY

   3.1 Prospective offerors must affirm and shall certify by submitting and signing their proposal, that their company fully complies with Resolution No. 74-R8-11 adopted February 24, 1974, Title VI and Title VII of the Civil Rights Act of 1964 and all other regulations promulgated thereunder.

4. REQUIRED FORMAT

   4.1 All proposals must be in the format required in this RFP as outlined in the Instructions. Non-conformance will be reason to declare the proposal non-responsive.

5. MINORITY PARTICIPATION

   5.1 The Authority strongly encourages offerors to include minority subcontractor participation in your proposal. Minority contractor participation will be considered in evaluating each proposal.

6. AGREEMENT

   6.1 The selected Contractor will be expected to enter into an agreement with the Authority for solids management disposal services.

7. INSURANCE

7.1 The Contractor shall, throughout the duration of the Contract, secure and maintain with companies authorized to do business in the Commonwealth of Virginia and sat and satisfactory to the Authority, the types of insurance required as outlined in this section.

7.2 The Contractor shall provide evidence of insurance, via a standard Certificate of Insurance from the Contractor's carrier, within ten days after execution of the Contract. Failure to submit a Certificate of Insurance will result in termination of the Contract.

A. Commercial General Liability Insurance including bodily injury, accidental death, as well as for claims for property damage. Policy subject to a $1,000,000 combined single limit per person/occurrence. The policy shall have an error and omissions endorsement.

B. Worker's Compensation and employer's liability insurance for all employees engaged in the Work under the Contract in accordance with the laws of the Commonwealth of Virginia. If any employees engaged in the Work are not protected under Worker's Compensation the Contractor shall provide similar protection for these employees in amounts not less than the legal requirements.

C. Automobile Liability Insurance including owned, non-owned and hired vehicles, $1,000,000 combined single limit.

D. Professional Liability Insurance coverage in an amount not less than $1,000.000.

7.3 Each policy of insurance shall contain an endorsement as follows:

> "It is understood and agreed that _____ Insurance Company shall notify the Fairfax County Water Authority, in writing, thirty days in advance of the effective date of any reduction in or cancellation of this policy."

7.4 All income taxes, retirement, worker's compensation and other fringe benefits shall be the responsibility of the Contractor.

7.5 The insurance coverage specified herein shall constitute minimum requirements. The Authority shall be named as an additional insured under the policies and coverage identified in this section.

7.6 All policies or certificates of Insurance must be issued indicating that such policies or certificates are applicable to all Work being performed by the Contractor for the Authority under this Agreement.

7.7 Policies and Certificates of Insurance must clearly indicate that they will remain in force for a period of one year from inception date or until all Work is completed by the Contractor and accepted by the Authority.

7.8 Nothing herein shall be deemed to operate as a waiver of the Authority's sovereign immunity under the law.

7.9 All of the aforementioned policies and Certificate of Insurance should be issued immediately after the Contractor receives notification of award and prior to beginning the work.

8. INDEMNIFICATION

8.1 The offeror agrees to indemnify and hold the Authority, its members, officers, agents and employees harmless from any and all claims made against the Authority, its members, officers, agents and employees which arise out of any act or omission of the offeror and any and all claims which result from any condition created or maintained by the offeror.

8.2 The agreement to indemnify and hold the Authority, its members, officer, agents and employees harmless shall not be limited to any liability insurance required under a separate provision of this RFP.

9. CONFLICT OF INTEREST

9.1 The offeror covenants that it has presently no interest, nor shall it acquire interest, direct or indirect, which would conflict in any manner or degree with the performance of services required under this contract. The offeror further covenants that in the performance of this contract no person having such interest shall be employed by the offeror.

10. TAXES

10.1 The Authority is exempt from federal and state taxes.

11. GOVERNING LAW AND POLICY

11.1 Any contract resulting from this RFP shall be governed in all respects by the laws of the Commonwealth of Virginia without reference to conflict of laws or principles and the Authority's Procurement Policy.

12. RELEASE OF DOCUMENTS

12.1 No reports, information, or data given to or prepared by any firm selected to provide the services furnished under the resulting contract shall be made available to any individual or organization by that firm without the prior written approval of the Authority.

13. ASSIGNMENT

13.1 No firm selected to provide the services furnished under the resulting contract may assign any interest in the contract or transfer any interest in the same without prior written consent of the Authority.

14. NON-DISCRIMINATION

14.1 During the performance of this contract, the contractor agrees as follows:

A. The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.

B. The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.

C. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this provision.

15. FAIRFAX COUNTY WATER AUTHORITY CONTRACTS-EMPLOYEES NOT TO BENEFIT

15.1 Upon the request of the Engineer-Director, as a prerequisite for payment pursuant to the terms of this contract, there shall be furnished to the Authority a statement that no employee of the Authority has received or has been promised, directly or indirectly, any financial benefit by way of fee, commission, finder's fee or in any other manner remuneration arising directly or indirectly from this contract.

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October 12, 1993

FAIRFAX COUNTY WATER AUTHORITY
RFP NO. 93-18
MANAGEMENT AND DISPOSAL OF SOLIDS
CORBALIS WATER TREATMENT PLANT

SECTION 4 - INSTRUCTIONS

1. UNDERSTANDING OF REQUIREMENTS

1.1 It is the offeror's responsibility to examine and understand the requirements of this contract. If a question arises as to the meaning or intent of the requirements, inquiry should be directed to the Purchasing Agent.

1.2 The submission of a proposal shall indicate that the offeror thoroughly understands the terms and conditions listed herein.

2. ADDENDA & INTERPRETATIONS

2.1 No interpretation of the meaning of the Request for Proposals will be made to any applicant orally. Every request for such interpretation must be in writing addressed to Purchasing Agent, Fairfax County Water Authority, P. O. Box 1500, Merrifield, Virginia 22116-0815. Written inquiries may be Faxed to (703) 204-1084. To be given consideration, requests must be received at least 5 days prior to the closing date. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent to all prospective offerers at the respective addresses furnished for such purposes, no later than three days prior to the date fixed for submittal of Proposals. Failure of any offerer to receive any such addenda shall not relieve said offerer from any obligation under his proposal as submitted. All addenda so issued shall be come part of the RFP documents.

3. ACCEPTANCE/REJECTION OF PROPOSALS

3.1 The Authority reserves the right to accept or reject any and/or all proposals, to waive irregularities and technicalities, and to request resubmission. The Authority reserves the right to award the contract to the responsible offeror submitting a responsive proposal, resulting in an agreement which is most advantageous and in the best interest of the Authority. The Authority shall be the sole judge of each proposal and its decision shall be final.

3.2 The Authority reserves the right to request clarification of information submitted and to request additional information of one or more offerors.

4. PROPOSAL PERIOD

4.1 Any proposal may be withdrawn up to the date and time set for the receipt and opening of the proposals. Any proposal not so withdrawn shall constitute an irrevocable offer for a period of 90 days to provide the Authority the services set forth in the proposal, or until such earlier time as determined by the Authority.

5. PROPOSAL FORMAT

5.1 Offerers shall submit an original (so marked) and six copies of their proposal. All material submitted shall become the property of the Authority and will not be returned. Proposals must be in the following general sequence:

A. Letter of Transmittal: signed by offerer's contractually binding authority with a commitment that the proposal will serve as firm bases for entering into a Contract under the terms outlined in the RFP.

B. Project Planning

- Specific details of the proposed procedures for solids management and disposal services for the quantities of solids with characteristics described previously.
- Details of the proposed method of solids disposal direct and indirect.
- Description of proposed method and procedures of solids loading at the plant site including interface with the Authority operations.
- Details of the planned procedures for solids management during non-application periods.
- Description of proposed off-site solids storage and how such storage will meet regulatory requirements. List of proposed storage site(s), including associated permit provisions, days allocated, use of Authority's storage slabs.

- List of proposed disposal sites, including associated permit provisions.
- List of property owners for proposed storage and disposal sites, including agreements by land owners to commit to the proposed plan.
- List of potential marketing options.
- Details of marketing program and bases for market development.
- List of all applicable regulatory agency rules and requirements, and demonstrations of how all requirements are satisfied in the proposed plan for both direct and indirect disposal.

C. Project Organization

- Organizational chart of supervisory and key personnel proposed to work on this project, including resumes.
- Organizational chart of firms and businesses who would be working on the project. For each firm or business, the following specific information must be provided:
  - Business name and address
  - Specific firm responsibility on project
  - Percentage or dollar amount of work to be performed
  - Key personnel
  - Demonstration that proposed firm or business is qualified to perform the work
- Separately identify proposed minority business participation and activities to be performed and provide all information requested above. Specifically show how MBE commitment will be attained (dollar amount of total computed average annual cost).

D. Project Management

- Details of public relations program proposed for this project
- Details of marketing plan

- Details of control procedures employed to ensure compliance with approved solids loading rates.
- Details of proposed solids sampling, testing and reporting program.
- Details of proposed soil sampling, testing and reporting program.
- Demonstration of compliance with all federal, state and local statutes, ordinances and regulations applicable to the performance of the proposed solids management and disposal plan.

E. Project Implementation

- Timetable to demonstrate ability to fully implement the program not later than January 1, 1994 to interface with existing solids disposal Contractor.
- Details of personnel and equipment necessary to operate the program, and demonstration that these resources are available to meet the implementation schedule.
- Demonstration that all permits and agreements will be secured to implement the plan.
- Solids removal schedule from the plant site.

6. PROPOSAL SUBMISSION

6.1 Only proposals received by 2:00 PM Local Prevailing Time on October 28, 1993 at the office of the Authority will be evaluated.

Mailing address: Fairfax County Water Authority
Purchasing Department
P.O. Box 1500
Merrifield, Virginia 22116-0815

Street address: Fairfax County Water Authority
Purchasing Department
8560 Arlington Boulevard
Fairfax, Virginia 22031

6.2 The outside of the package containing the proposal shall be marked in the lower left-hand corner as follows:

Proposal Submittal. Do Not Open
Services for Management and Disposal of Solids
10-28-93, 2:00 PM Local Prevailing Time.

6.3 The Authority is not responsible for the premature opening of a proposal not properly addressed and identified. Proposals which are opened prior to the official time as a result of improper identification may be rejected.

6.4 At the designated time and date, the Authority will open and list the proposals for the records. This is not a public opening. The proposals, if responsive, will be forwarded to the Evaluation Committee to initiate review and recommendation.

6.5 Proposals that fail to conform to the requirements of the RFP will be considered non-responsive and the applicant will not be considered any further in the evaluation process. The Authority reserves the right to request the submission of additional information to assist in evaluating a proposal.

7. RETURN OF PROPOSAL

7.1 The Authority advises that all materials submitted under this RFP will become the property of the Authority and will not be returned.

8. PROPRIETARY NATURE OF PROPOSALS

8.1 All proposals will be considered to be of proprietary nature until such time as a contract is awarded.

9. MISREPRESENTATION

9.1 If any offerer knowingly makes a material misrepresentation in submitting information to the Authority, such misrepresentation will be sufficient grounds for rescinding selection or award of a Contract under Phase 2.

10. EVALUATION

10.1 During the evaluation phase, proposals will be reviewed by an Evaluation Committee to ascertain which proposal best addresses all the requirements of the RFP. To assist in the evaluation, each offerer may be required to make an oral presentation of their proposal for solids management and disposal services to the Evaluation Committee. The presentation will be followed by an interview session to clarify specific matters presented. If deemed necessary, presentations will be scheduled as soon as practical after receipt of proposals and will be held at a location in Fairfax County, Virginia.

10.2 The Evaluation Committee will use available information to rank applicants in accordance with criteria stated in the RFP.

11. SELECTION FOR NEGOTIATION

11.1 The selection phase involves the rating of each offerer on the stated criteria. Selection will be based on the Authority's judgement of the offerer's ability to perform the desired service in a responsible manner using high quality standards. The highest ranked offerer will be invited to participate in the negotiation of a contract for solids management and disposal services.

12. NEGOTIATION

12.1 All aspects of the solids management and disposal services, including scope of work, schedule, responsibilities and unit price(s) shall be subject to negotiation prior to execution and award of any contract. If negotiations are not concluded successfully with the highest ranked offerer, then such negotiations shall be concluded and the Authority will enter into negotiations with the next highest ranked offerer. The Authority may follow this procedure with all offerers.

13. PROPOSAL REVIEW AND CONTRACTOR SELECTION

13.1 Proposals received shall be reviewed in accordance with guidelines set forth in the Virginia Public Procurement Policy and the Authority's Procurement Policy.

13.2 The Authority is under no obligation to award a contract, but may do so based upon the analysis of submitted proposals, subsequent interviews and negotiations with the best qualified offer.

* * * * * * * * * * * * * * * *

October 12, 1993

FAIRFAX COUNTY WATER AUTHORITY

RFP NO. 93-18
MANAGEMENT AND DISPOSAL OF SOLIDS
CORBALIS WATER TREATMENT PLANT

SECTION 5 - COMPENSATION

1. GENERAL

1.1 Compensation for solids disposal will be on the basis of wet tons of dewatered solids removed from the plant site by the Contractor. Payment will be based on a unit price per wet ton.

1.2 The offerer shall complete and submit with the proposal the non-binding estimate of unit prices in dollars per wet ton for management and disposal of dewatered solids as described in this RFP. The individual unit prices shall include all costs associated with the management and disposal for each wet ton of solids and no separate or other payments will be made therefor.

1.3 The compensation provisions are non-binding and may be modified during negotiations. The final payment provisions will be negotiated and included in the Contract for solids management disposal services.

1.4 Proposals will be evaluated based on the estimated annual contract cost as computed below for lime and polymer conditioned solids. The offerer has the option of selecting one or a combination of solids disposal options. In order for the proposal to be considered, the offeror must include one of the lime conditioned solids disposal options.

Contract Item	Description	Disposal	Estimated[1] Avg. Ann. Solids Quantity (Wet Tons)	Non-Binding Computed Average ($/Wet Ton)	Cost.$
C-I-A	Dewatered Lime Conditioned Solids	Direct	_____	_____	____
C-I-B	Dewatered Lime Conditioned Solids	Indirect	_____	_____	____
	Total (C-1-A + C-1-B)		17,885		

Contract Item	Description	Disposal	Estimated[1] Avg. Ann. Solids Quantity (Wet Tons)	Non-Binding Computed Average ($/Wet Ton)	Cost.$
C-2-A	Dewatered Polymer Conditioned Solids	Direct	_____	_____	_____
C-2-B	Dewatered Polymer Conditioned Solids	Indirect	_____	_____	_____
	Total (C-2A + C-2-B)		14,666		

NOTE:

[1] Offerer shall indicate quantity of dewatered solids in wet tons, to be disposed of directly and quantity to be disposed of indirectly.

2. MEASUREMENT FOR PAYMENT

2.1 Payment will be made on the basis of wet tons of dewatered solids loaded, weighed and removed from the site by the Contractor. No separate or additional payments will be made on account of solid quantities being more or less than the estimated average annual solid quantities.

2.2 Water shall not be added to the solids prior to measurements being taken for payment.

2.3 Each truck will be weighed by the Authority by use of the truck scale located on the plant site.

3. METHOD OF PAYMENT

3.1 Payment for solids disposal will be made monthly at the applicable contract unit price per wet ton of dewatered solids loaded, weighed and removed from the plant site.

3.2 The Contractor's monthly payment request shall include the following:

(1) Truck summary sheet for dewatered solids removed from the plant site. The truck summary sheet shall include the individual truck ticket numbers from the plant site truck scale.

(2) Indication of disposal (direct or indirect)

4. NONPAYMENT FOR FAILURE TO PERFORM

4.1 All costs for work by the Authority because of the Contractor's failure to perform will be deducted from current and future payments due the Contractor.

4.2 The Contractor will not be paid for work he fails to perform.

5. ANNUAL UNIT PRICE ADJUSTMENT

5.1 The unit price adjustment per wet ton shall be made effective on the anniversary of the contract Notice to Proceed date. The price adjustment per wet ton shall be applied by substituting the price adjustment for the base bid unit price, for the year in question, and shall remain in force and effect for a one-year period, beginning on the anniversary of the contract Notice to Proceed date.

5.2 The base unit bid price under the contract shall remain fixed for the life of the contract.

5.3 The U. S. average Consumer Price Index - All Urban Consumers for All Items (CPI) - shall be used to adjust the price. The price adjustment for the year in question shall be equal to the base unit price per wet ton multiplied by a unit price adjustment factor. The unit price adjustment factor shall be obtained by dividing the CPI for the preceding year by the base CPI. The base CPI shall be the average for the preceding calendar year prior to the contract execution. The CPI used to compute the price adjustment factor shall be the average for the preceding calendar year, from the date the price adjustment will take effect.

HYPOTHETICAL EXAMPLE

1992 289.1 (Actual 1992 CPI)

1993 305.0 (Assumed 1992 CPI)

$$\frac{305.0}{289.1} = 1.055 \text{ (price adjustment factor)}$$

$8.60 x 1.055 = $9.07 (Adjusted unit price)

5.4 In the event that the above publications are not available within 60 calendar days of the anniversary date for which the price adjustment is to be made, then a mutually agreed upon price adjustment shall be used for the interim period. When the publications become available, the adjustment shall be computed as described above and said adjustments shall be made retroactive to the anniversary date.

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BLUE PLAINS WWTP

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Attachment K: Wage Determination No.
Attachment L: Sludge Analytical Reports (Pages 1 through 6)
Attachment M: Tax Certification Affidavit

SECTION A: GENERAL

The solids resulting from wastewater treatment which are suitable for beneficial use or recycling are now referred to as "biosolids". The term is used throughout the wastewater industry, replacing the term "sludge", and is used throughout this document.

A.1 Required Minority Participation

A. To meet the goals of D.C. Law 1-95, as amended, D.C. Code Sec. 1-1141 et seq. (1987), each offeror shall agree that at least 35% of the total amount of the contract will be performed by Minority Business Enterprises (MBEs) certified as such by the D.C. Department of Human Rights and Minority Business Development (DHRMBD) by the date for submission of proposals. By signing the proposal, the offeror certifies that 35% of the total amount of the contract will be performed by MBEs certified by the DHRMBD.

B. For information regarding DHRMBD certification and lists of certified MBEs, contact:

Department of Human Rights and Minority
Business Development
Reeves Center
2000 14th Street, N.W., Third Floor
Washington, D.C. 20009
(202) 939-8780

A.2 Synopsis of Procurement

The District of Columbia is soliciting proposals for hauling and utilization of biosolids from the Blue Plains Wastewater Treatment Plant in Washington, D.C.

A.3 Contact Person

For Procurement Information Regarding this RFP Contact:

Danny Weiss, Chief
Contract Support Division
Department of Public Works
Reeves Center
2000 14th Street, N.W.
Washington, D.C. 20009
202-939-8072

A.4 Pre-proposal Conference

A pre-proposal conference to discuss the contents of this RFP and other pertinent matters will be held at 1:00 P.M. DST,

_____ at 5000 Overlook Ave., S.W., Room 317 of the Central Operation Facility, Washington, D.C. 20032. Prospective offerors will be given an opportunity to ask questions regarding this RFP at the conference. See also Section A.5 of this RFP.

A.5 Explanations to Prospective Offerors

Any prospective offeror desiring an explanation or interpretation of this RFP must request it in writing. Requests should be directed to Mr. Danny Weiss at the address listed in Section A.3. Requests must be received no later than _____. Any information given to a prospective offeror concerning a solicitation will be furnished promptly to all other prospective offerors as an amendment to the RFP, if that information is necessary in submitting offers or if the lack of it would be prejudicial to any other prospective offerors. Oral explanations or instructions given before the award of the contract will not be binding.

A.6 Failure to Submit Offer

Recipients of this solicitation not responding with an offer should not return this solicitation. Instead, they should advise Mr. Danny Weiss by letter or postcard whether they want to receive future solicitations for similar requirements. It is also requested that such recipients advise Mr. Weiss of the reason for not submitting a proposal in response to this RFP. If a recipient does not submit an offer and does not notify Mr. Weiss that future solicitations are desired, the recipient's name may be removed from the applicable mailing list.

A.7 Proposal Protests

Any aggrieved party may protest this solicitation, award, or proposed contract award. The protest shall be filed, in writing, within ten (10) working days after the basis of the protest is known or should have been known, with the Contract Appeals Board, 717 14th St., N.W., Suite 430, Washington, D.C. 20005.

SECTION B: PROPOSAL PREPARATION AND SUBMISSION

B.1 Proposal Identification

Proposals shall be submitted in two parts titled: "Technical Proposal" and "Price Proposal". An original and six (6) copies shall be submitted in a sealed envelope conspicuously marked: "Proposal in response to RFP No._____,Hauling and Utilization of Blue Plains Sludge."

B.2 Hand Delivery or Mailing of Proposals

Deliver to:	or	Mail to:
Dept. of Public Works Office of Management Services Contract Support Branch 2000 14th Street N.W. Second Floor Washington, D.C. 20009		Dept. of Public Works Office of Management Serv Contract Support Branch P.O. Box 43182-9182 Washington, D.C. 20010

B.3 Proposal Submission Date and Time

Proposals must be submitted no later than 4:30 P.M. DST on _____.

B.4 Proposal Size and Organization

All proposals must be submitted on 8 1/2" by 11" bond paper and typewritten. The participating jurisdictions (see D. 3) shall not be liable for any cost incurred by the offeror in preparation of the proposal. Telephonic and telegraphic proposals will not be accepted. The proposals shall be organized as follows:

Section I. Attachments

Attachments C, D, E, G, J and M shall be included. In addition, offeror shall include the information requested in Sections, B.10, B.12 and B.16.

Section II. Technical Proposal

A. This section shall contain an introduction outlining the offeror's overall technical approach to complete the total project and illustrating an understanding of the project. This statement should include the work to be performed; a project schedule with specified deadlines corresponding to the deliverables deadlines set forth in Section D; a description of how the work

will be accomplished within each phase of project activity; a list of tangible deliverable items, such as preliminary reports, interim reports, presentations, final reports, or other physical evidence of a task completed, a summary of any problems which the offeror might reasonably expect and a solution to those anticipated problems, and D.C. facilities requirements.

B. This section of the proposal shall describe the offeror's methodology for accomplishing the work outlined in the "Scope of Work" which should be described in sufficient detail to permit the District to evaluate it fairly and with a minimum of possible misinterpretation.

C. As discussed in Section A.1, thirty-five percent minority business participation is required. In this section, offerors shall indicate the percentage of work to be accomplished by the proposed certified Minority Business Enterprise (MBE), and submit the following documentation.

(1) Letter(s) of certification issued by the DHRMBD to the MBE(s) who will perform work under the contract.

(2) Signed agreement(s) between the offeror and certified MBE(s) which are unconditional, except to the extent they are subject to the award of a contract, pursuant to this solicitation. These agreements must include, at a minimum, the following:

- Price (including amount and method of compensation in order to enable the District to accurately compute the percentage of minority participation relative to the total amount of the contract);
- Term or period of contract;
- Specific services to be performed;
- Extent of services or work to be performed by subcontractors and extent of services or work including price and method of compensation to be subcontracted by the subcontractor at any tier; and
- Conditions for termination.

The apparently successful offeror(s) will be required to submit, within five (5) working days after the date

of the District's request, a sheltered market subcontracting plan which meets the requirements of the District of Columbia Procurement Regulations, 27 DCMR 1104 (Attachment I).

Section III. Organizational Support and Experience

This section shall contain all pertinent information relating to the offeror's organization, including resumes of key personnel to be assigned, the percentage of time that each will devote to the contract, abstracts of experience that would substantiate their qualifications and capabilities to perform the services required by the scope of the RFP.

This section shall include the following:

A. Location of headquarters;

B. A chart of the offeror's internal organization which shows the number of full-time personnel, contract staff members, and their level of responsibility within that organization;

C. Documentation which clearly shows the offeror's experience in performing similar contracts: See also Section C.11 of the RFP.

- Name of client organization
- Name, address, and current phone number of client contact person
- Contract number and inclusive dates
- Contract amount

D. Offeror shall provide the following information for every resume:

- Full name
- Title and areas of specialty
- Affiliation (that is, staff of offeror or subcontractor)
- Education/training

E. Prior and Pending Litigation/Liens and Debts:

The offeror shall list and summarize any civil litigation and criminal prosecutions involving it and any litigation between it and any party involving any bribery activities, class actions involving

discrimination complaints and antitrust suits within the last five (5) years. This information shall also be submitted for the offeror's parent or subsidiary organization or any of its subcontractors. The offeror, for itself, its parent or subsidiary organizations and its subcontractors previously mentioned, shall list all existing debts owed to participating jurisdictions and any liens placed on property of the offeror within the last three (3) years.

F. Permits and Disposal Sites Information

Section IV. Price Proposal

This section shall be submitted under a separate cover entitled "Price Proposal". It shall include the Offer Form (Attachment A) and the Cost/Price Analysis Form (Attachment B).

B.5 Complete Proposals

Proposal shall represent the best efforts of the offerors and will be evaluated as such. Proposals must set forth full, accurate, and complete information as required by the RFP.

B.6 Key Personnel

The offeror shall set forth in its proposal in Section III the names and reporting relationships of the key personnel whom the offeror will use to perform the work under the proposed contract. Their resumes shall be included in Section III.

B.7 Unnecessarily Elaborate Proposals

Unnecessarily elaborate brochures or other presentations beyond those sufficient to present a complete and effective response to this solicitation are not desired and may be construed as an indication of the offeror's lack of cost consciousness. Elaborate art work, expensive paper and bindings, and expensive visual and other presentation aids are neither necessary nor desired.

B.8 Retention of RFP

All proposal documents shall be retained by the District and therefore will not be returned to the offerors.

B.9 Examination of RFP

Offerors are expected to examine the Statement of Work and all

instructions and attachments in this RFP. Failure to do so will be at the offeror's risk.

B.10 Legal Status of Offeror

Each offeror must provide the following information in its proposal:

A. Name of the offeror;

B. Whether offeror is a corporation, joint venture, partnership (including type of partnership), or individual;

C. Copy of any current license, registration, or certification to transact business in the District of Columbia if required by law to obtain such license, registration, or certification. If the offeror is a corporation or limited partnership and does not provide a copy of its license, registration, or certification to transact business in the District of Columbia, the offeror shall certify its intent to obtain the necessary license, registration or certification prior to contract award or its exception from such requirements; and

D. If the offeror is a partnership or joint venture, names of general partners or joint ventures.

B.11 Organization of Offeror

Each proposal must further contain a chart showing the internal organization of the offeror and the numbers of full-time personnel in each organizational unit. This shall be included in Section III of the proposal.

B.12 Offeror's Authorized Agent

Each proposal shall set forth the name, title, telephone number, and address of the person authorized to negotiate on behalf of the offeror and contractually bind the offeror, if other than the person signing the proposal.

B.13 Price Schedule Submission

Offerors are to submit prices on the Offer Form, Attachment A. Offers for services other than those specified will not be considered. The prices set forth in the form will be used for evaluation purposes and for establishing a contract price. A Cost/Price Analysis Form (Attachment B) must be submitted for each Award Item offered.

B.14 Delivery Schedule

See Section D of the Request for Proposals, if applicable.

B.15 Certifications and Representations

Offerors shall complete and return with their proposal the Representations and Certifications, Attachment D, the Equal Employment Opportunity Forms, Attachment E and the Tax Certification Affidavit, Attachment M.

B.16 Signing of Offers

The offeror shall sign the offer or proposal and print or type its name on the Offer/Award sheet, Attachment C of this RFP. Erasures or other changes must be initialed by the person signing the offer. Offers signed by an agent shall be accompanied by evidence of that agent's authority, unless that evidence has been previously furnished to the Contracting Officer.

B.17 Acknowledgement of Amendments

Offerors shall acknowledge receipt of any amendment to this solicitation (a) by signing and returning the amendment; (b) by identifying the amendment number and date in the space provided for this purpose in Attachment C; or (c) by letter or telegram including mailgrams. The District must receive the acknowledgement by the date and time specified for receipt of offers. Offeror's failure to acknowledge an amendment may result in rejection of the offer.

B.18 Restriction on Disclosure and Use of Data

Offerors who include in their proposals data that they do not want disclosed to the public or used by the District Government except for use in the procurement process shall:

A. Mark the title page with the following legend: "This proposal includes data that shall not be disclosed outside the District Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose except for use in the procurement process."

"If, however, a contract is awarded to this offeror as a result of or in connection with the submission of these data, the District Government shall have the right to duplicate, use, or disclose the data to the extent consistent with the District's need in the procurement process. This restriction does not limit the District Government's right to use, without restriction, information contained in these data if it is obtained from another

source. The data subject to this restriction are contained in sheets (insert numbers or other identification of sheets)."

B. Mark each sheet of data it wishes to restrict with the following legend:

"Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal."

B.19 Late Proposals and Modifications and Withdrawals of Proposals

A. Any proposal received at the office designated in this proposal after the exact time specified for receipt will not be considered unless it is received before award is made, and:

1. It was sent by registered or certified mail not later than the fifth calendar day prior to the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by the 20th of the month must have been mailed by the 15th or earlier); or

2. It was sent by mail and it is determined by the District Government that the late receipt was due solely to mishandling by the District Government after receipt at the District Government installation; or

3. It is the only proposal received.

B. Any modification of a proposal, including a modification resulting from the Contracting Officer's requests for "best and final" offer, is subject to the same conditions as in B.19.A.1 and B.19.A.2 above of this provision.

C. The only acceptable evidence to establish:

1. The date of mailing of a late proposal or modification sent either by registered or certified mail is the U.S. Postal Service postmark on both the envelope or the wrapper and on the original receipt from the U.S. Postal Service. If neither postmark shows a legible date, the proposal or modification shall be deemed to have been mailed late. (The term "postmark" means a printed, stamped, or otherwise placed impression, that is readily identifiable without further action as having been supplied and affirmed on the date of mailing by employees of the U.S. Postal Service.)

2. The time of receipt at the District Government installation is the time-date stamp of such

installation on the proposal wrapper or other documentary evidence of receipt maintained by the installation.

D. Notwithstanding B.19.A, B.19.B, and B.19.C of this provision, a late modification of an otherwise successful proposal which makes its terms more favorable to the District will be considered at any time it is received and may be accepted.

B.20 Rights in Data

A. "Data," as used herein, means recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software. The term does not include information incidental to contract administration, such as financial, administrative, cost or pricing, or management information.

The term "Technical Data", as used herein, means recorded information, regardless of form or characteristic, of a scientific or technical nature. It may for example, be research documents or experimental, developmental or engineering work, or be usable or used to define a design or process or to procure, produce, support, maintain, or operate material. The data may be graphic or pictorial delineations in media such as drawings or photographs, text in specifications or related performance or design type documents, or computer printouts. Examples of technical data include research and engineering data, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications and related information, and computer software documentation. Technical data does not include computer software or financial, administrative, cost and pricing, and management data or other information incidental to contract administration.

The term "Computer Software", as used herein, means Computer Programs and Computer Data Bases. "Computer Programs", as used herein means a series of instructions or statements in a form acceptable to a computer, designed to cause the computer to execute an operation or operations. "Computer Programs" include operating systems, assemblers, compilers, interpreters, data management systems, utility programs, sort/merge programs, and automated data processing equipment maintenance diagnostic programs, as well as applications programs such as payroll, inventory control and engineering analysis programs. Computer Programs may be either machine-dependent or machine-independent, and may be general-purpose in nature or designed to satisfy the requirements of a particular

user.

The term "Computer Data Bases", as used herein, means a collection of data in a form capable of being processed and operated on by a computer.

B. All data first produced in the performance of this contract shall be the sole property of the Government. Contractor(s) hereby acknowledges that all data including, without limitation, computer program codes produced by Contractor(s) for the Government under this Contract are works made for hire and are the sole property of the Government; but, to the extent any such data may not, by operation of law, be works made for hire, Contractor(s) hereby transfers and assigns to the Government the ownership of copyright in such works, whether published or unpublished. The Contractor(s) agrees to give the Government all assistance reasonably necessary to perfect such rights including, but not limited to, the works and supporting documentation and the execution of any instrument required to register copyrights. The Contractor(s) agrees not to assert any rights at common law or in equity in such data. The Contractor(s) shall not publish or reproduce such data in whole or in part or in any manner or form, or authorize others to do so, without written consent of the Government until such time as the Government may have released such data to the public.

C. The District shall have restricted rights in computer software and all accompanying documentation, manuals and instructional materials listed or described in a license or agreement made a part of the contract, which the parties have agreed will be furnished with restricted rights, provided however, notwithstanding any contrary provision in any such license or agreement, such restricted rights shall include, as a minimum, the right to:

1. Use the computer software and all accompanying documentation and manuals or instructional materials with the computer for which or with which it was acquired, including use at any Government installation to which the computer may be transferred by the Government;

2. Use the computer software and all accompanying documentation and manuals or instructional materials with a backup computer if the computer for which or with which it was acquired is inoperative;

3. Copy computer programs for safekeeping (archives) or backup purposes; and

4. Modify the computer software and all accompanying documentation and manuals or instructional materials, or combine it with other software, subject to the provision that the modified portions shall remain subject to these restrictions.

D. The restricted rights set forth in paragraph C are of no effect unless (i) the computer software is marked by the Contractor(s) with the following legend:

RESTRICTED RIGHTS LEGEND

Use, duplication, or disclosure is subject to restrictions stated in Contract No._____ with (Contractor's Name)_____

and (ii) the related computer software documentation includes a prominent statement of the restrictions applicable to the computer software. The Contractor(s) may not place any legend on computer software indicating restrictions on the Government's rights in such software unless the restrictions are set forth in a license or agreement made a part of the contract prior to the delivery date of the software. Failure of the Contractor(s) to apply a restricted rights legend to such computer software shall relieve the Government of liability with respect to such unmarked software.

E. In addition to the rights granted in paragraph C above, the Contractor(s) hereby grants to the Government a nonexclusive, paid-up license throughout the world, of the same scope as restricted rights set forth in paragraph C above, under any copyright owned by the Contractor(s), in any work of authorship prepared for or acquired by the Government under the contract. Unless written approval of the Contracting Officer is obtained, the Contractor(s) shall not include in technical data or computer software prepared for or acquired by the Government under the contract any works of authorship in which copyright is not owned by the Contractor(s) without acquiring for the Government any rights necessary to perfect a copyright license of the scope specified in the first sentence of this paragraph.

F. Whenever any data, including computer software, are to be obtained from a subcontractor under this contract, the Contractor(s) shall use this same clause in the subcontract, without alteration, and no other clause shall be used to enlarge or diminish the Government's or the Contractor's rights in that subcontractor data or computer software which is required for the Government.

G. For all computer software furnished to the Government with the rights specified in paragraph B, the Contractor(s) shall furnish to the Government a copy of the source code with such rights of the scope specified in paragraph B. For all computer software furnished to the Government with the restricted rights specified in paragraph C, the District, if the Contractor(s), either directly or through a successor or affiliate shall cease to provide the maintenance or warranty services provided the District under this contract or any paid-up maintenance agreement, or if Contractor(s) should be declared bankrupt or insolvent by a court of competent jurisdiction, shall have the right to obtain, for its own and sole use only, a single copy of the then current version of the source code supplied under this contract, and a single copy of the documentation associated therewith, upon payment to the person in control of the source code the reasonable cost of making each copy.

H. The Contractor(s) shall indemnify and save and hold harmless the Government, its officers, agents and employees acting within the scope of their official duties against any liability, including costs and expenses, (i) for violation of proprietary rights, copyrights, or rights of privacy, arising out of the publication, translation, reproduction, delivery, performance, use or disposition of any data furnished under this contract, or (ii) based upon any data furnished under this contract, or based upon libelous or other unlawful matter contained in such data.

I. Nothing contained in this clause shall imply a license to the Government under any patent, or be construed as affecting the scope of any license or other right otherwise granted to the Government under any patent.

J. Paragraphs C, D, E, G, and H above are not applicable to material furnished to the Contractor(s) by the Government and incorporated in the work furnished under contract, provided that such incorporated material is identified by the Contractor(s) at the time of delivery of such work.

B.21 <u>Contract Award</u>

A. The Government will award (a) contract(s) resulting from this solicitation to the responsible offeror(s) whose offer(s) conform(s) to the solicitation and is(are) most advantageous to the Government, considering price and other factors specified elsewhere in this solicitation.

B. The Government may award (a) contract(s) on the basis of initial offers received, without discussion. Therefore, each initial offer should contain the offeror's best terms

from a standpoint of price and other factors.

C. Offerors shall submit proposals in accordance with the Offer Form, Attachment A. The Offer Form is comprised of 5 individual Award Items: Item 1 is for 150 tons per day, Item 2 is for 300 tons per day, Item 3 is for 450 tons per day, Item 4 is for 600 tons per day, and Item 5 is for 750 tons per day. The offeror may propose a unit price per ton on any one of the items, provided that if an offeror proposes a unit price on Item 2, it must also propose a unit price on Item 1; if the offeror proposes a unit price on Item 3, it must also propose unit prices on Items 2 and 1; if the offeror proposes a unit price on Item 4 it must also propose a unit price on Items 3, 2, and 1; if the offeror proposes a unit price on Item 5, it must also propose a unit price on Items 4, 3, 2 and 1.

The District intends to make (an) award(s) for the entire 750 tons per day to one or more offeror(s). The District could award five 150 ton per day contracts if they resulted in the most economically advantageous arrangement for the District. The method the District will use to make the award(s) is as follows:

First, the Evaluation Committee shall determine which proposals are acceptable in the Technical, Experience and Management, and Minority Participation areas, using the evaluation factors set forth in Section E of the RFP, pages 39 and 40.
Second, the Evaluation Committee will evaluate prices submitted by acceptable offerors to determine which single offer or combination of offers will result in the most advantageous contract to the District and the user jurisdictions.
Third, using the definitive responsibility criteria set forth for RFP Section D.19 Permits, the contracting officer shall determine whether the lowest priced offeror for a proposed individual award item is capable of performing the tonnage indicated for the individual award item. In determining capability of performance at the tonnage indicated for the individual award item, the contracting officer shall determine the number and size of storage sites for which permits have been obtained, the processing and disposal capacity of each site, and the extent to which the sites have been committed to the use of other jurisdictions or parties. (This information will be provided to the Evaluation Committee in summary form.) If the Contracting Officer and the Evaluation Committee determine that the offeror is not capable of performing the tonnage indicated for the individual award item, the contracting officer shall reject the offer for the individual award item and reevaluate the offers based on

the next lowest priced combination of individual award items that total 750 tons per day in accordance with the paragraph "second" above. The contracting officer may proceed to award the entire 750 tons in this manner.

B.22 Proposal Guarantee, Performance and Payment Security

All proposals submitted in response to this RFP shall include a proposal guarantee, performance security and payment security, as specified below.

A. Proposal Guarantee

Each proposal submitted by an offeror shall be accompanied by a proposal guarantee in the form of a bond (see Attachment J), certified check payable to the "District of Columbia Treasurer," irrevocable letter of credit issued by an insured financial institution, or United States Government securities that are assigned to the District and which pledge the full faith and credit of the United States. This proposal guarantee shall be in an amount equal to five percent of the offeror's proposed first year contract price set forth in the proposal. For additional information regarding guarantee and bond requirements, offerors may refer to Chapter 27 of the District's Procurement Regulations (27 DCMR 2700.1 et seq).

B. Purpose

The purpose of the proposal guarantee is to ensure that the offeror will keep its initial offer open for at least 150 days from the date set in this RFP for submission of proposals, or until negotiations are held, whichever occurs first; that if negotiations are held, the offeror shall keep its best and final offer open for a period of at least 90 days; and upon acceptance by the District of its initial proposal or best and final offer, that it will execute the contract, provide performance and payment securities and insurance information, and meet other requirements within the times specified in the RFP or at the District's request. In the event the offeror fails to keep its initial offer or best and final offer open for the required period of time, or in the event the offeror fails to execute the contract, provide performance or payment securities and insurance information, and meet other requirements within the specified times, the District shall use the proposal guarantee to cover any excess procurement costs to the District for procuring the required work and supplies.

C. Performance Security

Prior to contract execution and within seven days after being called upon by the District to do so, the successful offeror shall provide the District with a performance security securing performance and fulfillment of the contractor's obligations under the contract. Acceptable forms of security are as discussed above in the Proposal Guarantee Section B.22.A. Due to the essential and critical nature of the goods and services being specified in this RFP, the performance security shall be in an amount equal to 100 percent of the offeror's proposed first year contract price. Any change in work, extension of time, or termination of this contract, shall in no way release the Contractor(s) or any of its sureties from any of their obligations. If any modifications which increase the total contract price by $1,000,000 or more are made to the contract resulting from this RFP after contract execution, the Contractor(s) shall be required to provide an additional performance security, or increase its existing security, in an amount such that the total security remains equal to 100 percent of the contract's total price. Any such additions or increases in the posted performance security shall be made within 30 days of execution of the contract modification. Thirty (30) days prior to the expiration of each contract year, the Contractor(s) shall submit performance security, in an amount such that the total security remains equal to 100 percent of the subsequent contract's total price for the next year.

D. Payment Security

Prior to contract execution and within seven days after being called upon by the District to do so, the successful offeror shall provide the District with a payment security that ensures payment as required by law to all persons supplying labor or material in the performance of the work provided for in the contract. Acceptable forms of securities are as discussed above in the Proposal Guarantee Section B.22.A. Due to the essential and critical nature of the goods and services being specified in this RFP, the payment security shall be in an amount equal to 100 percent of the contractor's first year contract price. Any change in work, extension of time, or termination of this contract, shall in no way release the Contractor(s) or any of its sureties from any of their obligations. If any modifications which increase the total contract price by $1,000,000 or more are made to the contract resulting from this RFP after contract execution, the Contractor(s) shall be required to provide an additional payment security, or increase its existing security, in an amount such that the total security remains equal to 100 percent of the contract's total contract price. Any such additions or increases in the posted payment security shall be made

within 30 days of the execution of the contract modification. Thirty (30) days prior to the expiration of each contract year, the Contractor(s) shall submit payment security in an amount such that the total security remains equal to 100 percent of the subsequent contract's total price for the next year.

B.23 Labor Standards

This contract is subject to the Service Contract Act of 1965, as amended (41 U.S.C. 351). The prevailing wage rates shall be incorporated by amendment as Attachment K at a later date but prior to submission.

B.24 Certification Regarding a Drug-Free Workplace

A. Definitions (as used in this provision):

"Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812) and as further defined in regulation at 21 CFR 1308.11 - 1308.15.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession or use of any controlled substance.

"Drug-free workplace" means a site for the performance of work done in connection with a specific contract at which employees of the Contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance.

"Employee" means an employee of a Contractor directly engaged in the performance of work under a Government contract.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

B. By submission of its offer, the offeror, if other than an individual, who is making an offer that equals or exceeds $25,000 certifies and agrees that with respect to all employees of the offeror to be employed under a contract resulting from this solicitation will:

1. Publish a statement notifying such employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Contractor's workplace and specify the actions that will be taken against employees for violations of each prohibition;

2. Establish a drug-free awareness program to inform such employees about--

   (a) The dangers of drug abuse in the workplace

   (b) The Contractor's policy of maintaining a drug-free workplace;

   (c) Any available drug counselling, rehabilitation and employee assistance programs; and

   (d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

3. Provide all employees engaged in the performance of the contract with a copy of the statement required by subparagraph B.1 of this provision;

4. Notify such employees in the statement required by subparagraph B.1 of this provision, that as a condition of continued employment on the contract resulting from this solicitation, the employee will --

   (a) Abide by the terms of the statement; and

   (b) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five (5) days after such conviction.

5. Notify the Contracting Officer within ten (10) days after receiving notice under subdivision B.4(b) of this provision from an employee or otherwise receiving actual notice of such conviction; and

6. Within 30 days after receiving notice under subparagraph B.4 of this provision of a conviction, impose the following sanctions or remedial measures on any employee who is convicted of drug abuse violations occurring in the workplace:

(a) Take appropriate personnel action against such employee up to and including termination; or

(b) Require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purpose by a Federal, State or local health law enforcement or other appropriate agency.

7. Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs B.1 through B.6 of this provision.

C. By submission of its offer, the offeror, if an individual who is making an offer of any dollar value, certifies and agrees that the offeror will not engage in the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance in the performance of the contract resulting from this solicitation.

D. Failure of the offeror to provide the certification required by paragraphs B. or C. of this provision, renders the offeror unqualified and ineligible for award.

E. In addition to other remedies available to the D.C. Government, the certification in paragraphs B. and C. of this provision concerns a matter within the jurisdiction of an agency of the United States and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

SECTION C: SCHEDULE

C.1 Acceptance Period

The offeror agrees, if its offer is accepted within 150 days from the date specified in the RFP for the submission of proposals, or if its best and final offer is accepted within 90 days from the date specified for submission thereof, to furnish any or all items on which prices are offered at the price stated in Attachment A, for each item delivered or performed at the designated place within the time specified in this RFP.

C.2 Term of Contract

The term of the contract shall be for a period of sixty months from the date of award as specified on Offer/Award Sheet of the contract.

C.3 Special Payment Provisions

Payment shall be made in accordance with Clause 13 of the *Standard Contract Provisions (Dec. 1984)*, as amended except as provided under Payment Schedule, C.4.

C.4 Payment Schedule

Monthly payments will be made by the District for all material properly disposed or processed in accordance with the contract. Payments will be made by the District upon receipt and approval by the District of the required monthly reports and invoices. Payments will be made in accordance with the District's Quick Payment Act Regulations.

C.5 Disclosure of Information

No information regarding the Contractor's performance of the contract shall be disclosed by the Contractor(s) to anyone other than District Government officials unless written approval is obtained in advance from the contracting officer.

C.6 Applicability of Standard Contract Provisions

The Standard Contract Provisions for use with District of Columbia Government Supply and Services Contracts (Dec. 1984 as amended, Attachment H) shall be applicable to the contract resulting from this RFP.

C.7 Time

Time, if stated in a number of days, will include Saturdays, Sundays, and holidays.

C.8 Insurance

A. The successful offeror at its expense shall obtain the minimum insurance coverages set forth below prior to award of the contract and keep such insurance in force throughout the contract period.

B. Public Liability and Property Damage Insurance: Insurance against liability for personal and bodily injury and property damage in amount of $3,000,000 for each individual and $5,000,000 in the aggregate (liability) and $250,000 (property).

C. Workers' Compensation: The Contractor(s) shall carry workers' compensation insurance covering all of its employees employed upon the premises and in connection with its other operations pertaining to this agreement, and the Contractor(s) agrees to comply at all times with the provisions of the workers' compensation laws of the District.

D. Comprehensive Automobile Liability Insurance (applicable to owned, non-owned and hired vehicles): The Contractor(s) shall carry comprehensive automobile liability insurance applicable to owned, non-owned, and hired vehicles against liability for bodily injury and property damage in an amount of $1,000,000 for each individual; $3,000,000 for each occurrence (bodily injury; and $250,000 for each occurrence (property).

E. Fire Insurance: The Contractor(s) shall keep all Contractor(s) buildings, improvements and equipment, including all alterations, additions and improvements, sufficiently insured against loss or damage by fire. The insurance shall be in an amount to equal their replacement costs.

F. Product Liability: The Contractor(s) shall maintain insurance against product liability for property damages, business losses and bodily injury, including death, which may arise from the operations, processing, disposition and sales of any sludge or sludge by-product under the contract in the amount of $1,000,000 for each individual and $3,000,000 in the aggregate (liability) and $250,000 (property).

G. All insurance provided by the Contractor(s) as required by

this section, except comprehensive automobile liability insurance, shall set forth the District and participating jurisdictions as additional insured. All insurance shall be written with responsible companies licensed by the District with a duplicate copy to be sent to the Contracting Officer within 30 days of contract award. The policies of insurance shall provide for at least thirty (30) days written notice to the District prior to their termination or material alteration.

C.9 Type of Contract

The offeror must submit a proposal on the basis of a firm fixed price contract with economic price adjustments (see Section C.13).

C.10 Contract Administration

Contracting Officer - The Contracting Officer is the only District official authorized to contractually bind the District of Columbia. The Contracting Officer shall be the Director, Department of Public Works, 2000 14th Street, N.W., Washington, D.C. 20009. Telephone No. (202) 939-8000.

Contract Administrator - The Contract Administrator shall be the Administrator for Water and Sewer Utility Administration, 5000 Overlook Avenue, S.W., Washington, D.C. 20032. Telephone No. (202) 645-6309.

C.11 Standards For Responsible Contractors

The prospective Contractor(s)s must demonstrate to the satisfaction of the District the capability in all respects to perform fully the contract requirements; therefore, each prospective Contractor(s) will be required to submit within fifteen days of the date of request, the documentation requested in the General Responsibility Criteria listed below:

General Responsibility

1. Furnish evidence of adequate financial resources, credit, or the ability to obtain such resources as required during the performance of the contract.

2. Furnish evidence of the ability to comply with the required or proposed delivery or performance schedule, taking into consideration all existing commercial and governmental business commitments.

3. Furnish evidence of the necessary organization, experience, accounting, operational control, technical skills, the necessary production technical equipment and facilities, or the ability to obtain them. Reference should include the telephone number of the contact person.

4. Furnish evidence of compliance with the applicable District licensing, tax law, and regulations.

5. Furnish listing of similar contracts currently being performed or previously performed for the last five (5) years, specifically setting forth the nature and extent thereof.

6. Other information as may be needed by the District to make a determination as to the prospective contractor's responsibility.

If the offeror experiences a substantial change in its financial condition during the period prior to award of any contract pursuant to this RFP, or if a successful offeror experiences a substantial change in its financial condition during the term of a contract, the Contracting Officer shall be notified by the offeror or successful offeror of the change in writing at the time the change occurs or is identified. See also Section J of the RFP.

C.12 Contractors Employees

The Contracting officer may require the Contractor to remove from working on this contract any employee that the Contracting Officer deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on this contract is deemed by the Contracting Officer to be contrary to this contract or to the public interest. Any such requirement will be in writing from the Contracting Officer.

C.13 Subcontract Provisions

The following provisions in addition to other provisions required by the RFP shall be included in all subcontracts modified appropriately to indicate Contractor(s) and Subcontractors:

Changes Clause;
Default Clause;
Termination for Convenience Clause;

Service Contract Act;
Covenant Against Contingent Fees;
Appointment of Attorney;
Officers Not to Benefit;
Taxes;
Non-Discrimination in Employment;
Examination of Books and Records; and,
Appropriate insurance coverage with limits acceptable to the District.

Offerors certify with their offer and agree as a condition to the contract to meet each year of the term of the contract, the minimum MBE participation required by the contract.

Contractor's compliance with this minority participation percentage will be evaluated annually following the commencement date of the contract for the duration of the contract. The failure of the Contractor(s) to meet the percentage by the end of each year of the contract shall constitute a material breach of the contract. No later than thirty (30) days following the end of each contract year, the Contractor(s) shall submit to the Contract Administrator: (a) a statement of the total dollars actually paid or due to minority firms for service performed during the reporting year; (b) a description of the services performed during the reporting year; and (c) documentation and records supporting the total dollars paid and services performed. Prior to execution of the contract, the successful offeror(s) shall submit within five (5) working days after the date of the District's request, to the District, its proposed plan for providing adequate documents and records supporting dollars paid and services performed. The documentation and records required above shall be submitted by the Contractor(s) in accordance with the plan approved by the Contract Administrator. The Contractor(s) also agree(s) to provide such other documentation and reports and cooperate with the District as may be required in order to determine the extent of the Contractor's compliance with the percentage of minority participation. See also Section A.1 of the RFP.

C.14 Price Adjustment

In light of the five year term of this contract, a general adjustment of unit prices will be allowed in accordance with the following: An upward or downward price adjustment during the term will be made using the percentage difference in the Department of Labor, All Urban Consumers, Consumer Price Index (CPI) for the Maryland, Virginia, and Washington, D.C. areas, effective on the contract award date and the CPI effective one, two, three and four years from the contract award date. The initial price for each ton of sludge shall be adjusted by the Contracting Officer using the ratio of the

applicable current year CPI to the base as illustrated by the following:

(Current CPI/Base CPI) x Initial Price = Current Price

The price adjustment will be limited to a maximum 5% increase or decrease.

C.15 Examination of Books and Records

The Contracting Officer, the Inspector General, the D.C. Auditor and the participating jurisdictions' Auditors or any of their duly authorized representatives shall, until three years after final payment, have the right to examine any directly pertinent books documents, papers and records of the Contractor(s) involving transactions related to the contract.

C.16 Contract Administrator's Authority

The Contract Administrator has the authority for administration and supervision of the Contract. He will be the sole judge of the intent and meaning of the Contract Documents and his decision and his interpretation thereof shall be binding on all parties.

The Contract Administrator has authority:

a) to stop the work whenever such stoppage may be needed, in his sole discretion, to prevent improper execution of the work, or other wise to protect District interests;

b) to determine the amount, quality, acceptability and fitness of all work, and equipment required by the Contract;

c) to decide all questions which arise in relation to the work, the execution thereof, manner of performance, rate of progress and the fulfillment of the Contract.

C.17 Wastewater Treatment Plant Parking Restrictions

A. Contractor Parking:

Vehicular traffic within the fenced area is restricted to permitted entry only. Permits will be issued to the Contractor for company owned vehicles displaying official company logo and other vehicles deemed appropriate by the Contract Administrator.

On plant parking of vehicles will be limited to the areas designated for that Contractor's assigned working space, and it will be the sole responsibility of the

Contractor to control parking within the designated areas. Violators of this restriction will be ticketed and towed at the Contractor's expense. The District will not provide additional parking of any kind for vehicles to be used by the Contractor, Contractor's employees, subcontractors, or subcontractors employees, or suppliers or suppliers' employees.

The Contractor shall assume total responsibility for providing parking for the Contractor's employees, the employees of all subcontractors and vendors/suppliers for the duration of the Contract. The Contractor shall further assume responsibility to provide any shuttle service necessary to insure said employees' timeliness in reporting to the designated worksite while performing work on any project on the Plant.

B. Parking at Central Operations Facility:

Parking areas located outside the fenced area and around the Central Operations Facility are designated as "Controlled Parking Areas" for District employees and short-term visitors to the Plant only. Violators of this restriction will be ticketed and towed at the owner's expense. Permits for the "Controlled Parking Areas" are not available to the Contractor nor any of his employees, subcontractors, subcontractors' employees, suppliers or suppliers' employees.

C.18 <u>Plant Entry Identification</u>

All persons (the Contractor, subcontractors, suppliers, etc.) who need to be on the Plant site will be required to have on their person a wallet size photo identification card showing the following information:

(1) Name of company employing individual;

(2) Recent $1\frac{1}{4}$ x $1\frac{1}{4}$ inches color photograph of individual;

(3) Individual's name;

(4) Individual's signature;

(5) Statement signed by officer of the company stating that the named individual is an employee of the company; and

(6) Identification card expiration date.

Each person entering the Plant will be expected to produce their card when requested to do so by uniformed security

personnel.

SECTION D: STATEMENT OF WORK

D.1 Scope of Work

The District of Columbia is soliciting proposals for the hauling and utilization of biosolids from the Blue Plains Wastewater Treatment Plant in Washington, D.C. The quantity of biosolids to be hauled and utilized is approximately 750 wet tons per day. Offerors must be capable of accepting and must accept both raw and digested biosolids at a rate commensurate with production, as directed by the District.

The acceptable methods of utilization are:

A. Land application;
B. Off-site composting, to include disposal of product; (See Par. D.21), and
C. Any other sludge disposal technology which meets the terms and conditions of this RFP and which is determined to be advantageous and acceptable to the participating jurisdictions.

The contract is solicited in five incremental award groups from 150 wet tons per day to 750 wet tons per day. Offerors may submit offers on any or all award groups except that offerors must submit prices for <u>all</u> lesser increments if selecting more than 150 wet tons per day (Award Item 1 of the Offer Form). The District, in conjunction with the user jurisdictions, reserves the right to make an award or awards on the combination that is most advantageous to the District and the user jurisdictions.

The District shall not award contracts where different offerors have common subcontractors.

Contracts resulting from this solicitation will be administered by the D.C. Department of Public Works.

If proposals are submitted involving Rail Haul, all costs incurred by this mode must be borne by the Contractor(s). The staging area consists of a rail siding located at the Solid Processing Building but with very limited storage space for rail cars.

If proposals are submitted involving Barge Haul, all costs incurred by this mode must be borne by the Contractor(s). A minimum of 400 linear feet of dock space is available. It will be the contractor's responsibility to determine water depth and to provide whatever dredging is necessary.

D.2 Estimated Daily Sludge Quantity from Blue Plains

INDIVIDUAL AWARDS

ITEM 1	Approximately 150 tons per day.
ITEM 2	(Offerors must make offer on Item 1 before making an offer on Item 2)Approximately 300 tons per day.
ITEM 3	(Offerors must make offers on Items 1and 2 before making an offer on Item 3) Approximately 450 tons per day.
ITEM 4	(Offerors must make offers on Items 1, 2, and 3 before making an offer on Item 4) Approximately 600 tons per day.
ITEM 5	(Offerors must make offers on Items 1,2, 3 and 4 before making an offer on Item 5) Approximately 750 tons per day.

Note 1: The District may make individual awards which total 750 tons, See RFP, page 14, Section B.21, Contract Award.

Note 2: The above quantities are the best estimates available but actual production may vary. If multiple contracts are awarded, distribution between Contractor(s) may be made favoring the lower priced Contractor(s).

Note 3: The minimum guarantee (See Par. D. 6) protects the Contractor(s) in the event that insufficient biosolids are available to meet at least 50% of the Estimated Daily Quantity. However, in the event that quantities greater than the Estimated Daily Quantity are available, the Contractor(s) must also accept the overage with distribution as in Note 2.

D.3 Participating Jurisdictions

Participating jurisdictions are the District of Columbia, Fairfax County, Montgomery County, Prince George's County, and the Washington Suburban Sanitary Commission.

D.4 Definitions

A. General Biosolids Characteristics (Blue Plains)

Biosolids is the residue produced by the wastewater treatment process and consists of a "cake" form with a solids content in the range of 18-35%. The biosolids weigh approximately 1,500 pounds per cubic yard (median). The biosolids are chemically conditioned and may be regarded as moderately corrosive. In the routine of biosolids processing, the Blue Plains facility thickens primary sludges by gravity and thickens biological sludges (secondary and nitrification) by flotation prior to dewatering. Centrifuges aand vaccuum filters are currently used for dewatering. It is anticipated that during the term of this contract that the vaccuum filters will be replaced with belt filter presses. Biosolids may be post-limed to meet regulatory requirements. It is expected that the percent solids of the biosolids following post-liming will be approximately 28-35%. The Contractor(s) must be prepared to solve all problems that may result from the high solids. This includes problems in the loading and unloading of trucks. See Section D. 5.

B. Digested Bicsoids - Digested bioslids is defined generally as the solids residue produced by the wastewater treatment process which is further treated by an anaerobic digestion process. Anaerobic digestion is a biological process that takes place in an oxygen free environment and breaks down complex organic compounds to less complex forms, making them less putrescible.

C. Raw Biosolids - Sometimes referred to as UNDIGESTED BIOSOLIDS - Raw biosolids is defined generally as the solids residue produced by the wastewater treatment process which has not been treated by the anaerobic digestion process. However, these biosolids may be treated with lime.

D.5 No Additional Compensation

The offers shall include all costs necessary to fulfill all of the Contractor's obligations under the contract. No additional compensation above the unit price is authorized.

D.6 Guarantees

The District guarantees to the Contractor(s), on a calendar month basis, a minimum quantity of biosolids to be hauled and utilized equal to fifty percent (50%) of the estimated daily quantity in each award group multiplied by the number of days in the month. If the District fails to provide the minimum monthly quantity of biosolids as defined in the preceding sentence, the District shall pay the Contractor(s) a sum based on the unit price per ton for each ton under the

minimum monthly quantity that the District fails to provide. The amount paid under the guarantee shall be calculated as follows:

[No. of days in month x 50% of the estimated daily quantity] minus [No. of tons actually hauled and utilized by the Contractor(s) for the month] multiplied by the unit price per ton.

The District shall not be liable for any guarantees if the failure to provide the minimum monthly quantity arises out of causes beyond the District's control as referenced in the Standard Contract Provisions (Rev. 12/84), as amended, Paragraph 9(c).

D.7 Use of D.C. Facilities

If space is needed by the Contractor(s) for limited processing of sludge on the Blue Plains Plant site, the Contract Administrator will consider a request for such space. Since space is minimal, availability will be determined by the Contract Administrator. Offerors shall furnish with their proposals specific requirements for space at the Blue Plains site. The Water and Sewer Utility Administration (WASUA) will determine the availability of space. That determination may impact the acceptability for award.

D.8 Utilities

If utility service is required, the Contractor(s) shall be responsible for connecting to utility sources as designated, directed and approved by the District. The Contractor(s) shall be responsible for actual costs of connection and costs incident to connections.

The District will allow the Contractor to use electric power and water without charge for up to 1000 square feet of office space and worker's lunchroom, washroom and dressing room facilities. If Contractor requires electric power and water in excess of the above amounts then the Contractor shall be responsible for the actual costs for such additional connections including payment for meters and other such monthly utility use. Utility costs for these additional services shall be assessed monthly and deducted from Contractor invoices.

D.9 Haul Route, Loading and Work Areas

A. Trucks carrying biosolids may be loaded at the Dewatered Sludge Loading Facililty, Primary Tanks 1 and 2, loading station E2 at the Solids Processing Building, or at a future location in the current composting site.

B. The Contractor(s) shall keep its(their) off-plant haul route and its(their) on-site work area neat and clean and free of odor, and shall bear all responsibility for the clean-up of any spill which occurs during the treatment or transport of biosolids or biosolids by-products in accordance with applicable laws and regulations. The Contractor(s) shall immediately clean up any such spill.

If the Contractor(s) fail(s) to commence clean-up operations within two hours of oral notification, the Contract Administrator shall have the right to clean up the spill or arrange for its clean-up and may charge to the Contractor(s) all costs, including administrative costs and overhead, incurred by the District in connection with such clean-up. The District may also charge to the Contractor(s) any costs incurred or penalties imposed on the District by the executive or judicial branch of the United States or any state as a result of any spill. The District may deduct all such costs or penalties from any amount due to the Contractor(s) under this contract or other contracts with the District. The Contractor(s) is(are) required to immediately notify the Contract Administrator when any spills occur.

C. Under no circumstances is(are) the Contractor(s) to discharge biosolids or biosolids by-products into the waterways or any place other than where authorized to do so by State and local permits.

D. No loaded biosolids trucks are to remain overnight at any location without prior approval of the political jurisdictions involved.

E. The Contractor(s) will assure that, except as allowed by state permits, there is no fording of any streams by off-road vehicles.

F. The Contractor(s) will assure that all local and state regulations are followed regarding parking on highways at disposal sites and clean-up requirements for trucks exiting muddy fields.

G. The Contract Administrator is solely responsible for determining the loading schedule. This schedule will be issued periodically, in writing, to the Contractor(s).

H. All trucks are to be washed after loading and prior to leaving the Blue Plains Plant. An unmanned wash station is provided by the District for this purpose.

Normal operations will require drivers to merely activate the controls and to drive through.

I. The Contractor(s) should be aware that construction or other activity at the Blue Plains site may result in traffic congestion and possible lost time in loading. See also Section D.5 of the RFP.

D.10 Inclement/Freezing Weather Responsibilities

In times of freezing weather, the Contractor(s) may encounter problems with biosolids freezing. The Contractor(s) must receive biosolids in all weather conditions, when it is available, and is(are) responsible for all problems related to freezing biosolids or by-products after receipt.

D.11 Weight Measurement

All trucks must obtain a tare and gross weight for each load hauled. For purposes of payment, the truck scales at Blue Plains shall be the scales of record.

D.12 Violation of Permit or Regulation

The Federal Government, the District and other local and state jurisdictions have regulations or laws controlling biosolids and biosolids disposal operations. The Contractor(s) shall comply with all current laws and regulations and those which may be passed subsequent to the issuance of this RFP. However, unforeseeable expenses caused by laws and regulations passed after the BEST AND FINAL OFFER will be treated as a contract modification. Violation of any of those regulations or laws may result in immediate termination of the contract. In addition, the Contractor(s) shall indemnify the participating jurisdictions for all costs incurred by the participating jurisdictions as a result of Contractor(s) violation of applicable laws or regulations, including costs of corrective action, fines or other expenses.

D.13 Air and Water Quality Standards

Generally, bioslods processing, disposal or application sites are permitted by state or local authority. The Contractor(s) must submit for review and acquire approval for any installation or site use from all appropriate Regulatory authorities. Compliance with the requirements of those authorities will be the responsibility of the Contractor(s).

(See Section D.19)

D.14 District's Right To Dispose

The Blue Plains Plant has limited on-site biosolids storage capacity. When the Chief, Bureau of Sludge Management determines in his or her judgment that this storage capacity is approaching its limit, the Chief is authorized to orally order the Contractor(s) to remove from the plant at least the Estimated Daily Sludge Quantity (EDSQ) for as many days as the Chief directs. The Contractor(s) shall commence removal of the EDSQ within four hours of the oral order of the Chief. If the Contractor(s) fail(s) either to commence removal or to remove at least the EDSQ for each day the Chief directs, the District, at its discretion, may remove or have removed that biosolids which the Contractor(s) fail(s) to remove. In this event, the District may deduct from amounts due or becoming due the Contractor(s), all costs (including actual and administrative costs) incurred by the District in removing such biosolids. The District may excuse the Contractor(s) from meeting the requirements of this section when the Chief determines that removal is impossible due to the occurrence of a cause beyond the control and without the fault or negligence of the Contractor(s), as set forth in paragraph (9)(C) of the Default Clause of the Standard Contract Provisions for use with District of Columbia Supply and Services Contracts (Rev. 12/84), as amended.

The District's right to dispose also applies to removal of biosolids from storage in the event of contractor's non-performance.

D.15 Equipment

Transport vehicles must be of type(s) approved for this application by the political jurisdictions involved and be compatible with the District's loading facilities. The hauling Contractor(s) shall see to it that their vehicles are loaded within all legal weight limits. The Contractor(s) shall operate all vehicles in a safe manner and within all traffic and speed regulations. The Contractor(s) shall clean the vehicles as often as necessary to prevent deposit of material on roadways.

Currently, trucks are loaded by overhead clamshell cranes in the Dewatered Sludge Loading Facility and by clamshell cranes and hopper arrangement at Primary Tanks 1 and 2. The Contractor(s) must provide trucks that can be loaded at the these facilities and at loading station E2 at the Solids Processing Building.

The following items should be considered by the Contractor when selecting trailers for this contract:

a) Door height on the Dewatered Sludge Loading Facility building is 16 feet. Trailers must pass through these building doors.

b) Truck lanes inside the building are 11' - 6" wide. No part of the tractor or trailer should extend outside the lane.

c) The maximum length of the tractor-trailer unit cannot exceed 60 feet.

d) There is no minimum height limit.

e) Materials of trailer construction should be selected based on the fact that sludges may contain lime and ferric salts.

f) Trailers must not leak sludge or water.

g) Tractor and trailers must have ID numbers visible from both sides and above.

D.16 Off-Site Storage of BioSolids

No on-plant storage of biosolids by the Contractor(s) will be allowed. Off-site storage or all weather disposal capability must be provided for at least a sixty (60) day capacity at the estimated daily biosolids quantity. The off-site storage must be permitted under the same procedure as a biosolids disposal site.

The quantity of biosolids stored at any time shall not exceed the capacity for which the storage is permitted. The Contractor's biosolids storage capabilities must be available to begin operations not later than the effective date of the contract and must be maintained for the life of the contract. Under no circumstances is space allocated for storage of Blue Plains biosolids to be used for storage of biosolids from other treatment plants, unless approved beforehand in writing by the Contract Administrator. Failure to comply with any of the conditions of this section is a permit or contract violation for which the contract may be terminated by the District. The District shall not award contracts for any items where different offerors have common subcontractors.

D.17 Biosolids Management Sites

Offerors must submit with their proposals copies of all permits for proposed disposal, storage, and application sites

in force on the date of proposal submission. Any proposal with permits for less than 6 months of disposal capacity will be unacceptable (See Section D.19). The Contractor(s) shall assure that the District, or its representatives, shall be afforded the right of access to all permitted sites at any time.

D.18 Site Reports

The Contractor(s) will monitor all storage, processing and utilization sites. Monthly reports will be forwarded by the Contractor(s) to the Bureau of Sludge Management. The reports shall include a daily record of site activities, including site identification (down to the field number), site location (county, address, route number, etc.), amounts and types of sludge received, applied or stored, site type (agricultural, reclamation, storage,landfill, etc.), crop, contact person, and name and address of site owner. The monthly report shall also indicate the level of compliance with all parameters of applicable permits, regulations and agreements.

The reports shall summarize on a monthly basis all of the areas specified in D.17, and shall be submitted by the 15th of each month for activities in the previous month. The Contractor(s) shall also provide the Contract Administrator with a monthly status report of progress in acquiring additional disposal sites. This report shall also be submitted by the 15th of each month for activities in the previous month. This report shall indicate all sites acquired and permitted, showing tax map references, parcel numbers and the proposed haul routes to sites.

The Contractor(s) shall also provide to the Bureau of Sludge Management, copies of all permit reports required by Federal, District and/or State Regulatory Agencies.

D.19 Permits

It is a material requirement of this contract that the Contractor(s) obtain and maintain all permits necessary for the performance of the contract. This will include, but not be limited to, all permits necessary to the processing, storage, hauling and ultimate utilization of the biosolids or by-products. In obtaining permits, the Contractor(s) shall avoid the overwhelming distribution of biosolids into one state or local jurisdiction.

D.20 Special Standards of Responsibility

The District has determined that the offeror shall meet special standards of responsibility (definitive responsibility criteria) since specialized facilities are

needed for adequate contract performance. Failure to meet the definitive responsibility criteria shall cause rejection of the individual award item. The offeror shall submit to the District within seven days of the District's request the following definitive responsibility criteria set forth in Sections A. and B. below:

A. Furnish copies of valid permits with sufficient capacity and terms for an initial six month period of operation; and,

B. Submit a detailed plan showing how the offeror will obtain and maintain permits for the duration of the term of this contract. This plan should at a minimum contain:

1. identification of all disposal, processing and storage sites which are under contract or option to be utilized in fulfilling the contract;

2. proposed use and procedures to be followed for each site;

3. haul routes to each site;

4. storage, processing or disposal capacity of each site; and,

5. permit status of each site, the schedule for obtaining the permit for those sites not permitted and justification for expecting permit issuance shall be provided.

A permit may be used only by the Contractor(s) who obtained it, unless a written agreement containing the approvals of the land owner, permittee and State regulatory agency is obtained before use.

Within 60 days following the award of a contract, the Contractor(s) shall furnish the Contract Administrator copies of such additional valid permits with sufficient capacity and duration to complete, at least, the first year's operation. Prior to the expiration of any permit, the Contractor(s) shall obtain permit extensions or new permits for a period covering at least the remaining portion of the contract. The Contractor(s) must submit these new permits or extensions to the Contract Administrator.

In the event that a disposal or storage site is also

permitted for receipt of biosolids from other than Blue Plains, the Contractor(s) shall so indicate and advise which portion(s) of the site with its available capacity shall be allocated for use by the participating jurisdictions pursuant to this contract.

The Contractor(s) will be liable for any fines or other costs incurred by the Contractor(s), the District and the other participating jurisdictions resulting from a Contractor's permit violation.

NOTE:

The State of Virginia is in process of revising its regulations for permitting biosolidsd disposal. When the new regulations become effective, and if the new regulations allow, the Contractor(s), will be required to obtain all the permits necessary for biosolids operations in that State pursuant to this contract. However, if the new regulations require the District to obtain the permits, then the Contractor(s) must provide to the District all the necessary information, including the completion of all forms, ready for signature. The District will sign and make the application. It is understood that in this case, the District and the Contractor(s) will be co-permittees.

D.21 Safety Program

A. General - In order to provide safety controls for the protection of the life and health of District and Contract employees and the general public; prevention of damage to property, materials, supplies, and equipment; and for avoidance of work interruptions in the preformance of the Contract, the Contractor shall comply with all applicable Federal and local laws governing safety, health and sanitation including the Safety Standards, Rules and Regulations issued by the American National Standards, U. S. Department of Labor, U. S. Department of Health, Education and Welfare, and the D.C. Minimum Wage and Industrial Safety Board.

The Contractor shall also take or cause to be taken such additional safety measures as the Contract Administrator may determine to be reasonably necessary.

The Contractor shall designate one person to be responsible for carrying out the Contractor's obligation under this Article.

The Contractor shall maintain an accurate record of all accidents resulting in death, injury, occupational

disease, and/or damage to property, materials, supplies, and equipment incident to work performed under the Contract. Copies of these reports shall be furnished to the Contract Administrator within two working days after occurrence.

The Contract Administrator will notify the Contractor of any noncompliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his representative at the site of the work shall be deemed sufficient for the purpose.

This Article is applicable to all subcontractors used under the Contract and compliance with these provisions by the subcontractors will be the responsibility of the Contractor.

B. Contractor's Program Submission - Prior to commencement of the work, the Contractor shall:

1. Submit in writing to the Contract Administrator for his approval his program for complying with this Article for accident prevention.

2. Meet with the Contract Administrator's Safety Representative after submission of the above program to develop a mutual understanding relative to the administration of the overall safety program.

D.22 Payment to the District

The Contractor(s) shall agree to share, with the District, 50% of the gross income received from third parties in the utilization, disposal or management of biosolids or biosolids by-products obtained under the contract. The District shall have the right to retain sufficient funds from amounts otherwise due under such contract to cover payments due the District under this contract. During the course of the contract, the Contract Administrator shall be notified by the Contractor(s) of any arrangements which will produce such income to the Contractor(s).

The Contractor(s) shall submit a statement and a monthly check (payable to the District of Columbia Government Treasurer) to the Contract Administrator by the 15th of each month for income generated in the previous month. The statement shall include a daily record of the gross income received; the source of the income (including the organizations' name, address and telephone number); and the

type of activity that generated the income (utilization, disposal, or management of biosolids or biosolids by-products).

SECTION E: EVALUATION OF PROPOSALS

E.1 The District and the user jurisdictions shall evaluate the technical proposal (Section E.2), the experience and management capability (Section E.3), and the minority participation (Section E.4) and determine whether an offer is acceptable or unacceptable. Using the procedures set forth in Section B.21, the District intends to award a contract or contracts. Proposals will be evaluated by a committee comprised of representatives from the participating jurisdictions.

E.2 Technical Proposal

The Evaluation Committee will determine the acceptability or unacceptability of the quality and efficiency of the methods proposed in the technical proposal by evaluating the following factors:

A. reliability of method,
B. history of community acceptance of sludge disposal in impacted areas,
C. overall parity of distribution of biosolids between the participating states,
D. impact on Blue Plains, and
E. odor control.

E.3 Experience and Management Capability:

The Evaluation Committee will determine the acceptability or unacceptablility of the experience and management capability of an offeror by evaluating whether the offeror is well managed, capable of effectively and efficiently handling a project of the size described herein, and experienced in the processing, hauling or utilization of municipal biosolids. Offerors shall therefore furnish in their proposal detailed and sufficient information to allow the Evaluation Committee to verify and evaluate the nature and extent of such experience and management capability of both the organization and key personnel.

E.4 Minority Participation:

The Evaluation Committee will determine the acceptability or unacceptability of the extent to which the offeror

demonstrates a commitment to further the District of Columbia Government's goals and policies of promoting minority business opportunities and contracting and subcontracting with certified minority firms. To be acceptable, an offeror must demonstrate that at least thirty five percent of the total contract dollars will be paid to MBE's for work performed under the contract.

E.5 Price:

After determining which offerors are acceptable as set forth in Section E.1, the Evaluation Committee will evaluate prices submitted by acceptable offerors to determine which single offer or combination of offers will result in the most economically advantageous contract to the District and the user jurisdictions.

Chester Water Authority

DETAIL SPECIFICATIONS
SECTION 1 - UTILIZATION OF WATER TREATMENT PLANT COPRODUCT

1.01 GENERAL. The term Authority as used herein refers to the Chester Water Authority. The term Contractor or Bidder used herein refers to the entity performing work for the Authority under this Contract.

All the information and requirements in the "Notice to Bidders" shall be read into and considered a part of the Instructions to Bidders.

Bidders must carefully examine the water treatment plant coproduct, specifications, proposal and contract form before submitting their proposals.

1.02 QUALIFICATIONS OF BIDDER. No Proposal will be considered from any Bidder unless he is known to be skilled in work of a similar nature to that covered by the contract, and has sufficient cash capital to meet all obligations to be incurred in carrying out the intent of the specifications. The Authority may make such investigations as it deems necessary to determine the ability of the bidder to perform the work.

The Authority reserves the right to reject any bid if the evidence submitted by, or investigation of such bidder fails to satisfy the Authority that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein, but failure so to reject shall not be considered proof of such Bidder's Qualifications.

1.03 WITHDRAWAL OF PROPOSALS. The Authority reserves the right to accept or reject any or all bids within 75 days of bid opening, and no bid may be withdrawn within said period except in accordance with Federal and/or State regulations.

1.04 RIGHT TO REJECT PROPOSALS. The unqualified right is reserved by the Authority to reject any and all bids, to waive any informality in bids received and to accept or reject any or all items of any bid as may be deemed to be in the best interest of the Authority. The decision of the Authority as to the bidder or bidders selected will be conclusive. Conditional bids will not be accepted.

Proposals which contain any omissions, erasures, alterations, additions not called for, or irregularities of any kind may be rejected as not in proper form.

1.05 AWARD. Award will be made to the highest qualified bidder paying or lowest qualified bidder charging meeting specifications. The Authority reserves the right to waive technicalities if it is deemed in the best interest of the Authority.

1.06 PREPARATION OF PROPOSAL. Proposal must be signed and submitted on the form provided in these Contract Documents, and it must not be removed from the Documents.

Proposal must be submitted in a sealed envelope bearing on the outside, the name of the bidder and his address, and shall be clearly marked:

PROPOSAL FOR UTILIZATION OF WATER TREATMENT PLANT COPRODUCT FROM THE CHESTER WATER AUTHORITY'S OCTORARO TREATMENT PLANT - CONTRACT NO. 95-06.

If forwarded by mail, the sealed envelope containing the Proposal and marked as designated above, must be enclosed in another envelope addressed as indicated in the "Notice to Bidders".

1.07 HOLD HARMLESS COMMITMENT. Contractor agrees to pay and hold Authority harmless from:

A. All debts, demands or claims growing out of the utilization of the water treatment plant coproduct.

B. This Contract shall be binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

C. This Contract cannot be assigned or sold to a third person or party without the express written consent of the Authority.

1.08 REGULATORY COMPLIANCE. The Contractor agrees that the use, storage, processing and sale of finished material will be in accordance with all Federal, State and Local regulations and requirements.

1.09 CHANGE IN LAW. In the event of a "Change in Law" the Chester Water Authority and the Contractor agree that either party may request a modification to the Agreement and if such modification cannot be mutually agreed to, then the Agreement becomes null and void.

DETAIL SPECIFICATIONS

SECTION 2 - UTILIZATION OF WATER TREATMENT PLANT COPRODUCT

2.01 GENERAL. The Chester Water Authority is offering approximately 3000 Tons per year of dried water treatment plant sludge from the Octoraro Treatment Plant. This material has been determined by the Chester Water Authority to be a "coproduct" as provided for in Subchapter A, Section 287.1 of the Pennsylvania Department of Environmental Resources' Residual Waste Management Regulations. As a "coproduct" this material is suitable for use as a soil substitute in the manufacturing of soil amendments, bricks and other materials.

A summary of prior analytical testing of this material supporting the Authority's "coproduct" determination has been submitted to the Permitting Section, Division of Municipal & Residual Waste, Bureau of Waste Management, Pennsylvania Department of Environmental Resources by the Chester Water Authority.

The dried sludge can be examined and sampled at the Octoraro Treatment Plant of the Chester Water Authority, located near Oxford, in Little Britain Township, Lancaster County, Pennsylvania.

2.02 SCOPE OF WORK. The dried water treatment plant sludge will be transported up to 60 road miles (one way) to the user's facility by the Chester Water Authority. For Bid Evaluation purposes, a value of $0.20 per ton per mile (for hauling distances in excess of 20 miles one way) will be added to the bid price if the contractor bids "charge" or subtracted from the bid price if the contractor bids "pay.

Delivery will be made in approximately 10 ton loads to the user's storage area and will be made on a mutually agreed upon schedule to suit the user's needs.

2.03 TERM OF CONTRACT. This contract will run from March 1, 1995 to February 28, 1996 under Item 1 or to February 28, 1997 under Item 1A Alternate.

2.04 MEASUREMENT. The quantity of material delivered will be measured by weighing on certified vehicle scales.

2.05 METHOD OF PAYMENT. If the Contractor purchases the material, the balance due to the Authority shall be paid at the end of each month that deliveries of material are made.

If the Contractor charges the Authority for the material, payment will be made 30 days after receipt of Contractor's invoice by the Authority.

2.06 MATERIAL COMPOSITION. The following table shows the concentration range of various constituents found in several samples of dried water treatment plant sludge:

SUMMARY OF CHESTER WATER AUTHORITY COPRODUCT TESTING

	DER MAXIMUM FOR AG USE	COMMON RANGE FOR SOILS **	COPRODUCT *** CWA SLUDGE
ALUMINUM		10,000-300,000	67,100-80,400
ANTIMONY		2-200	< 1.7
ARSENIC		1-50	< 1.1-36
BARIUM		100-3000	64-89
BERYLLIUM		0.1-40	0.83-1.26
BORON		2-100	1.1-5.1
CADMIUM	25	0.01-0.70	< 0.10-0.23
CALCIUM		7000-500,000	1820-4540
CHROMIUM	1000	1-1000	21.8-24.6
COBALT		1-40	19.1-25.2
COPPER	1000	2-100	54.4-63.8
IRON		7000-550,00	19,600-31,100
LEAD	1000	2-200	18.8-26.1
MAGNESIUM		600-6000	3240-4170
MANGANESE		20-3000	2170-3330
MERCURY	10	0.01-0.30	0.07-0.14
MOLYBDENUM		0.2-5	< 0.20-3.3
NICKEL	200	5-5000	36.6-55
NITROGEN,TOTAL		200-4000	7800-13,100
PHOSPHORUS		200-5000	1300-12,400
POTASSIUM		400-30,000	330-795
SELENIUM		0.1-2.0	2.3-12.3
SILICON		230,000-250,000	227-2570
SILVER		0.01-5.0	< 0.18-1.3
SODIUM		750-7500	45-64
SULFUR		30-10,000	3300-4000
TITANIUM		1000-10,000	150-236
VANADIUM		20-500	33.1-41.2
ZINC	2500	10-300	80.6-111
TOTAL SOLIDS*			80-91 %
VOLATILE SOLIDS*			19-26 %
pH			6.0 (AVE)

* ALL VALUES ARE EXPRESSED IN MG/KG (PPM) OF DRY WEIGHT, EXCEPT FOR TOTAL AND VOLATILE SOLIDS WHICH ARE EXPRESSED IN " % AS RECEIVED"

** CHEMICAL EQUILIBRIA IN SOILS, WILLARD L. LINDSAY, 1979.

*** RESULTS OF MONTHLY COPRODUCT ANALYSES (JUNE 1994-NOVEMBER 1994)

DRAFT

AGREEMENT FOR DISPOSAL OF BIOSOLIDS FROM [redacted] WATER RECLAMATION FACILITY

Agreement dated as of _____, 1995, between [redacted] and Browning-Ferris, Inc. ("BFI").

W I T N E S S E T H:

WHEREAS, [redacted] and BFI desire to enter into an agreement pursuant to which BFI would remove, transport and dispose of Sludge (as hereinafter defined) generated at the [redacted] Water Reclamation [redacted] ("Facility");

NOW, THEREFORE, in consideration of the premises and mutual covenants and agreements hereinafter set forth, [redacted] and BFI hereby agree as follows:

PART ONE
DEFINITIONS

As used herein, the following terms shall have the definitions set forth below.

"BFI" is defined in the Preamble hereof.

"Contract Term" is defined in Section 4.3.

"Contract Year" or Year" means each successive annual period during the Contract Term, beginning with the date of the Notice to Proceed.

"Facility" is defined in the Preamble hereof.

"Force Majeure" is defined in Section 4.10.

"[redacted]" is defined in the Preamble hereof.

"Land Application Sites" means any site approved by [redacted] and having all applicable permits on which BFI has the right to dispose of Sludge through land application methods, including the sites listed on Exhibit "A" hereto.

"Notice to Proceed" means a notice from [redacted] to BFI specifying the date on which BFI is to commence accepting Sludge at the Facility. Such date shall be not less than _____ (_____) days after the date of the Notice to Proceed, and the Notice to Proceed shall be delivered not later than _____, 1995.

"Sludge" is defined as lime stabilized sludge generated by the Facility qualifying Class B sludge under 40 CFR Part 503.

DRAFT

PART TWO
SLUDGE DISPOSAL

2.1 Delivery and Acceptance of Sludge

During the Contract Term, BFI will accept from [redacted], and [redacted] will deliver to BFI, all Sludge generated by the Facility. The parties agree that BFI is not obligated to accept or dispose of any sludge which does not qualify as Class B Sludge or better under 40 CFR Part 503.

2.2 Loading of Sludge

(a) BFI shall provide the personnel and equipment necessary to collect, transport and dispose of Sludge from the Facility on a twenty-four (24) hour on-call basis.

Trailers and/or containers will be furnished by BFI to provide adequate loading and hauling capabilities from the Facility. BFI will conduct all transportation of the Sludge in compliance with the requirements of all applicable federal and state statutes and regulations, including the Motor Carrier Act of 1980, and applicable rules and regulations of the Federal Highway Administration's Bureau of Motor Carrier Safety and the Interstate Commerce Commission.

(b) [redacted] will provide suitable loading facilities at the Facility to ensure easy access for collection of Sludge and will provide the Sludge in a condition suitable for transportation by BFI. [redacted] will, if requested by BFI, provide areas at the Facility for storage of trailers and/or containers.

All disposal equipment will be kept clean and free of Sludge and loading areas will remain free of spilled waste material.

(c) BFI shall designate an employee authorized to make decisions with respect to operations under this Agreement and shall notify [redacted] within seven (7) days if any different employee is authorized to make such decisions.

(d) To the extent reasonably practical, the work schedule of BFI will be coordinated with the daily operations of the Facility and, in the event of a conflict, the operations of the Facility will take precedence.

2.3 Disposal Activities

(a) BFI will dispose of all Sludge collected and transported under the provisions of this Agreement in compliance with all legal requirements imposed by Federal, State and local agencies, statutes and regulations.

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(b) Either BFI or a party whose permit or license is applicable to BFI has and will maintain or cause to be maintained during the Contract Term all permits and licenses required under applicable law to enable it to collect, transport and dispose of the Sludge in compliance with the provisions of this Agreement.

(c) To the extent permissible, in BFI's reasonable judgment, under prevailing weather conditions, BFI shall dispose of all Sludge in Land Application Sites; otherwise BFI shall dispose of the Sludge in landfills.

(d) BFI has the right to dispose of at least [redacted] wet tons of Sludge from the Facility at the Land Application Sites listed in Exhibit "A" and will not dispose of any other sludge in such sites without the prior written consent of [redacted].

(e) BFI will provide all data required by the owner/operator under 40 CFR Part 503. BFI shall also be responsible for all testing and monitoring of the Sludge and any disposal sites.

(f) BFI will not dispose of Sludge in any site, either landfill or land application, outside of the Commonwealth of Virginia, without providing to [redacted] appropriate documentation that disposition of the Sludge will comply with all laws and regulations applicable to such site.

(g) BFI will notify [redacted] prior to 7:00 a.m. on any day on which it will not remove Sludge from the Facility for any reason. Unless such failure to remove is excused pursuant to Section 4.10 or is otherwise caused by [redacted], BFI shall be responsible for any cost and expense incurred by [redacted] in removing and disposing of the Sludge which BFI failed to remove.

(h) BFI will advise [redacted] of any contacts which BFI has with any federal, state, or local agency relating to this Agreement or any operations hereunder and will advise [redacted] of the reasons for and information respecting such contact.

2.4 Quality of Sludge

[redacted] will deliver Sludge having the qualifications set forth in the definition of Sludge herein.

PART THREE
PAYMENTS

3.1 Fees

(a) Landfill Fees. The cost of disposal by landfilling for Sludge shall be $___ per ton.

PART THREE
PAYMENTS

3.1 Fees

(a) Landfill Fees. The cost of disposal by landfilling for Sludge shall be $___ per ton.

(b) Land Application Fees. The cost of disposal by land application for Sludge shall be $___ per ton.

3.2 Monthly Invoice and Payment

(a) Within ___ days after the end of each month of the Contract Term, BFI shall provide an invoice of all charges owed by to BFI under this Agreement. The invoice shall be accompanied by statements of the net tons of Sludge and destination of each vehicle removing Sludge from the Facility. shall make monthly payment to BFI within ___ days of receipt by of the invoice from BFI.

PART FOUR
MISCELLANEOUS

4.1 Insurance

Throughout the Contract Term, BFI shall carry and maintain the following insurance coverage with minimum limits of liability in not less than the following amounts:

(a) Comprehensive General Liability Insurance:

Combined Limit Per Occurrence:	$1,000,000

(b) Comprehensive Auto Liability Insurance:

Combined Limit Per Occurrence:	$1,000,000

(c) Workers' Compensation:

Employers Liability	EA ACC	$ 100,000
	EA Disease	$ 100,000

(d) Pollution Legal Liability Insurance:

Per Occurrence	$ 5,000,000
Aggregate	$10,000,000

4.2 Indemnification

A. BFI will indemnify and save harmless , its officers, agents, servants, and employees from and against any and all suits, actions, legal proceedings, claims, demands, damages, costs, orders (including consent and clean-up

orders) and expenses (including engineering and attorneys' fees) arising from personal injury, including death or disease, and property damage, including environmental contamination, to the extent resulting from (i) a negligent act or omission of BFI, its officers, agents, servants and employees incident to performance of any work under this Agreement and (ii) a breach by BFI of any provision of this Agreement, and (iii) any act or failure to act of BFI, its officers, agents, servants and employees in connection with performance or failure to perform under this Agreement, except for any such matters for which BFI is entitled to indemnify from [redacted] under Section 4.2B hereof.

B. [redacted] will indemnify and save harmless BFI, its officers, agents, servants, and employees from and against any and all suits, actions, legal proceedings, claims, demands, damages, costs, orders (including consent and clean-up orders) and expenses (including engineering and attorneys' fees) arising from personal injury, including death or disease, and property damage, including environmental contamination, resulting from (i) the negligent act or omission of [redacted], its officers, agents, servants and employees incident to performance of any work under this Agreement or (ii) the breach by [redacted] of any provision of this Agreement.

4.3 <u>Term</u>

This Agreement shall be in force and effect, unless terminated earlier as provided herein, for a period of three (3) years beginning on the date of the Notice to Proceed. Thereafter, this Agreement shall be renewed automatically for terms of one (1) year each, unless canceled by either party by giving at least ninety (90 days prior notice of termination in writing to the other party (the "Contract Term").

4.4 <u>Default and Termination</u>

In the event of the breach by either party of any obligation under this Agreement, the non-breaching party shall have the right to terminate this Agreement by following the procedure described in this Section.

Prior to the enforcement of its right, the aggrieved party shall give sixty (60) days' notice in writing to the defaulting party to cure or remedy said default. If the default has not been remedied or cured, at the end of said sixty (60) day period this Agreement shall be automatically terminated. Notwithstanding the foregoing, [redacted] shall have the right to terminate this Agreement prior to the end of such sixty (60) day period if, in the reasonable judgment of [redacted], such termination is required for reasons of health or safety arising from the breach of the Agreement by BFI.

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and no officer, agent or employee of BFI is, or will be for any purpose, an employee of [redacted].

4.6 Remedies, Cumulative

Except as expressly provided herein, the rights and remedies contained in this Agreement shall not be exclusive but shall be cumulative of all other rights and remedies, now or hereafter existing, whether by statute, at law or in equity; however, neither party shall terminate this Agreement except in accordance with the provisions hereof.

4.7 Non-Waiver

Failure of BFI or [redacted] to insist upon strict performance of any of the terms or conditions of this Agreement, failure or delay to exercise any rights or remedies provided herein or by law or failure of BFI or [redacted] to notify the other party promptly in the event of default shall not be construed as a waiver or relinquishment of the future strict performance of any such term or condition by BFI, or [redacted] or a waiver to any of either party's rights or remedies as to prior to subsequent defaults hereunder.

4.8 Assignment

This Agreement shall bind and benefit the respective parties and their legal successors and shall not be assignable, in whole or in part, by any party hereto without first obtaining the written consent (which shall not be unreasonably withheld) of the other party; however, BFI may assign this Agreement, in whole or in part, to an affiliate of BFI.

4.9 Address and Notice

All notices required or permitted hereunder shall be in writing (unless another medium is expressly authorized herein) and shall be deemed delivered at the earlier of when actually delivered or three (3) days after deposit in a United States Postal Service Post Office or receptacle with proper postage affixed (Certified Mail, Return Receipt Requested). Notices shall be addressed to each respective party at the address set out below or such other address as the party may have designated by notice similarly given the other party.

BFI: _____

_____

_____

_____

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[redacted]

4.10 Force Majeure

If the performance by either party of any of its obligations and undertakings hereunder shall be prevented, interrupted or delayed by acts of God, war, riot or civil commotion, compliance with any law, regulation or order (including any such law, regulation or order affecting BFI's ability to dispose of the Sludge) of any governmental body or instrumentality thereof, whether now existing or hereafter created, or any similar events beyond its reasonable control, the performance by such party shall be excused for such period of time as such party is using due diligence to resume performance at the earliest possible time.

4.11 Performance Bond

BFI will provide and maintain during the first Contract Year a performance bond in the amount of $_____ in substantially the form of Exhibit "C" hereto.

4.12 Sole Agreement

This Agreement, the Proposal dated _____, 1995, of BFI and the Specifications of [redacted] dated _____, 1995, constitute the sole understanding and agreement between the parties hereto with respect to the subject matter hereof and supersede all prior negotiations, representatives or agreements.

4.13 Amendment

Neither this Agreement nor any provision hereof may be changed, modified or amended except by a written instrument signed by both of the parties hereto.

4.14 Further Assurances

Each party promises and agrees to execute and deliver any documents and instruments and to perform any acts which may be necessary or reasonably requested by the other party in order to give full effect to this Agreement.

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IN WITNESS WHEREOF, this Agreement has been executed as of the day and year first above written:

BROWNING-FERRIS INC.

By: _____

[redacted]

By: _____

BioGro Hauling Contract

Agreement For Professional Services For Residual Solids Management

THIS AGREEMENT is made this _____ day of _____, 19___, by and between the CITY OF _____, _____ (the City), and Wheelabrator Clean Water Sytems Inc., a Maryland corporation having its place of business at 180 Admiral Cochrane Drive, Suite 305, Annapolis, Maryland 21401 (Wheelabrator Clean Water Systems).

WITNESSETH:

WHEREAS, the City operates the Wastewater Treatment Plant located at _____ _____. which generates wastewater treatment sludge (the "biosolids"); and

WHEREAS, the City solicited proposals for residual solids management and selected WCWS's proposal as the best program to meet the City's requirements; and

WHEREAS, WCWS is willing and able to manage said biosolids and has agreed to do so in accordance with the terms and conditions of this Agreement (the "Agreement").

NOW THEREFORE, in consideration of the payments to be made and the services to be performed hereunder, and for other good and valuable consideration, the receipt of which is hereby mutually acknowledged, the City and WCWS hereby act and agree as follows:

ARTICLE I.
SCOPE OF AGREEMENT

This agreement. together with any schedules, appendices and other attachments hereto, constitutes the entire agreement between the City and WCWS. Except as otherwise provided herein, no modification of this Agreement shall be effective until reduced to writing and executed by the parties.

ARTICLE II.
DESCRIPTION OF SERVICES

2.01 WCWS shall provide those professional services as set forth in Appendix I (the "Services") through _____. Extensions shall be mutually agreed and based upon written authorization from the City. The parties acknowledge that the Services do not constitute construction work.

2.02 Subject to the terms and conditions of this Agreement, WCWS shall perform the Services in accordance with the schedule specified in Appendix I. The parties understand that agricultural land application is dependent upon weather constraints. The parties agree that in the event WCWS determines that adverse weather conditions would hamper performance of the Services, WCWS may suspend its performance hereunder for the duration of such adverse weather conditions.

2.03 WCWS shall provide residual solids management services as required by the City during the term of this contract. These services include loading, transportation and land application of biosolids, permit acquisition. The City may utilize WCWS for additional professional services for dewatering, lime stabilization, composting, on and off-site storage, and any other requirements related to residual solids management for the City. All work will be performed only after written authorization is received from the City, which will include mutually agreed upon terms and conditions for these professional services.

ARTICLE III.
METHOD OF OPERATION

WCWS shall perform the Services in the manner specified in Appendix I.

ARTICLE IV.
UNDERTAKINGS BY WCWS

4.01 WCWS shall comply with all safety regulations of the City.

4.02 WCWS will operate so as to not interfere with plant operations. WCWS shall use its best efforts to keep the working area clean, and perform all workmanship in a first class and professional manner.

4.03 WCWS shall maintain comprehensive general public liability and other insurance covering all of its activities under this Agreement in an amount and for such purposes as set forth in Appendix I hereto and shall furnish appropriate certificates evidencing such insurance.

4.04 Subject to the City's continued compliance with the provision of Article VI and Section 7.01 hereof. WCWS shall obtain and comply with all necessary permits. licenses and authorizations regarding the removal. transportation and disposal of biosolids as are required by all applicable federal, state, and local laws and regulations and, shall provide copies to the City of all permits. licenses and authorizations.

4.05 WCWS shall remove biosolids in storage from areas and to a level practical considering the specific terrain at each plant. WCWS will rough grade non-paved plant access roads during its operations.

4.06 WCWS will secure state permits to apply biosolids on a infrequent basis. Such permits do not require groundwater monitoring. If state requirements change, WCWS is not required to install or pay for groundwater monitoring wells. WCWS shall. at the City's request, utilize a site not requiring monitoring wells rather than a similar site requiring monitoring wells provided that the sites are comparable distances for transportation, and are of comparable quality for disposal. If the State requires any ground water monitoring wells on any sites, the City shall pay for their installation and testing. If the City elects not to install or pay for wells and monitoring required by the State, the City may terminate this agreement with ninety (90) days written notice.

ARTICLE V.
PAYMENT TERMS

5.01 The City shall pay WCWS in accordance with the schedule and at the rates set forth in Appendix I. Payment shall be sent to Wheelabrator Clean Water Systems Inc., P.O. Box 64116, Baltimore, Maryland 21264.

5.02 The City shall make the payments referred to in Section 5.01 hereof not later than twenty (20) days following receipt by the City of WCWS's approvable invoice. The City shall make every effort to pay all payment requests in a timely manner and within twenty (20) days from receipt of the requests. It is understood that, in the event that payment is not made within twenty (20) days, that the City will not be required to pay any amount of money as interest, penalty, damages, or otherwise on late payments. It is further understood, however, that WCWS is not required to proceed with continuing services in the event that payments are delayed beyond sixty (60) days.

5.03 Any dispute between WCWS and the City concerning the whole or a part of a particular payment required by this Article V shall not delay or otherwise affect the City's obligation to pay any undisputed portion of such payment or to make any other payment required hereunder.

5.04 In the event of any change in a federal, state or local law or regulation pertaining to waste implemented during the term of this Agreement which results in a significant increase or decrease in the cost of performing the Services, the City and WCWS agree to negotiate a mutually agreeable adjustment to the payment terms of Appendix I.

ARTICLE VI.
UNDERTAKINGS BY THE CITY

6.01 The City shall ensure WCWS and its employees, agents or independent contractors access to and from the biosolids storage areas.

6.02 The City shall not interfere unreasonably with the removal operations of WCWS and its employees, agents or independent contractors in monitoring the performance of

the Services.

6.03 To the extent reasonably requested by WCWS for the purpose of WCWS's compliance with federal, state and local laws and regulations applicable to the performance of its obligations hereunder, the City shall allow WCWS to analyze the chemical composition of the biosolids to be removed by an independent chemical laboratory certified by the State of _____.

6.04 The City shall cooperate to the fullest extent possible in assisting WCWS to obtain all federal, state and local permits, licenses and authorizations which WCWS is required to obtain in order to perform the services required by Article I of this Agreement.

6.05 The City shall obtain and comply with all necessary federal, state and local licenses and authorizations which the City is required to obtain in order to perform its obligations hereunder and, upon request of WCWS, shall permit WCWS to inspect said permits, licenses and authorizations.

6.06 The City will be responsible for removal of all material and trash which is not suitable for agricultural land application.

6.07 If required, the City shall provide dilution water and electricity for lagoon cleaning.

6.08 The City shall provide and deliver gravel and culverts for WCWS road work on plant sites for this project. The City shall provide gates and modify fences to provide access to stockpiled biosolids storage areas on plant sites.

ARTICLE VII.
REPRESENTATIONS, WARRANTIES AND COVENANTS OF THE CITY

7.01 The City represents, warrants and covenants as follows:

(i) The City shall promptly furnish to WCWS any information regarding known or suspected changes in the composition of the biosolids.

(ii) In the event that the City becomes aware that the biosolids is not suitable for agricultural land application the City will promptly notify WCWS in writing.

7.02 In the event that WCWS has reason to believe at any time after having taken possession of the biosolids that any biosolids is not suitable for disposal under permit conditions ("Nonconforming Biosolids"), WCWS may revoke its acceptance of the Nonconforming Biosolids by notice to the City.

ARTICLE VIII.
INDEMNIFICATION

8.01 WCWS shall indemnify and shall hold harmless the City, its employees and agents (each of the foregoing being hereinafter referred to individually as "Indemnified Party") against all liability to third parties (including reasonable attorneys' fees), other than liability solely the fault of the Indemnified Party, proximately caused by (1) WCWS's failure to comply with any term of this Agreement or with any federal, state and local laws and regulations as provided for in Section 4.04 hereof, or (2) the fault or gross negligence of WCWS's employees or agents.

8.02 The City shall indemnify and shall hold harmless WCWS and its employees and agents (each of the foregoing being hereinafter referred to individually as "Indemnified Party") against all liability to third parties (including reasonable attorneys' fees), other than liability solely the fault of the Indemnified Party, proximately caused by (1) the City's failure to comply with any term of this Agreement or with any federal, state and local laws and regulations relating to this Agreement, or (2) the fault or gross negligence of the City's employees or agents.

ARTICLE IX.
TERMINATION

9.01 In the event that either party is unable to perform any of its obligations under this Agreement, or to enjoy any of its benefits because of any event (hereinafter referred to as a "Force Majeure Event") which is unavoidable and beyond the control of the defaulting party, including, but not restricted to, a labor stoppage, strike action or unrest, a judicial or governmental decree, regulation or other direction not the fault of the party who has been affected, the threat or initiation of any legal action, communication line failure, power failure and

any natural disaster or Act of God, the party who has been so affected shall immediately give notice to the other party and shall do everything possible to resume performance. Upon receipt of such notice, this Agreement shall be immediately suspended. If the period of non-performance exceeds fifteen (15) days from the receipt of notice of the Force Majeure Event, the party who has not been so affected may, by giving written notice, terminate this Agreement.

9.02 The City may terminate this Agreement for convenience with ninety (90) days written notice to WCWS If so terminated, The City will remit all payments due for services provided through the termination date, and reimburse WCWS for all documented, unabsorbed fixed costs, unavoidable variable costs and overhead as well as reasonable profits lost for the term of this Agreement as a result of such termination for convenience.

ARTICLE X.
INCIDENTAL OR CONSEQUENTIAL ACTION

In no event shall either of the parties hereto be liable to the other for payment of any incidental or consequential damages resulting from the default in the performance of their respective obligations under this Agreement. However, the provisions of this Article X shall not apply in any way to WCWS's obligation to indemnify the City and any Indemnified Party pursuant to Section 8.01 hereof or to the City's obligation to indemnify WCWS and any Indemnified Party as set forth in Section 8.02 hereof.

ARTICLE XI.
LIMITATION OF ACTION

Any action of any kind of WCWS against the City or the City against WCWS arising as a result of this Agreement must be commenced within one year (or, if such one-year period is prohibited by the applicable statute, such limitation shall be deemed to agree with the minimum period of limitation permitted by the applicable law) from the date the right, claim, demand or cause of action shall first accrue.

ARTICLE XII.
ASSIGNMENT

Neither this Agreement nor any interest therein is assignable or transferable by operation of law. Neither party shall assign or transfer this Agreement, or any interest therein, without the other party's written consent, except that either party may assign its rights and obligations under this Agreement in whole or in part to any division or subsidiary or said party.

ARTICLE XIII.
INDEPENDENT CONTRACTOR

The relationship of each of the parties to the other hereunder shall be that of an independent contractor and not that of employer-employee, master-servant or principal-agent, and neither party to this Agreement shall have the authority to bind the other under any agreement or understanding with any third party.

ARTICLE XIV.
APPLICABLE LAW: LEGAL PROCEEDINGS

This Agreement shall be governed by the laws of the State of _____, including (notwithstanding the fact that this Agreement involves the purchase of services) all rules and remedies set forth under the State of _____'s Uniform Commercial Code, except to the extent that the provisions of this Agreement are clearly inconsistent therewith. The parties further agree that any legal proceedings arising out of or relating to this Agreement shall be conducted in the State of _____.

ARTICLE XV.
COUNTERPARTS: HEADINGS

This Agreement may be executed in any number of counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The section headings contained herein are for convenience of reference only and shall not control the interpretation of any term or condition hereof.

ARTICLE XVI.
SEVERABILITY

Any invalidity, in whole or in part, of any provision of this Agreement shall not affect the validity of any other of its provisions.

ARTICLE XVII.
CUMULATION OF REMEDIES

All remedies available to either party for breach of this Agreement are cumulative and may be exercised concurrently or separately, and the exercise of any one remedy shall not be deemed an election of such remedy to the exclusion of other remedies.

ARTICLE XVIII.
NOTICES

Any notice or other communication hereunder shall be in writing, which includes telex, fax and telegram (deemed received the day after transmission) and if mailed by certified or registered mail, postage prepaid, return receipt requested, shall be deemed to have been duly given or made on the date of receipt, or if not mailed in such manner, when actually delivered to the City or WCWS at the address listed on the face of this Agreement, except as either party may from time to time (by written notice to the other party) have designated another address.

ARTICLE XIX.
WAIVER

No term or provision hereof shall be deemed waived and no breach excused unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to, or waiver of, a breach by the other, whether express or implied, shall not constitute a continuing waiver of or consent to, or a consent to or waiver of, or excuse for any different or subsequent breach.

CITY OF _____

BY:

City Manager

(SEAL)

Attest: _____

City Clerk

Wheelabrator Clean Water Sytems Inc.

BY: Stephen R. Toft

Vice President

(SEAL)

Attest: _____

Secretary

APPROVED AS TO FORM

City Attorney

EXAMPLE - CHANGES WITH EACH CONTRACT

APPENDIX I

Wheelabrator Clean Water Sytems Inc. will remove, transport, and land-apply biosolids from the _____ Wastewater Treatment Plant located _____

_____.

Permitting

WCWS will permit and maintain a base of permitted agricultural land to be used as utilization sites for the biosolids removed from the Wastewater Treatment Plant. To ensure adequate site availability during the actual land-application period, WCWS will maintain a base of sites able to accommodate a minimum of _____ gallons annually. This excess land is required since some land may be sold, leased, cropping systems may change, and weather related/field conditions at the time of application may be variable thus necessitating a variety of soil and crop types.

Method of Operation

WCWS will set a floating biosolids removal barge in a corner of the storage lagoon to be emptied. The barge will be equipped to mix, slurry, and pump biosolids from the lagoon.

The biosolids will be pumped via a six inch hose into tankers. It is expected that this material can be removed at a consistency estimated at 6-8% total solids. As the level drops to the bottom of the holding lagoon, the pumping operation may require a source of dilution water. WCWS estimates only a minimal amount of dilution will be necessary. If requested, If requested, WCWS will wash down the sides and bottom of the lagoon.

The biosolids will be transported in sealed tanker trailers with a capacity of 6,500 gallons

per load. The tankers will transport biosolids to the application sites where it will be transferred via vacuum into a high floatation biosolids application vehicle (3,500 gallon capacity). This vehicle, or "terra-gator", will apply the biosolids by either surface application or sub-surface injection under pressure at predetermined agricultural rates.

Scope of Responsibilities

WCWS shall be responsible for removing, transporting and land-applying biosolids in a professional manner. WCWS will provide all necessary pumps, barge, hoses, application and transportation equipment, labor, management, etc., and any other incidental requirements to remove the biosolids from the Wastewater Treatment Plant. WCWS will locate, secure, soil sample and permit application sites. WCWS will apply biosolids in compliance with all terms and conditions of permits issued by the State of _____.

The City will be responsible for the following:

1) Providing WCWS with a representative biosolids sample which WCWS will have analyzed for the permit application.

2) Biosolids that is suitable for land-application according to _____ laws.

3) A suitable 3-phase power source.

4) A suitable dilution water source.

5) E.P. toxicity testing, if required.

Price

This agreement provides for biosolids removal services for a term of _____ years from _____ through _____. The pricing assumes a minimum of _____ gallons hauled per contract year during that period.

For work completed before _____, WCWS will provide the operational services described herein for the price of _____ per gallon hauled. This price includes all costs of materials handling including mobilization, setup, equipment, labor, management, permitting, monitoring, and demobilization.

There will be a regular adjustment in the price paid for the services provided by WCWS to The City. The first adjustment shall be on _____, and shall be repeated at the end of each twelve months thereafter. The adjustment will be the percent increase or decrease in the Consumer Price Index for All Urban Consumers (CPI-U) as published by the U.S. Department of Labor. The adjustment will be made by multiplying the percent increase or decrease in the CPI-U over the most recent twelve months reported times the current unit price and adding or subtracting the adjustment to the price used during the previous twelve months.