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Multiuser Confined Disposal Sites Program Study

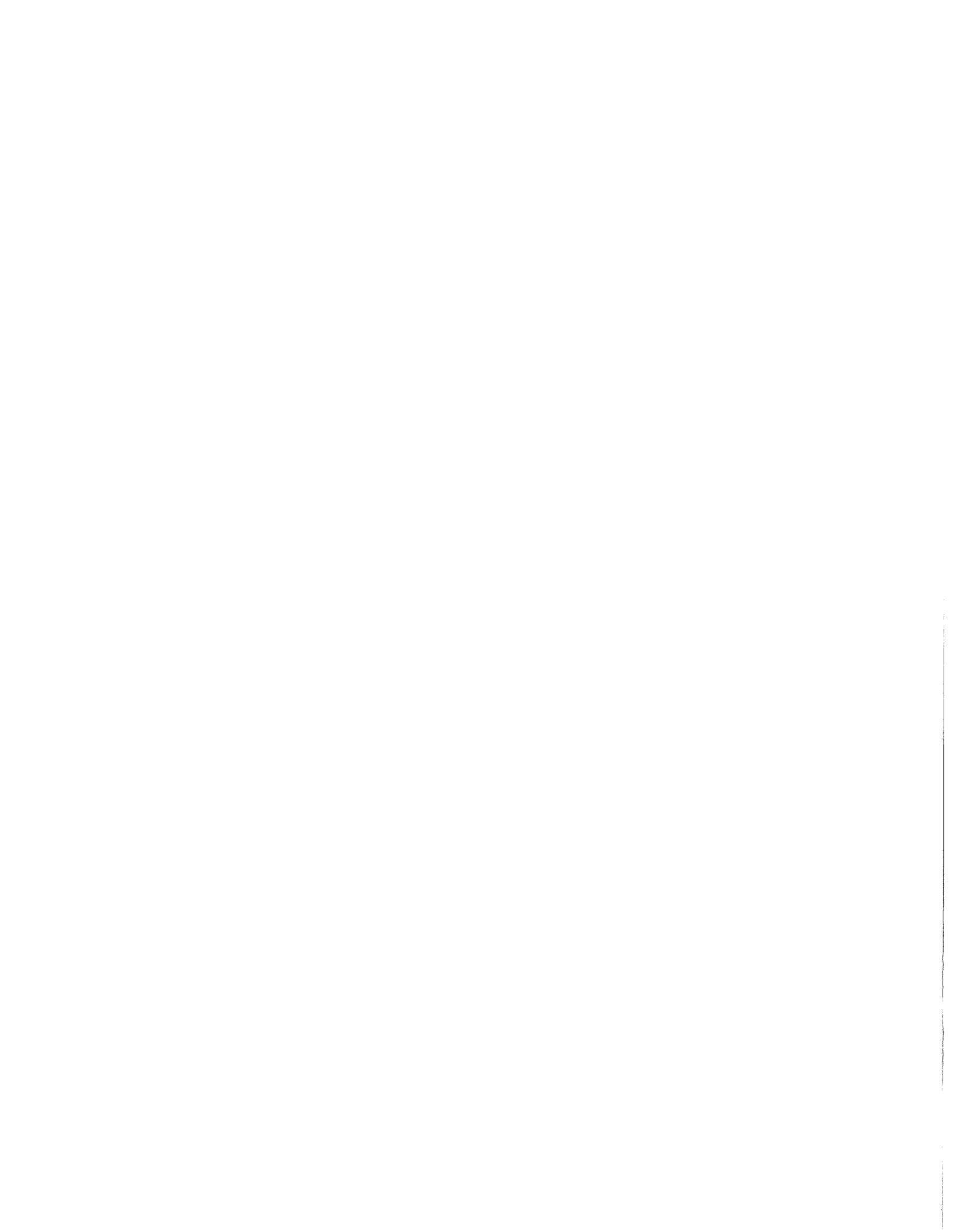
FUNDING ANALYSIS ISSUE PAPER

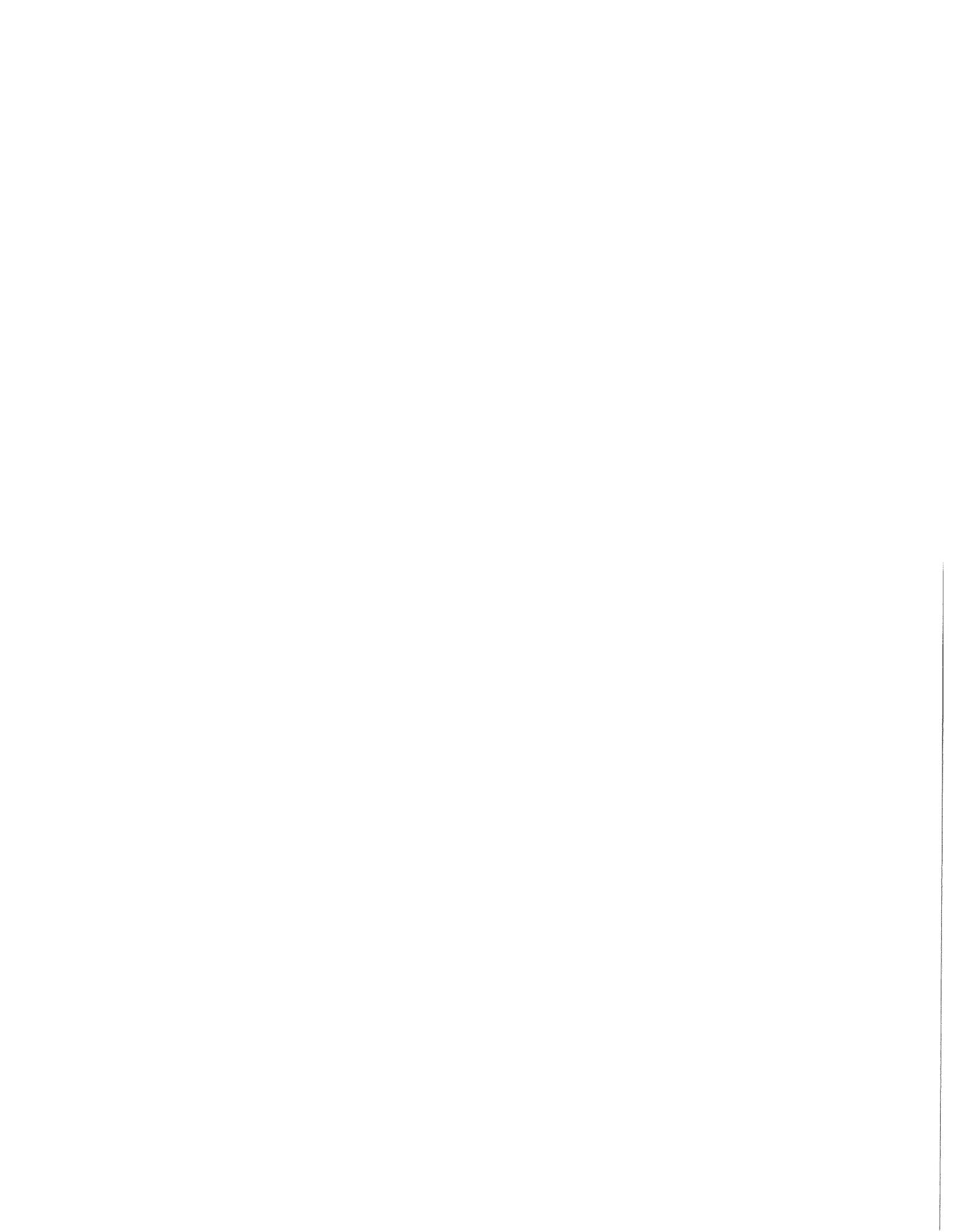
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PTI Environmental Services
and Washington Department of Ecology

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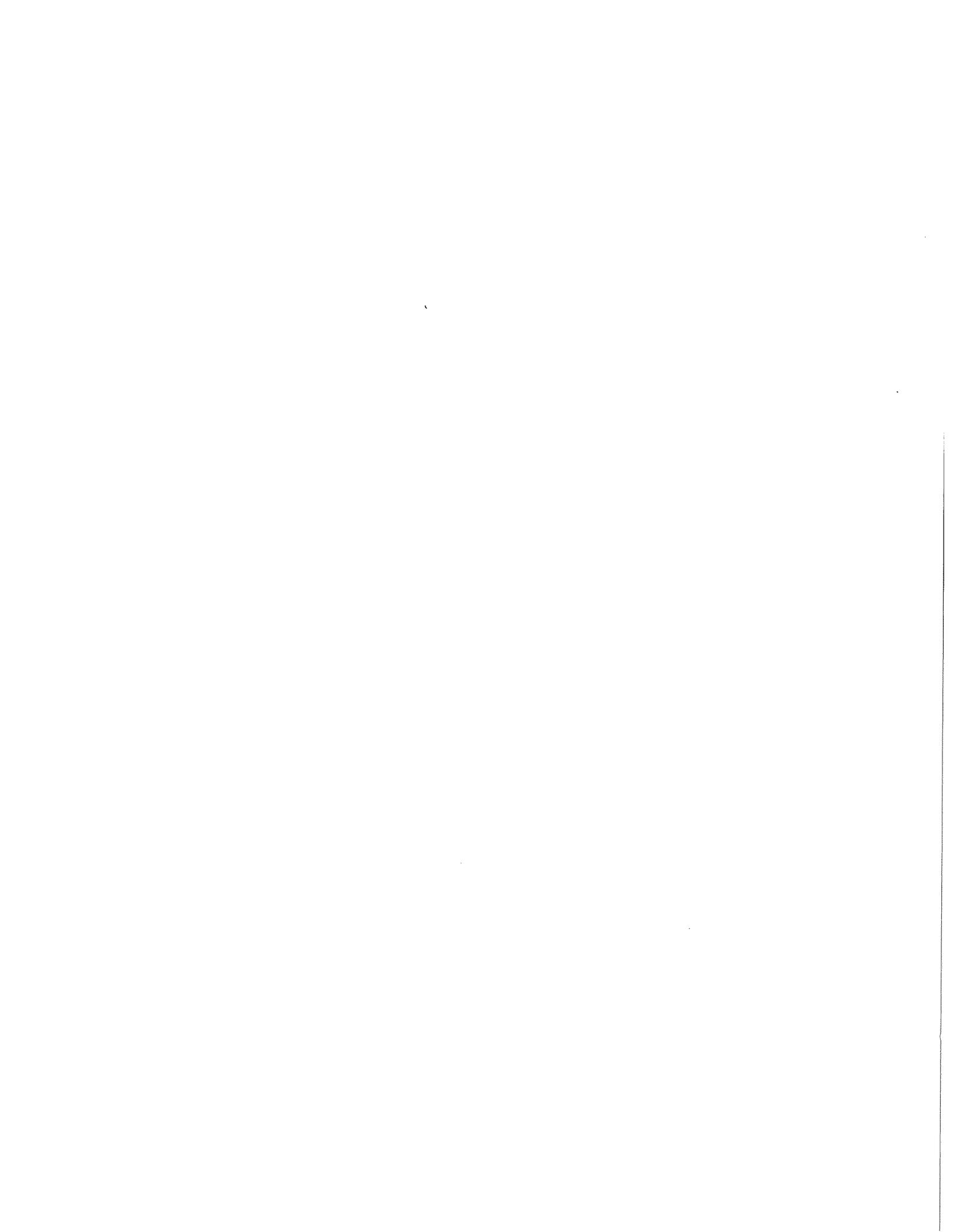
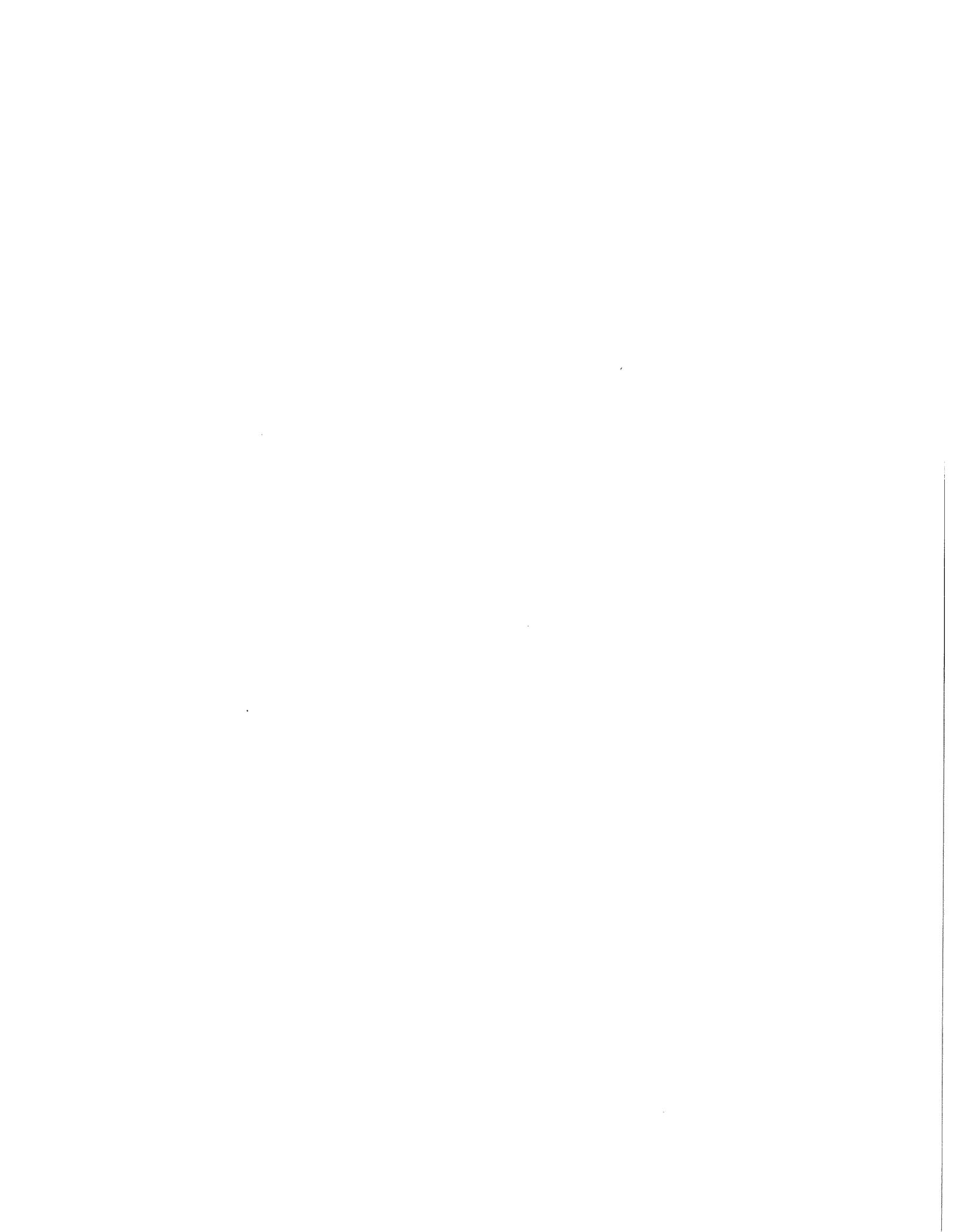
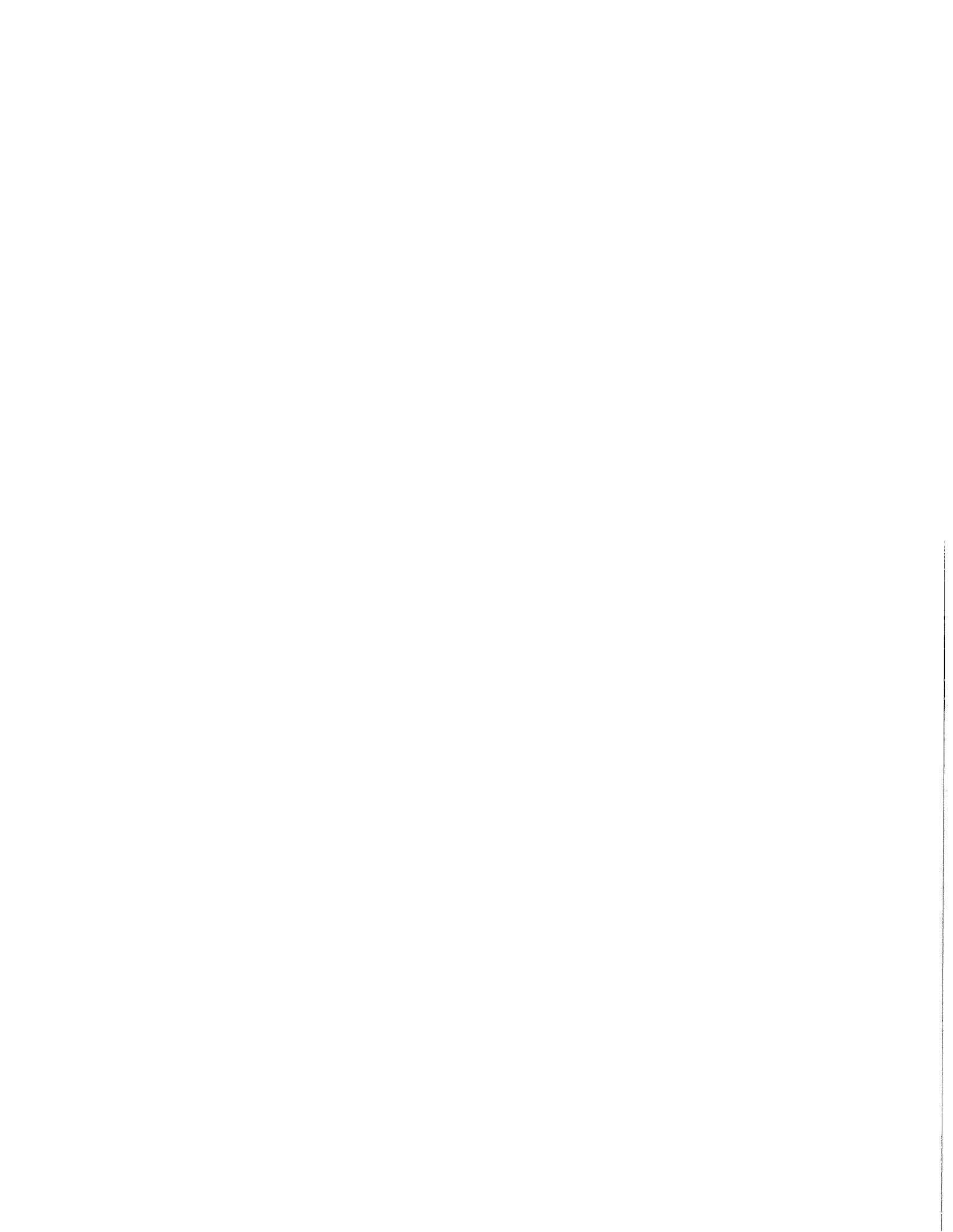


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EXECUTIVE SUMMARY

FUNDING ANALYSIS ISSUE PAPER

The Funding Analysis Issue Paper examines the alternatives for funding multiuser confined disposal sites, and discusses the factors that affect the feasibility of funding alternatives. The feasibility of funding multiuser confined disposal sites is judged based on two criteria:

1. Users would be willing to dispose of dredged materials at the price required to support all facility costs, and
2. Institutions responsible for facility construction and operation can bear the debt burden and risk burden for total system costs without undue financial hardship.

The major factors affecting the feasibility of funding alternatives are:

- o Costs
- o Ownership and Institutional Options
- o Financing Techniques
- o Funding Sources

Costs

Costs have been estimated for four disposal sites for siting and initial construction costs (Year 0), operation and periodic construction and closure costs (Years 1-20) and final closure and post closure costs. User costs such as sediment testing, dredging and transport, were also estimated. Some costs have not been determined: regulatory costs, liability costs, lease costs (for aquatic disposal), and total system costs. The funding analysis includes only those costs that are measurable and would be the direct responsibility of the owner or operator of a "generic" multiuser confined disposal facility. It does not include the undetermined costs or user costs other than disposal.

Ownership and Institutional Options

The **Institutional Alternatives Issue Paper** addresses alternative arrangements for providing regulatory, siting and construction, operation and post closure functions. In general, the institutional alternatives do not affect the funding feasibility. The funding analysis is based on the underlying assumption that institutions owning and operating a disposal facility have 1) sufficient debt capacity, 2) authority to guarantee a flow of revenue over the life of the disposal facility, and 3) a good bond rating (Moody's B or better).

Eight options for public/private ownership, ranging from public ownership and public operation to private ownership and private operation are identified and discussed.



With the 1986 Federal Tax Reform Act, tax incentives for private investment in public facilities were severely reduced. In the absence of such incentives, the primary attraction for private investment is the income producing potential of a project. Hypothetically, an advantage of private participation is more efficient and cost-effective operations. Potential disadvantages are loss of control by the public agency and higher borrowing costs.

The funding analysis addresses a range of costs that represent the range of ownership options: at the low end is the costs of public financing through tax exempt bonds, at the high end is the costs of private financing through bank loans.

There are areas of significant risk in the development and operation of multiuser disposal sites that could affect the feasibility of private or public ownership and operation: unpredictability of siting costs, unpredictability of customer use, potential liability for facility failure before and after closure, and regulatory risk. These risks can be addressed by developing new institutional arrangements to minimize siting difficulties, and providing mechanisms to limit liability costs and to secure customer use over time. Regulatory risk is difficult to control because new regulations are often imposed at the federal level or created in response to new knowledge about environmental impacts.

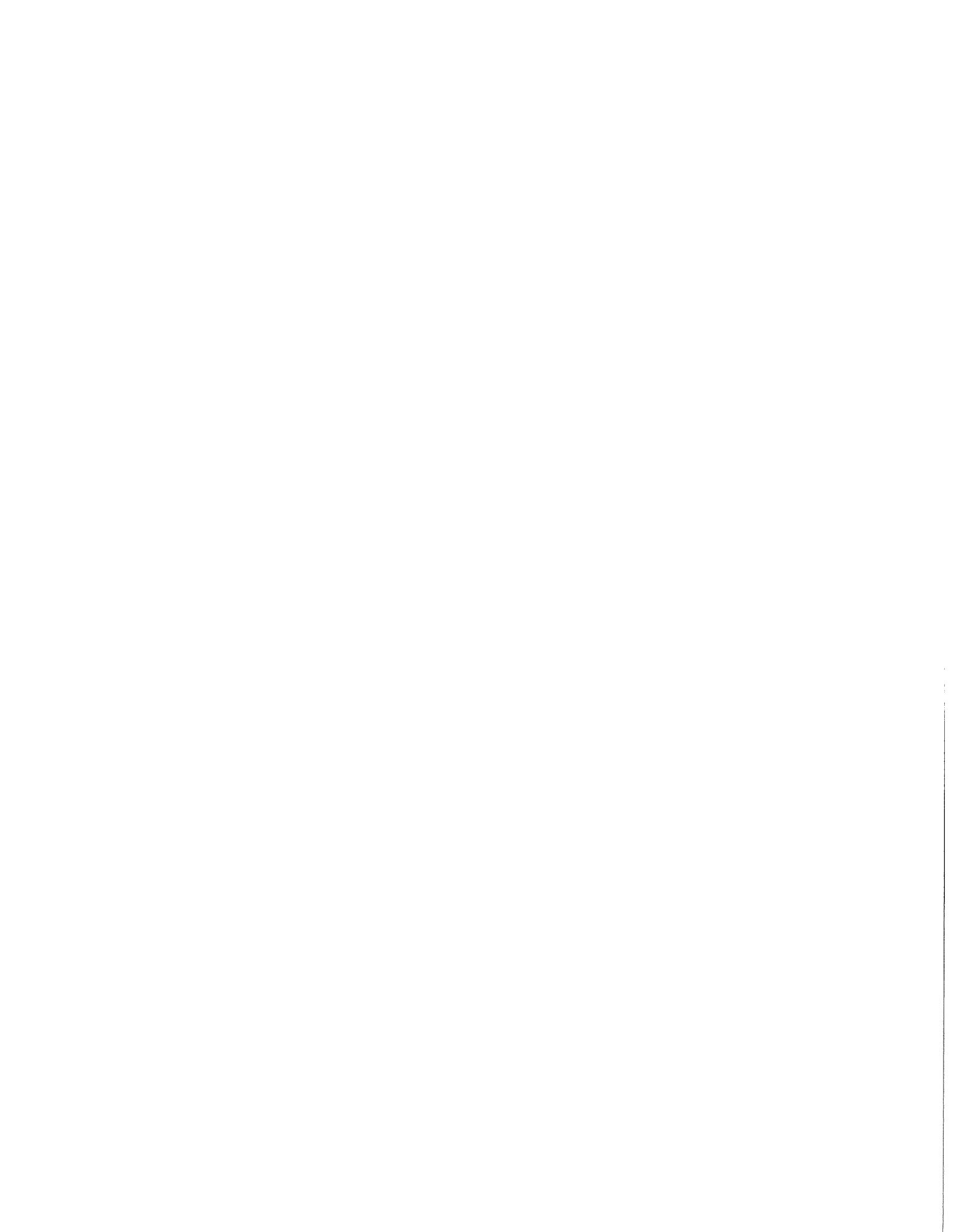
Financing Techniques

There are several techniques that might be employed for financing multiuser disposal sites. These are private financing (bank loans and equity contributions), tax exempt bonds, subsidized low interest loans (e.g. through a revolving loan fund or government guarantees), grants, and pay-as-you-go. The costs of borrowing money varies under each of these options from the highest of about 13 percent (private financing) to no borrowing with the pay-as-you-go option. For a facility totally funded through user fees, with no subsidies from other sources, the private financing and tax exempt bonds present the reasonable range of financing alternatives.

Each of these four disposal site options have a different profile of costs. Some sites have relatively large development cost, requiring large borrowings and higher long term debt than less capital intensive sites. The ongoing operating costs for the four disposal sites also differ. This means that each disposal site has a different "sensitivity" to financing assumptions and costs of borrowing.

Funding Sources

The funding analysis assumes that costs for a disposal facility are supported 100 percent by user fees. However, funding sources may include user fees and a wide range of taxes or assessments, and federal assistance. Policy as to whether a multiuser disposal site should be funded solely from user fees or subsidized by other funding sources should be developed after examining cost allocation/equity issues and risk/liability issues.



Cost allocation/equity issues relate to the idea of allocating costs to fairly distribute them among those who contribute to the problem of contaminated sediments and those who benefit from the solution of safe disposal at confined sites. While it is not feasible to make direct claims on individual prior contributors, it may be fair to recover a portion of the costs of disposing of contaminated sediments from general contributor classes. This could be done through a variety of taxes or fees such as a tax on sewer utilities (for sewer discharges), a tax on developed property (for surface water runoff), or a business and occupation tax (for commercial/industrial discharges). Alternatives for allocating costs among those who benefit include a general tax in recognition of the general public benefits; or benefit assessments related to the purposes served by dredging (e.g. assessing ships based on hull depth).

The risk/liability issues are unpredictability of siting costs, unpredictability of customer user, potential liability for facility failure, and regulatory changes. These could be mitigated somewhat by identifying secure sources for funding unanticipated costs associated with these risks.

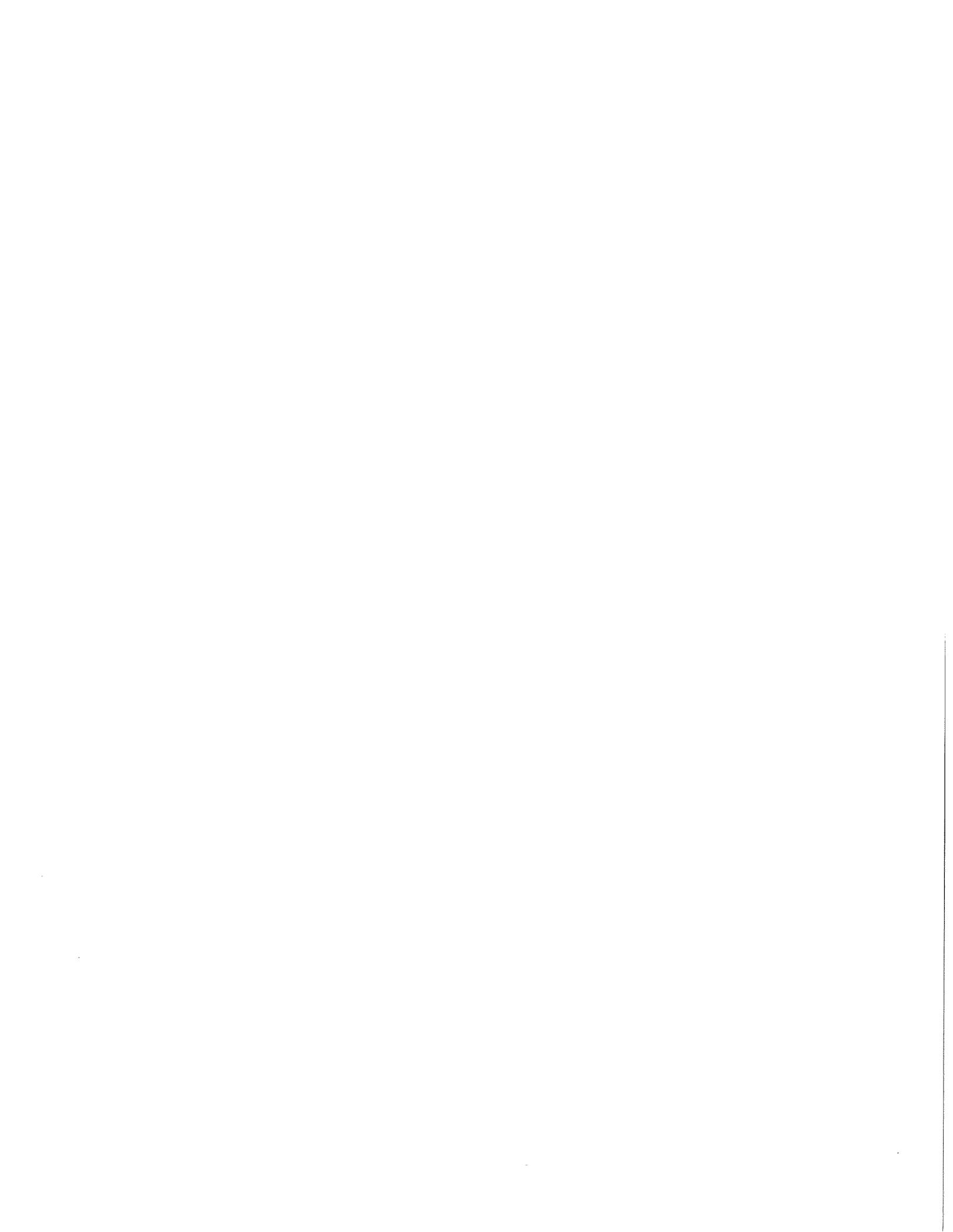
Results and Discussion

The 20 year life cycle cost projections for disposal site alternatives include all financing costs for site construction, closure and post closure and all facility operating and maintenance costs.

User fees for all options are in a reasonable range when compared to current disposal rates for solid waste and hazardous waste in the Puget Sound region. The user fee estimates for Year 1 range from \$17-82 per cubic yard. Dredged sediment weighs an average of 1.2 tons per cubic yard; based on this factor, user fees range from \$14-68 per ton. Fees for solid waste disposal at landfills in the Puget Sound region are in the \$20-40 per ton range. Hazardous waste disposal fees are often over \$100 per ton. However, disposal fees at construction and demolition debris landfills, which also accept dredged materials, are about \$6.50 per cubic yard--much lower than the projected user fees.

The 1989 present value of the life cycle costs for the disposal options range from \$20.1 to 63 million. Based on the present value costs, the ranking of options from lowest to highest costs (note that aquatic disposal costs do not include any site lease costs) is:

- Aquatic Disposal, Tax Exempt Bonds
- Aquatic Disposal, Private Financing
- Upland Disposal, Tax Exempt Bonds
- Nearshore Unsaturated Disposal, Tax Exempt Bonds
- Upland Disposal, Private Financing
- Nearshore Unsaturated, Private Financing
- Nearshore Saturated Disposal, Tax Exempt Bonds
- Nearshore Saturated, Private Financing



Conclusions and Recommendations

The feasibility of funding multiuser confined disposal sites depends on the economic impacts on users and public and private institutions. The funding analysis provides an estimate of the range of costs to users and public and private institutions. The estimates of user fees resulting from this analysis appear to be reasonable when compared to current costs for solid waste and hazardous waste disposal, although they are higher than the cost of disposal at construction and demolition debris landfills. The impact on public and private institutions depends on the debt capacity and overall financial condition of an individual institution, and the total number of disposal sites that need to be built. The overall feasibility is affected by several factors that cannot be defined or estimated at this stage in the study. This includes A) factors affecting public and private institutions, B) factors affecting users, and C) risk and liability issues.

A) The feasibility for public and private institutions responsible for disposal of contaminated sediments is affected by factors such as:

1. Overall debt capacity and financial condition;
2. Availability of and authority over suitable sites;
3. Authority to control or regulate users (flow control);
4. Capital planning capabilities;
5. Ability to assume liability for risks, and
6. Ability to handle siting process.

Since most of these factors will depend on the specific institution, their impact on the feasibility of funding multiuser disposal sites cannot be assessed until a specific institution is designated.

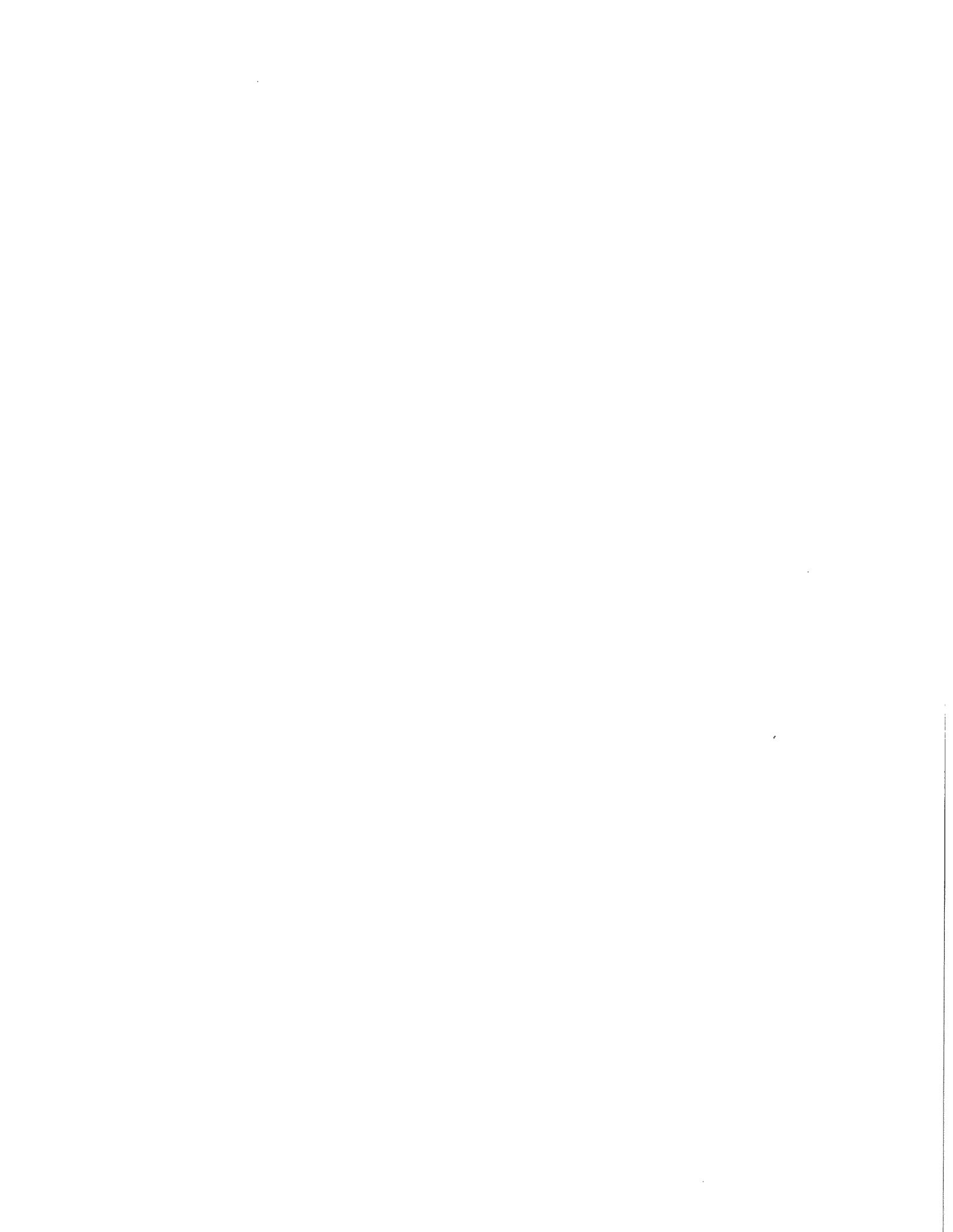
B) The feasibility for users is affected by factors such as:

1. Source of funding for public users, return on investment for private users);
2. Other dredging costs, such as sediment testing and transport of dredged material, and
3. Available alternatives for disposing of dredged sediments.

Some of these user factors are project specific and can only be assessed on a project by project basis. However, a better assessment of these factors could be developed by surveying users and inventorying specific alternative disposal sites.

C) The feasibility of funding confined disposal sites is also affected by risk and liability issues:

1. Unpredictability of siting costs;
2. Unpredictability of customer user;
3. Potential liability for system failure, and
4. Regulatory risks.

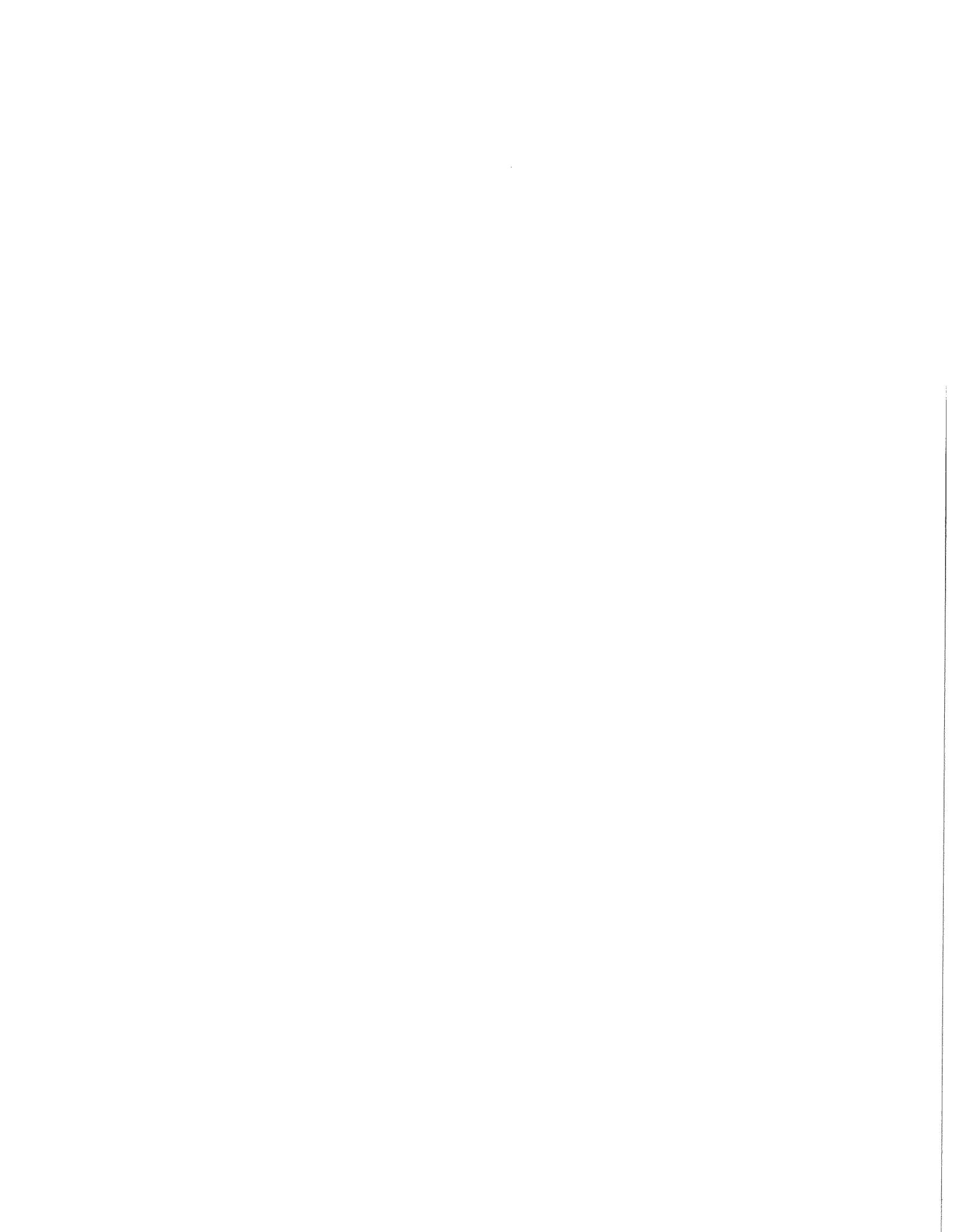


Some of these risk and liability issues are being addressed in the context of this and other studies on contaminated sediments. As these issues are resolved, a better assessment of the overall funding feasibility can be made. The key actions that will help resolve these issues are:

1. Establishing appropriate institutional arrangements to facilitate the siting process;
2. Establishing control over disposal of contaminated sediments through standards and flow control authority; or a commitment on the part of dredgers to buy future capacity in a disposal site;
3. Developing more accurate projections of dredged materials requiring confined disposal
4. Developing a mechanism for sharing liability among public agencies, site owners and users, and
5. Developing regulatory standards and institutional arrangements for regulatory oversight of disposal of contaminated sediments.

As outlined above, several steps can be taken to more accurately assess the feasibility of mulituser confined disposal sites. However, even if all this is done, several site specific factors still affect funding feasibility, and cannot be resolved until specific sites are investigated.





INTRODUCTION

The 1989 Puget Sound Water Quality Management Plan contains several requirements for the Contaminated Sediments and Dredging Program implemented by the Washington Department of Ecology (Ecology). One of these requirements, the Multiuser Confined Disposal Sites Program, is a study to evaluate the utility and viability of establishing a system of multiuser confined disposal sites for contaminated sediments dredged from Puget Sound. Results of the study will be used by Ecology as the basis for a recommendation to the Puget Sound Water Quality Authority for the establishment of a multiuser site program.

Over the past several years, various criteria have been established by regulatory agencies for determining the degree of contamination in sediments below which the sediments could be disposed of at designated open-water unconfined disposal sites. These interim criteria have now been replaced by disposal guidelines by the Puget Sound Dredged Disposal Analysis (PSDDA) study (PSDDA 1988). Disposal requirements are currently being addressed for contaminated sediments not allowed for open-water unconfined disposal.

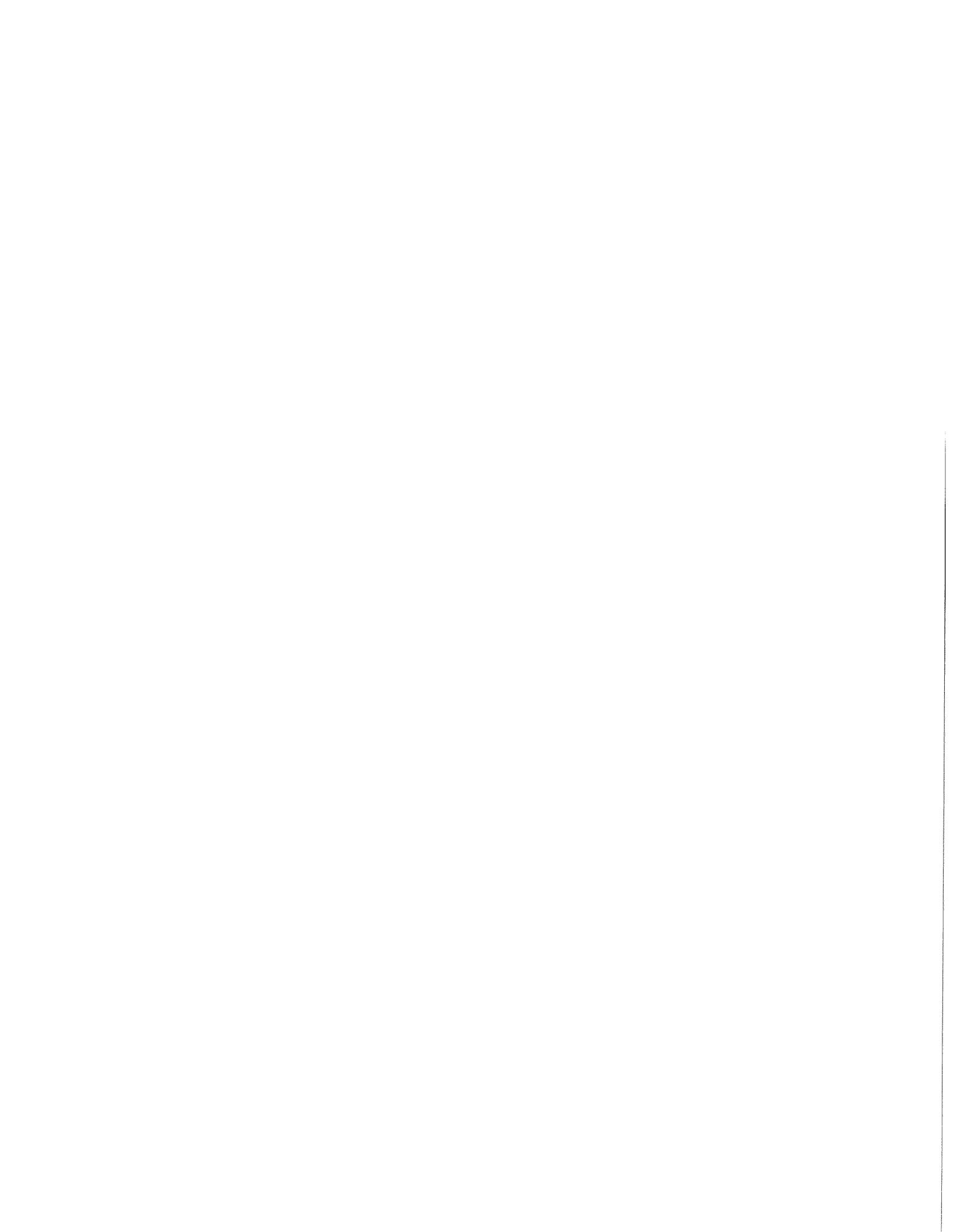
Confined disposal involves the containment of dredged material so that migration of contaminants and effect on the environment and human health are minimized. Confined disposal standards are now under development to address the level of contamination above which the standards will apply; the required testing for determining application, and the design, operation, and closure/post-closure requirements of confined disposal sites.

Confined disposal will occur either in the upland environment similar to municipal landfills, in the nearshore environment, which generally involves the filling of intertidal and/or subtidal areas for the creation of usable land or intertidal habitat, or in the aquatic environment where confinement will occur in deeper waters.

Upland, nearshore, and aquatic disposal of dredged material generally occurs at sites established specifically for the project, especially for larger dredging projects. Although some current sites in the Puget Sound basin receive dredged material for disposal from more than one dredging project, these sites are limited to municipal landfills and a small number of other upland sites.

The concept of multiuser sites involves the establishment of one or more sites that would be available for use by all dredgers on a long-term basis for the disposal of dredged material requiring confinement.

The objectives of the Multiuser Confined Disposal Sites Program Study being conducted by Ecology are to identify the issues, make recommendations regarding the utility and viability of multiuser sites for the confined disposal of contaminated sediments in upland, nearshore, and aquatic areas; and to develop an action plan for implementing the recommendations. Contractor support for the study consists of developing issue papers addressing the following components:



- o Assessment of needs
- o Identification of potential environmental and public health concerns associated with establishing such sites, and possible methods of eliminating or minimizing those concerns through application of technology and/or site location selection
- o Development of order-of-magnitude costs for siting, operation, and closure/post-closure, and development of funding alternatives
- o Assessment of institutional options for siting, operation, and closure/post-closure of sites
- o Development of alternative public involvement and public education plans

A draft report will also be prepared incorporating responses to comments on the issue papers, summarizing the issues, making recommendations for Ecology's consideration, and suggesting an action plan for implementation of the recommendations.

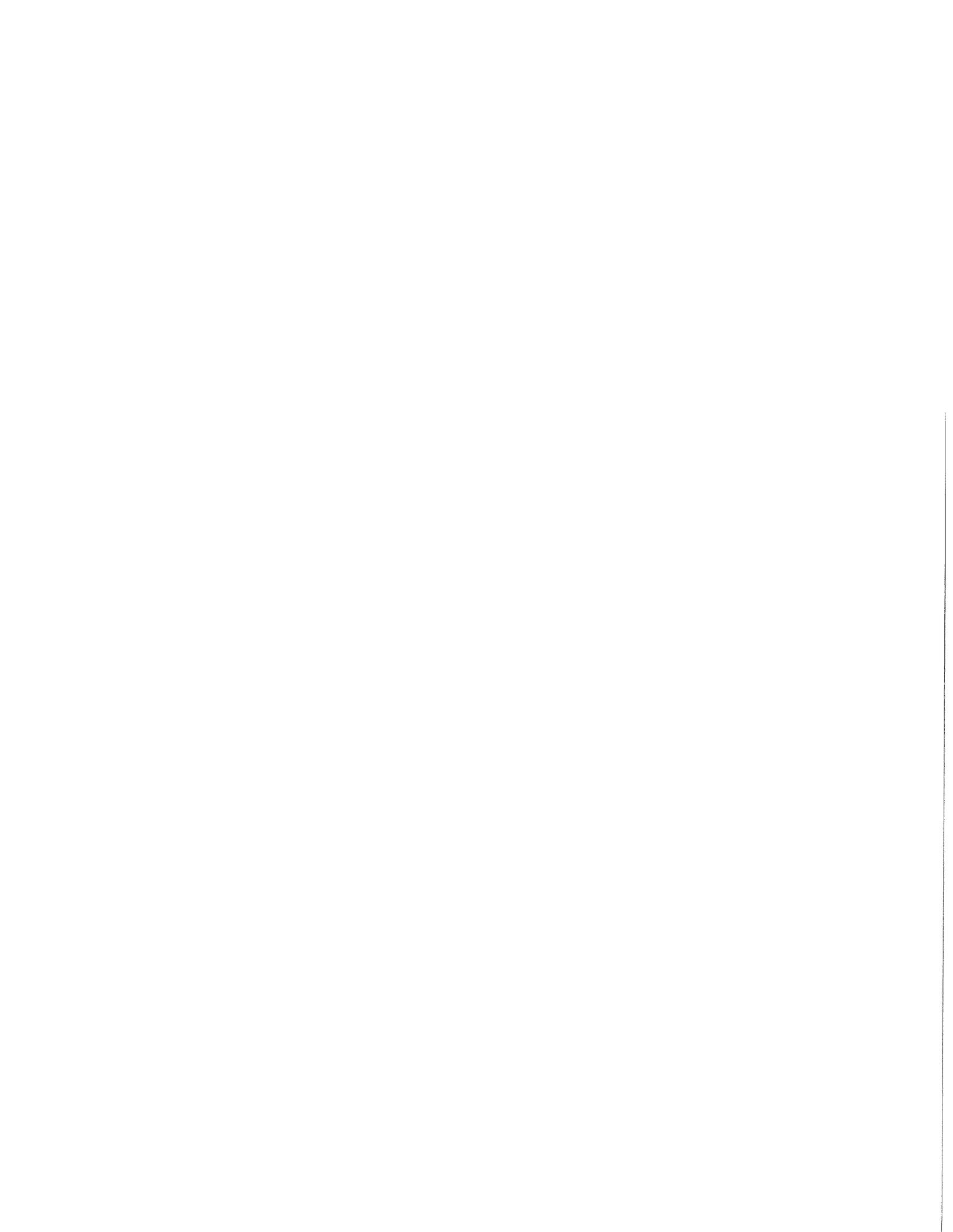
This report, The Funding Analysis Issue Paper, examines the alternatives for funding Multiuser Confined Disposal Sites, and discusses the factors that affect the feasibility of the funding alternatives. The major factors affecting the feasibility of the funding alternatives are:

- o Costs
- o Ownership and Institutional Options
- o Financing Techniques
- o Funding Sources

Eight funding scenarios have been developed. The quantification of the funding alternatives provides one means of comparing the feasibility of funding multi-user confined disposal sites. In order to develop these funding projections, several assumptions were made about the factors listed above. A section on each of these factors discusses issues, identifies the assumptions used in the quantitative analysis, and identifies the implications of making alternative assumptions.

The **Results and Discussion** section contains the details on the quantitative analysis and a summary of the results for eight funding scenarios--two funding scenarios for each of four confined disposal options: aquatic, nearshore unsaturated, nearshore saturated, and upland. The two scenarios for each disposal option represent a range of financing costs (low end and high end).

The **Conclusions and Recommendations** section summarizes the findings of the funding analysis, discusses the overall feasibility of funding Multiuser Confined Disposal Sites, and addresses the possible impacts of unresolved issues.



APPROACH AND METHODS

The funding analysis examines the alternatives for funding Multiuser Confined Disposal Sites and discusses the factors that affect the feasibility of the funding alternatives.

The major factors affecting the feasibility of the funding alternatives are:

- o Costs
- o Ownership and Institutional Options
- o Financing Techniques
- o Funding Sources

Costs involved in actual implementation of multiuser disposal sites, but not included in the funding analysis are: regulatory costs, liability costs, lease costs for aquatic sites, total system costs (i.e. costs for the total number of sites that would be required in the Puget Sound region), and costs to users for sediment testing, dredging and transport.

Each of the four factors have both quantitative and qualitative affects on the feasibility of the funding alternatives. Quantitative feasibility is examined by calculating and comparing the net costs for alternative funding scenarios, and the resulting requirements for user fees (assuming that costs are supported 100 percent by user fees). Eight funding scenarios were quantified:

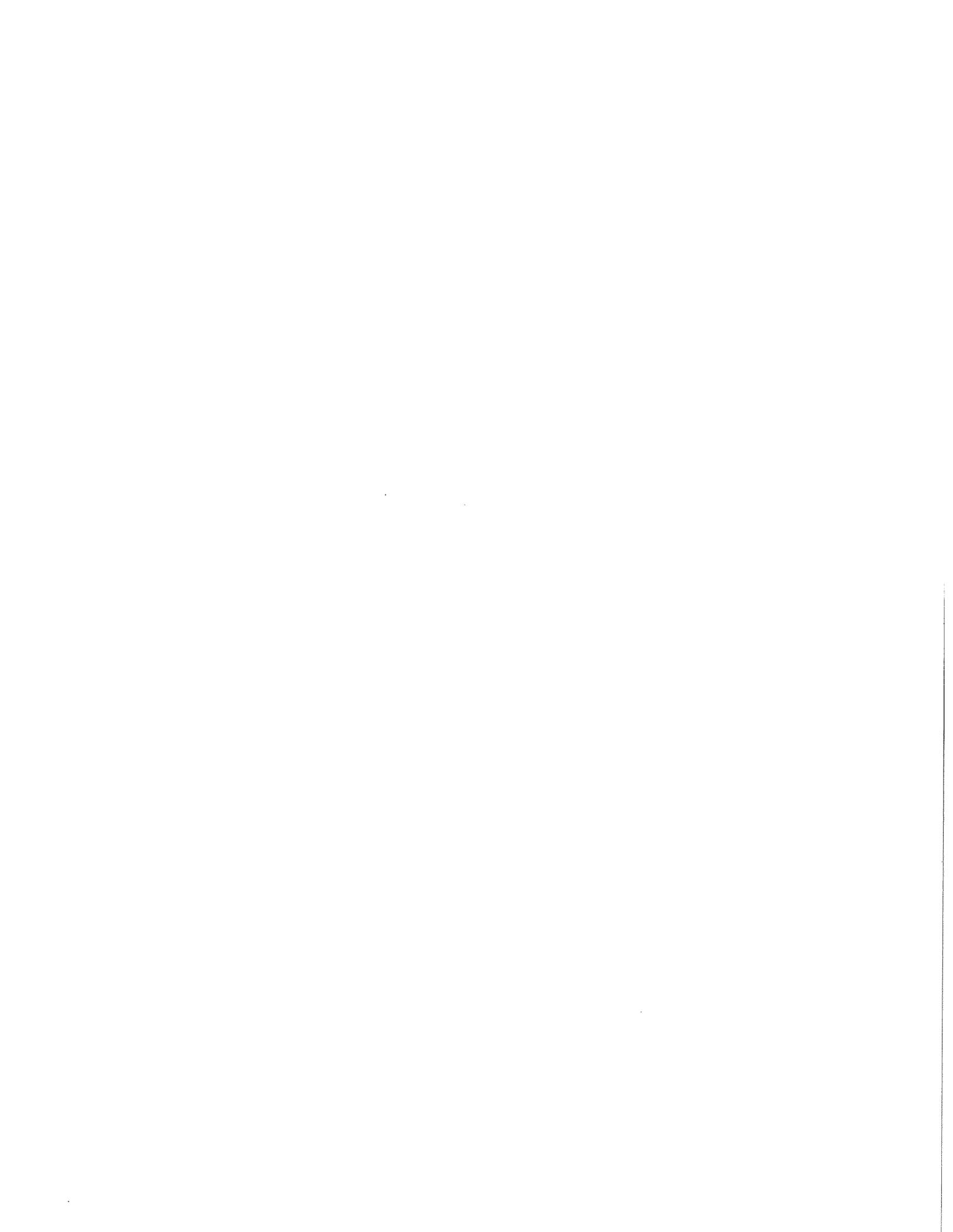
- Aquatic Disposal, Tax Exempt
- Aquatic Disposal, Private
- Nearshore Unsaturated Disposal, Tax Exempt
- Upland Disposal, Tax Exempt
- Nearshore Saturated, Tax Exempt
- Upland Disposal, Private
- Nearshore Unsaturated, Private
- Nearshore Saturated, Private

In order to quantify the funding scenarios, several assumptions were made about the four factors listed above. Explanation of the assumptions used in the quantitative analysis, and the implications of making alternative assumptions, are discussed in the following sections.

The following sections also discuss the qualitative affects of each factor on funding, and the unquantified affects of costs, ownership options, financing techniques and funding sources on the funding alternatives. This discussion identifies some of the policy issues that need to be addressed in order to fully evaluate funding feasibility.

DISCUSSION OF COSTS

The **Cost Analysis Issue Paper** provides estimated costs for four confined disposal sites: aquatic, nearshore unsaturated, nearshore saturated, and upland. Each of these sites have a different profile of costs. Some sites,



such as the upland site, have relatively large development costs, requiring large borrowings and higher long term debt than less capital intensive sites, such as aquatic disposal. The ongoing operating costs for the four disposal sites also differ. This means that each disposal site will show a different "sensitivity" to financing assumptions and costs.

Estimated Costs

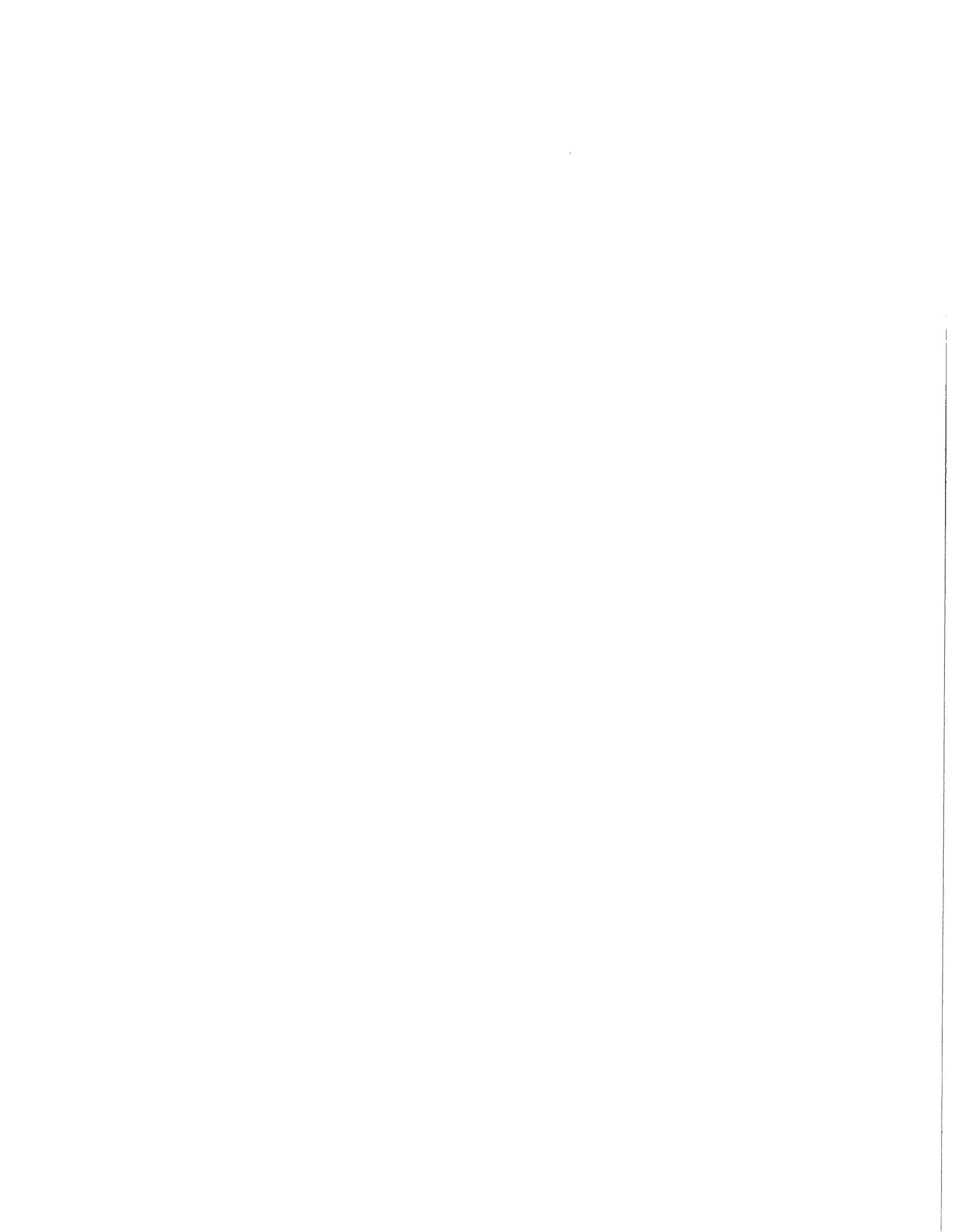
The estimated costs included in the projections developed in the **Cost Analysis Issue Paper** can be grouped into the following categories:

1. Siting and Initial Construction Costs (Year 0):
 - site survey, selection and testing
 - site acquisition
 - site preparation
 - all pre-opening construction costs: berms, dewatering facilities, leachate and liner systems, monitoring wells, habitat mitigation.
 - design and permitting
 - mobilization/engineering/administration
2. Operation and Periodic Construction and Closure Costs (Years 1-20)
 - all post-opening construction cost (years 1-20): berms, dewatering facilities, leachate and liner systems, monitoring wells, habitat mitigation, etc. for periodic opening of new cells.
 - disposal/O & M/ administration
 - monitoring
 - closure of cells during facility lifetime
 - funding for "financial assurance account" for post closure costs
3. Closure/Post Closure:
 - post closure monitoring, site maintenance, and administration (years 21-30)
4. Costs born directly by users:
 - sediment testing, dredging, and transport

Cost Assumptions

The quantitative analysis of funding alternatives uses only those costs that are measurable and would be the direct responsibility of the owner or operator of a generic multiuser confined disposal facility; regulatory costs, liability costs, user costs are not included. Costs are for a single site (with four siting alternatives: upland, nearshore unsaturated, nearshore saturated and aquatic) with a 20 year capacity of 1,250,000 cubic yards. It is assumed that the use of the 20 year capacity is at an even 62,500 cubic yards per year.

In the funding analysis, siting and initial construction costs are included and treated as capital costs that require debt financing. The debt or loan payments required in future years (years 1-20) to finance capital debt are included in the analysis.



Operation and periodic construction and closure costs for years 1-20 are treated as operating costs. Periodic construction and closure costs (i.e. occurring every two or three years) are assumed to be funded through annual contributions to a Construction Reserve Account; this annual contribution is treated as an operating cost.

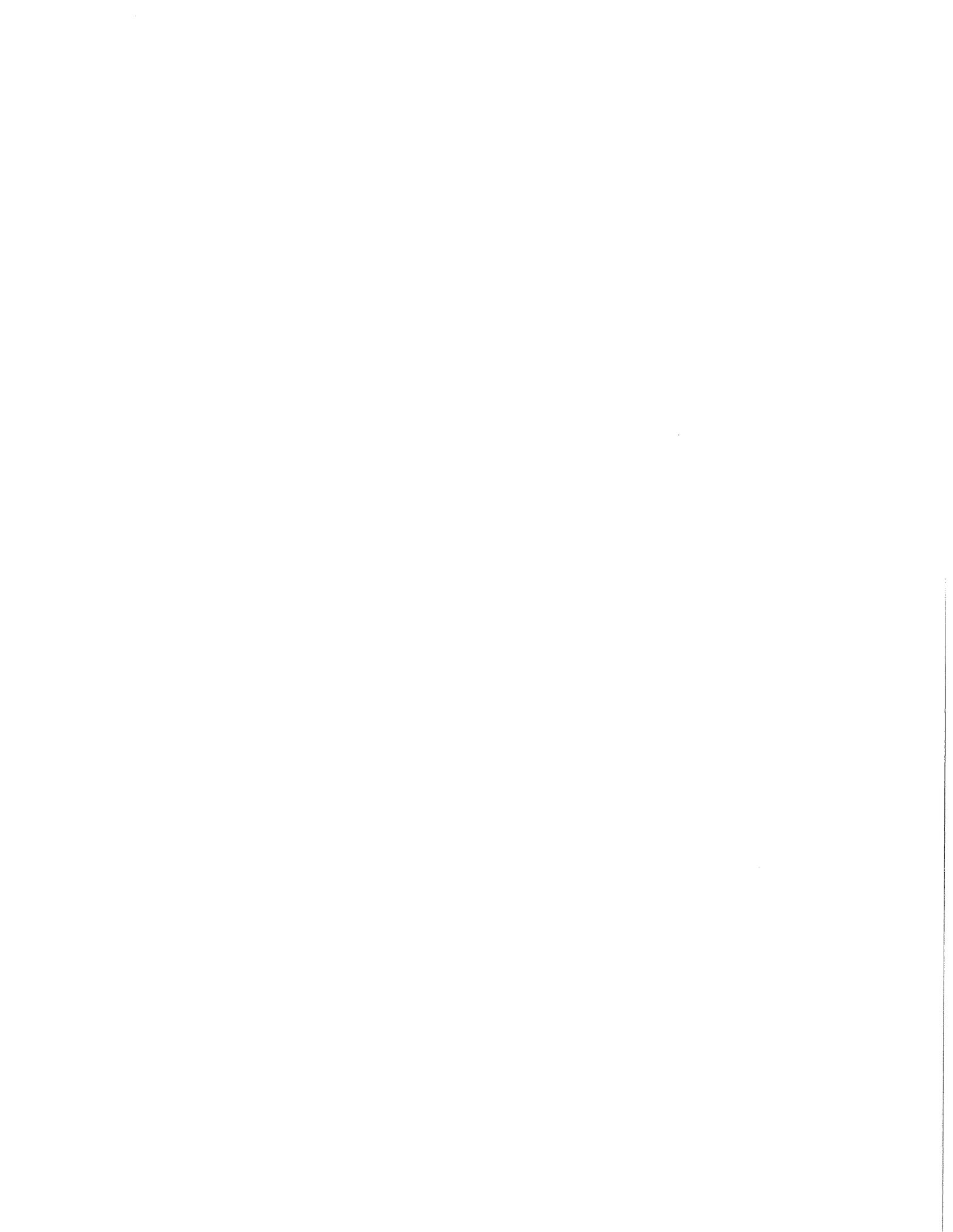
Post closure costs are funded prior to closure through contributions to a trust fund; after closure, the trust fund is drawn down to cover post closure costs. Post closure monitoring, site maintenance and administration (years 21-30) are funded through a "financial assurance account" which is accumulated during the operating lifetime of the facility (under requirements similar to those specified in WAC 173-304-467 for solid waste facilities). According to these regulations, the contributions to this account must come from a dedicated portion of user fees. The funding analysis assumes a monthly contribution is made to the financial assurance account, and the annual total for this contribution appears as a cost in years 1-20. The funds for the financial assurance account are invested and held in a trust fund which cannot be used for any purpose other than post-closure costs.

The calculations for the funding scenarios included estimates of investment earnings for both reserve funds (Construction Reserve Account and Financial Assurance Account). Assumptions about investment rates are based on the current (June, 1989) market rate for certificates of deposit (CD) as shown below:

<u>Investment Type</u>	<u>Est. Rate</u>	<u>Assumption</u>
Public Long Term	10.10%	one year CD + 1%
Private Long Term	11.50%	one year CD + 2%
Public or Private Short Term	9.15%	one year CD

Long term investment rates apply to the Financial Assurance Account, since this is a trust fund that accumulates over 20 years. The short term rate applies to the Construction Reserve Account which accumulates fund over 1-2 years and is then drawn down to pay for interim capital costs. (These investment interest rates are used in calculating future cash flows for the eight funding scenarios. The real rate of return on investments is determined by discounting future cash flows to determine the present value. In the analysis of the funding scenarios, all future cash flows are discounted at the rate of 7.5 percent--a rate equal to the cost of capital for public agencies--to determine the net present value of all costs. Therefore, the real rate of return for investments is the difference between the discount rate and the actual investment rates; in this case the difference is 1.65-3.65 percent.)

Costs born directly by users for sediment testing, dredging and transport of dredge material to the disposal site are not included in the quantitative analysis, since these costs are not the responsibility of the disposal facility. However, these costs do have an impact on the economic feasibility of the confined disposal site alternatives. Transportation costs, in particular, could be affected by both the type and location of a confined disposal facility; the more distant the facility, the higher the transport



costs. Whether or not higher transport costs prohibit a user from disposing at a particular facility depends on several factors: the overall economic return on the user's dredging project, the availability of alternative disposal sites, and the total costs of dredging, transport and disposal. In the absence of specific information about user projects, these factors cannot be predicted. However, it is important to understand that these factors could impact the overall feasibility of a disposal alternative.

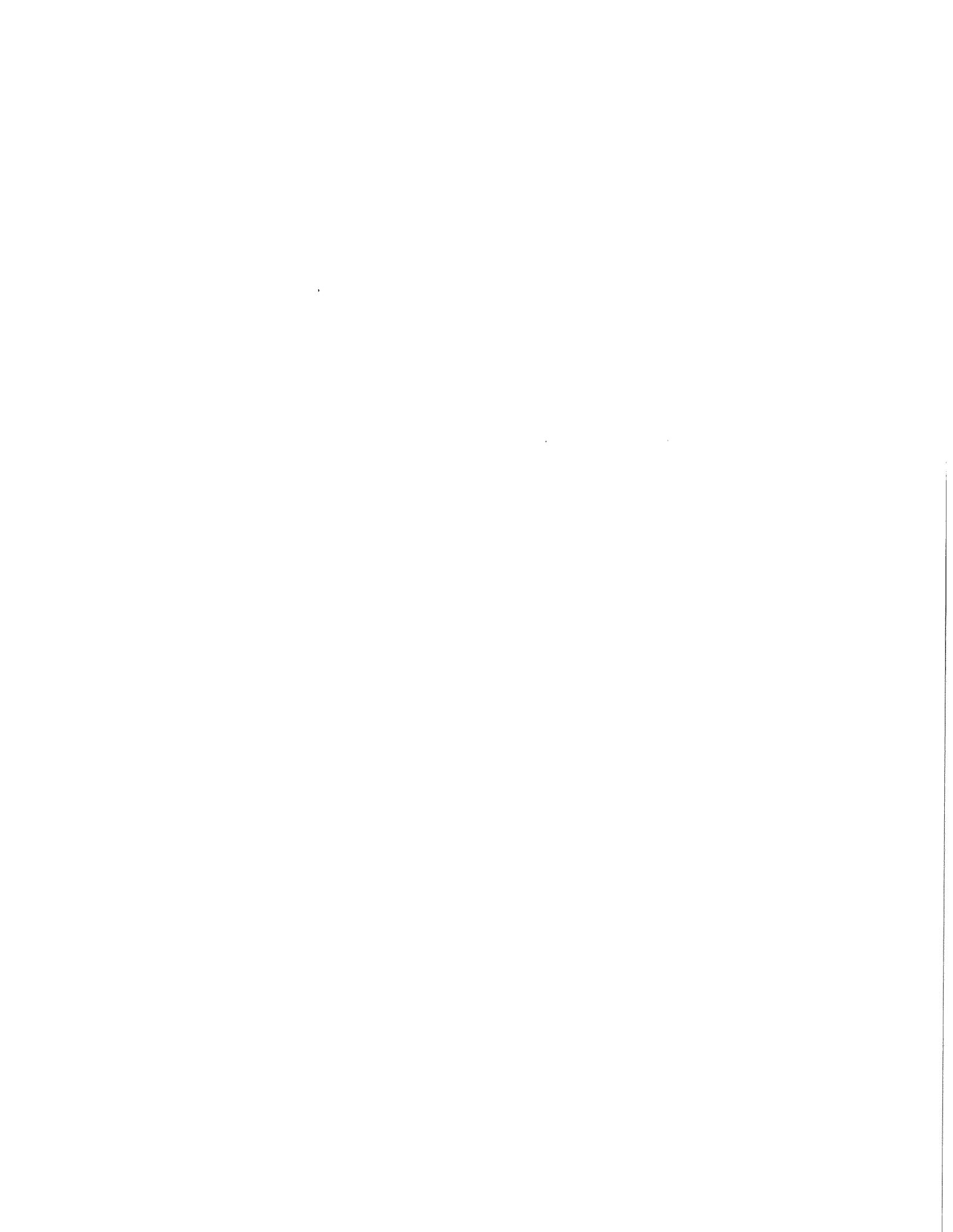
The quantitative analysis also does not include liability costs. Future facility failure, and the potential cost of remediating such a failure, are difficult to predict. However, there are various techniques that could be used to estimate and fund liability costs. For example, if guidelines for estimating liability costs were established, these costs could be funded through insurance premiums or establishment of a "liability reserve" as part of the financial assurance account which is required for post-closure cost. Depending on the estimated amounts and funding requirements for liability costs, this could have a significant impact on the funding feasibility of disposal alternatives.

Regulatory costs are not included in the quantitative analysis. Regulatory costs include costs such as staffing required for establishing regulatory guidelines, reviewing permit applications and enforcing regulations. These costs might differ among the institutional alternatives, but are likely to be similar for all the disposal alternatives, so would not directly affect the feasibility of disposal alternatives.

Undetermined Costs

There are costs that have not been included in the **Cost Analysis Issue Paper**, in part because of the difficulty of developing estimates. The undetermined costs include regulatory costs, liability costs, lease costs for aquatic disposal sites, and total system costs. While regulatory costs could be significant, they would be unlikely to have a major impact on the funding feasibility of disposal alternatives, since they would be about the same for all alternatives. Liability costs could have a major impact on project feasibility, depending on how costs are shared among owners, operators, permittees and users, and how liability costs are estimated and funded. Lease costs for aquatic sites are like the land purchase costs that are estimated for the other alternatives; without a determination of the lease costs, it is difficult to make an appropriate comparison among the disposal alternatives. Total system costs could have a major impact if, for example, all sites are developed by one agency in a short period of time, thus affecting the agency's overall debt capacity and financing capability.

Regulatory costs include the cost for the Planning/Regulation function identified in the **Institutional Alternative Issue Paper**. The Planning/Regulation function includes: development of a coordinated management plan, setting standards for contaminated dredged materials, oversight regulation, and liability management. These regulatory costs may be significant, but are not included in the **Cost Analysis Issue Paper** because they are not related to specific disposal alternatives. It is assumed that



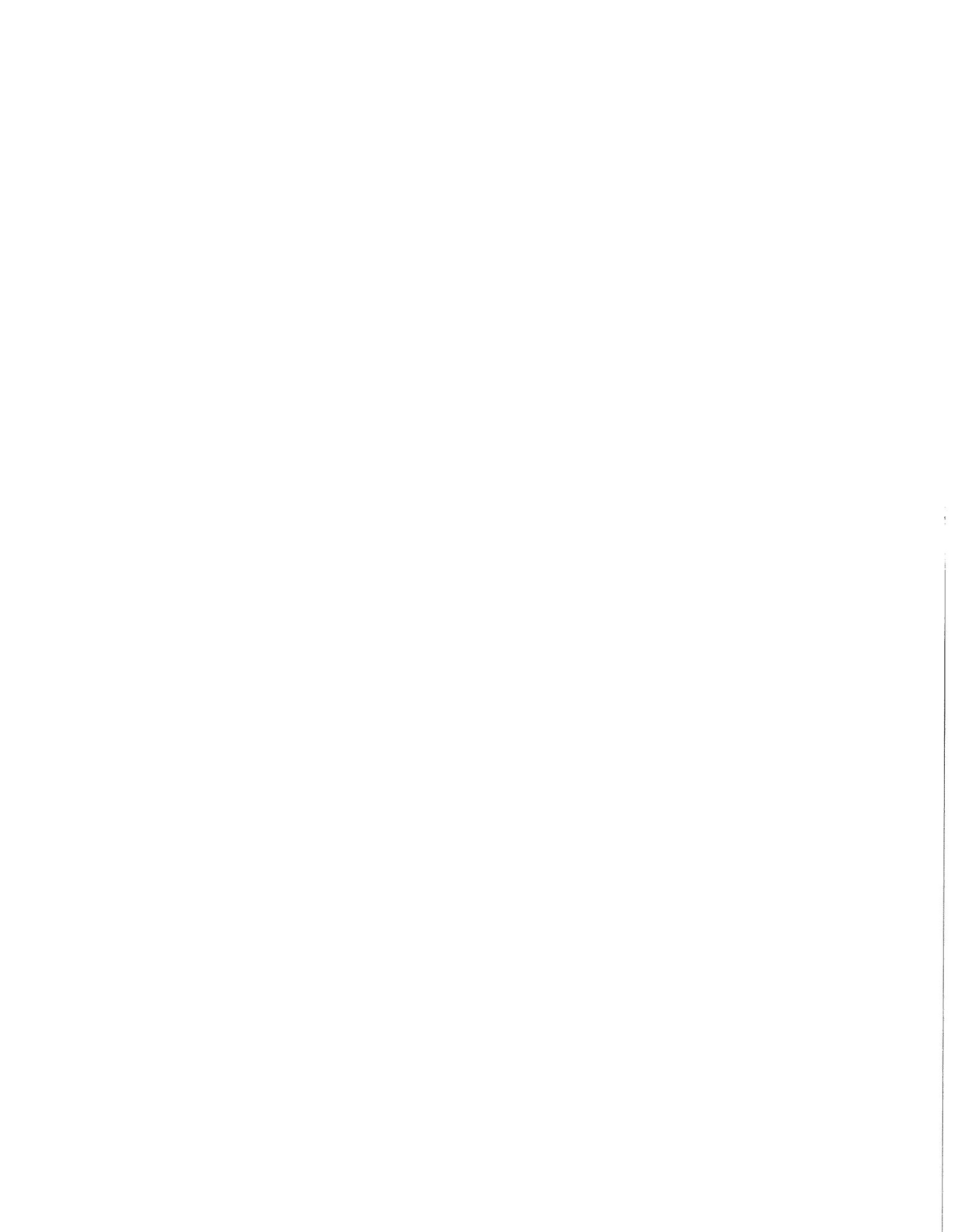
regulatory costs, though unknown, would be about the same for every disposal alternative, and would not affect the comparative feasibility among alternatives.

Liability costs are costs to correct any future failure of disposal systems. Liability costs are unknown; since multiuser confined disposal of sediments is a new type of facility, there is no track record for judging potential liability. Furthermore, in the event of a system failure, responsibility for liability costs would be probably be shared by several parties; not all cost would be born by the owner/operator of a disposal facility. Though no liability costs are included in the funding analysis, this issue has an impact on the economic feasibility of the disposal alternatives, since alternative disposal types (sites) may have different levels of environmental risks.

Because aquatic sites are owned by the Department of Natural Resource (DNR), an aquatic facility would require a lease arrangement between DNR and the public or private owner/operator of the facility. Therefore, the alternatives for confined aquatic disposal would include a lease cost. As discussed in the **Cost Analysis Issue Paper**, no lease costs were assumed in developing the cost estimate for confined aquatic disposal. This was done, in part, because of the difficulty in determining what DNR lease costs might be for this type of facility. However, since it is likely that some type of lease charge would be made by DNR, this undetermined cost could have an impact on funding feasibility. A lease cost is similar to a land acquisition cost, which is included in the cost estimates for the other disposal alternatives, and is a significant cost element. In comparing the costs and funding feasibility among alternatives, it is important to remember that lease costs for aquatic disposal have not yet been determined and are not included in the analysis.

Total system costs, that is the costs for all disposal sites needed to handle total projected volumes of dredged materials, have not been estimated. The cost analysis is based on a "generic" site that has a capacity of 1,250,000 cubic yards. The projected need for the 20 year period is a total of 6.8 to 9.5 million cubic yards. Based on the capacity of the generic site, a total of five to eight sites may be required for the total system. The impact of total system costs depends on which jurisdiction(s) funds the sites and whether a jurisdiction is responsible for one site or all sites. Total system costs also relate to the general financial capabilities and authority of a jurisdiction and affect:

1. The feasibility of "subsidizing" part of the costs through revenue sources other than user fees;
2. The feasibility of issuing bonds because of the impact on debt capacity; and
3. The feasibility of using other financing mechanisms such as revolving loan funds and grants.



DISCUSSION OF INSTITUTIONAL AND OWNERSHIP OPTIONS

The **Institutional Alternatives Issue Paper** addresses alternative arrangements for providing regulatory, siting and construction, operation and post closure functions. The funding analysis focuses on the options for siting and construction, and operation (including funding of financial assurance account for post closure costs). The institutional options for regulatory oversight generally provide some type of multi-jurisdictional authority, and are not significantly different for funding purposes. Institutional options for siting and construction, and operation do have a potential impact on funding including: authority to impose taxes or fees to finance a facility, and authority to control use of a facility (flow control). The conditions of a specific jurisdiction or institution such as overall debt capacity of the institution and current bond rating affect costs: since the funding analysis is for generic disposal options, these specific factors cannot be determined. While the analysis makes no assumptions about institutional alternatives, it does incorporate some underlying assumptions that whatever institutional alternative is used has:

1. Sufficient debt capacity to incur long term debt for facility siting and construction costs;
2. Authority to guarantee a flow of revenue over the life of the facility, either through flow control, contracts with users, or imposition of taxes and fees; and
3. A bond rating equivalent to Moody's B or better (this affects the borrowing interest rate)

Public/Private Options

Under any institutional alternative, there are several options for ownership and operation, ranging from public ownership and public operation to private ownership and private operation. These alternatives are summarized in the Matrix of Ownership Options shown on page 8.

Option 1 is the "total public" option where the public jurisdiction is directly responsible for financing, contracting for independent design and competitive bids for construction of a facility, and operating the facility.

Option 2 is the "turnkey service" option. Under this option, the private sector provides a turnkey service (design-build), turning the facility over to the public entity for operation.

Options 3 and 4 are variations on the turnkey service where the private sector designs and builds the facility, and also operates it under either a short term contract (option 3) or long-term service contract (option 4) with the public entity.



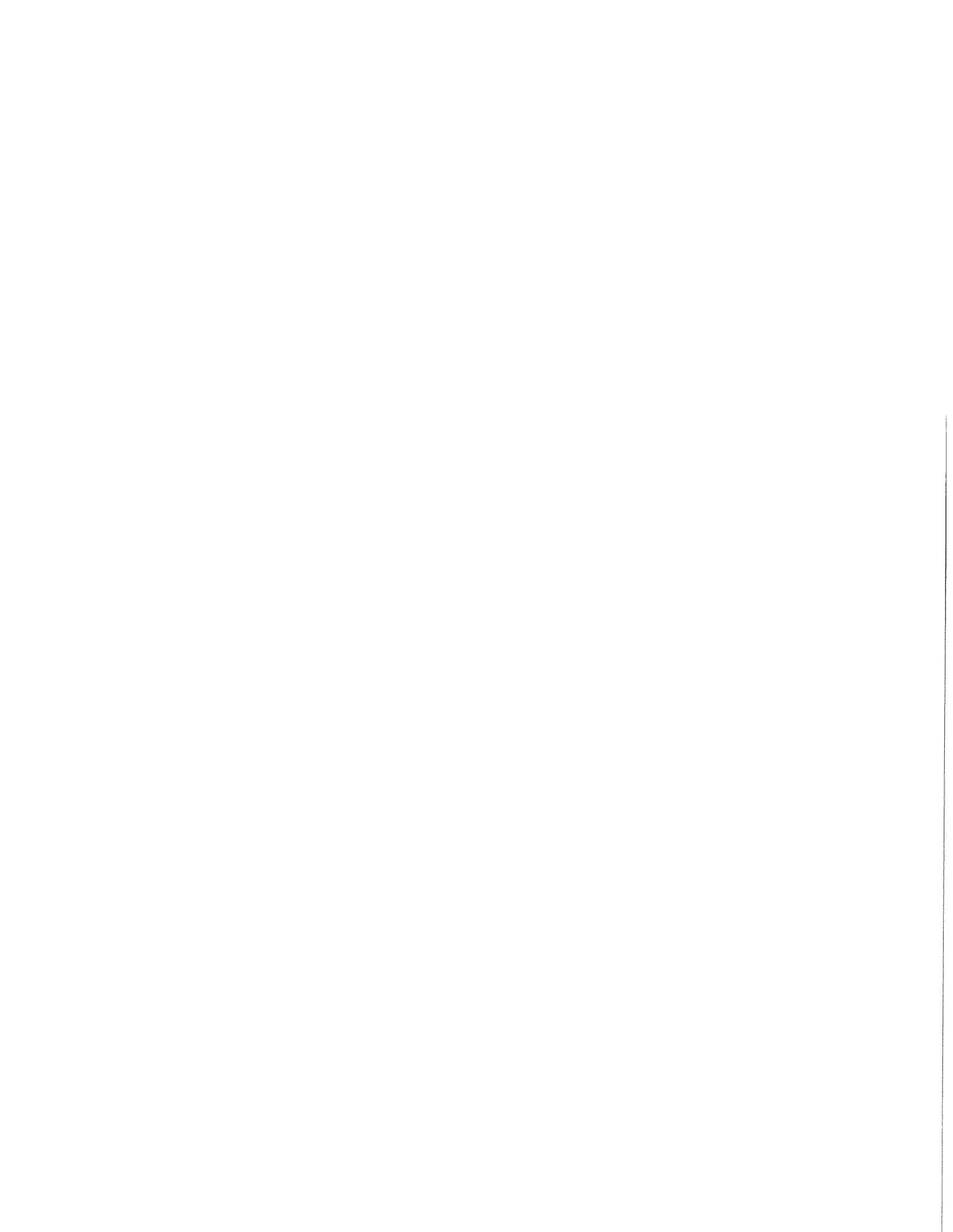
Options 5 and 6 are private management contract options where the public entity constructs the facility, then contracts with a private entity to manage and operate the facility, either under a short-term contract (option 5) or a long term contract (option 6).

Option 7 is a private full service option where the private entity designs, builds, owns, operates and finances the facility. This option is applicable to upland and near-shore sites.

Option 8 is a variation on the private full service option that applies particularly to aquatic sites, because these sites are all under State ownership. In this situation, the private entity leases the site from the state, then finances any construction costs and operates the facility.

MATRIX OF OWNERSHIP OPTIONS FOR MULTI-USER SEDIMENTS DISPOSAL SITES

FUNCTIONS: DISPOSAL SITES:	PLANNING/ REGULATION	SITING: SURVEY & SELECTION, PRE-INVESTIGATION, PERMITS, SITE DEVELOPMENT	OPERATION: OWNERSHIP/OPERATION, MONITORING AND RATES	CLOSURE/ POST-CLOSURE: CLOSURE PLAN LIABILITY
1. ALL SITES	STATE/JOINT/ OR NEW AUTHORITY	PUBLIC OWNERSHIP, INDEPENDENT DESIGN & COMPETITIVE BID	PUBLIC OPERATION	STATE/JOINT/ OR NEW AUTHORITY
2. ALL SITES	STATE/JOINT/ OR NEW AUTHORITY	PUBLIC OWNERSHIP WITH PRIVATE DESIGN/BUILD	PUBLIC OPERATION	STATE/JOINT/ OR NEW AUTHORITY
3. ALL SITES	STATE/JOINT/ OR NEW AUTHORITY	PUBLIC OWNERSHIP WITH PRIVATE DESIGN/BUILD	SHORT TERM CONTRACT WITH PRIVATE FIRM	STATE/JOINT/ OR NEW AUTHORITY
4. ALL SITES	STATE/JOINT/ OR NEW AUTHORITY	PUBLIC OWNERSHIP WITH PRIVATE DESIGN/BUILD	LONG TERM CONTRACT WITH PRIVATE FIRM	STATE/JOINT/ OR NEW AUTHORITY
5. ALL SITES	STATE/JOINT/ OR NEW AUTHORITY	PUBLIC OWNERSHIP, INDEPENDENT DESIGN & COMPETITIVE BID	SHORT TERM CONTRACT WITH PRIVATE FIRM	STATE/JOINT/ OR NEW AUTHORITY
6. ALL SITES	STATE/JOINT/ OR NEW AUTHORITY	PUBLIC OWNERSHIP, INDEPENDENT DESIGN & COMPETITIVE BID	LONG TERM CONTRACT WITH PRIVATE FIRM	STATE/JOINT/ OR NEW AUTHORITY
7. UPLAND, NEARSHORE	STATE/JOINT/ OR NEW AUTHORITY	PRIVATE OWNERSHIP AND FINANCING	20 YEAR CONTRACT WITH PRIVATE FIRM	STATE/JOINT/ OR NEW AUTHORITY
8. AQUATIC	STATE/JOINT/ OR NEW AUTHORITY	LONG TERM PRIVATE LEASE WITH PRIVATE DESIGN/BUILD	PRIVATE FULL SERVICE	STATE/JOINT/ OR NEW AUTHORITY



Advantages and Disadvantages of Private Ownership

Prior to the 1986 Federal Tax Reform Act, there were significant financial incentives for private industry to join with public agencies to build and operate public facilities. These incentives made it worthwhile for private industry to make large equity contributions for funding the capital costs of facilities, thereby reducing overall borrowing costs. In the absence of these incentives, the incentive for private investment in a project depends primarily on the income producing potential of a project.

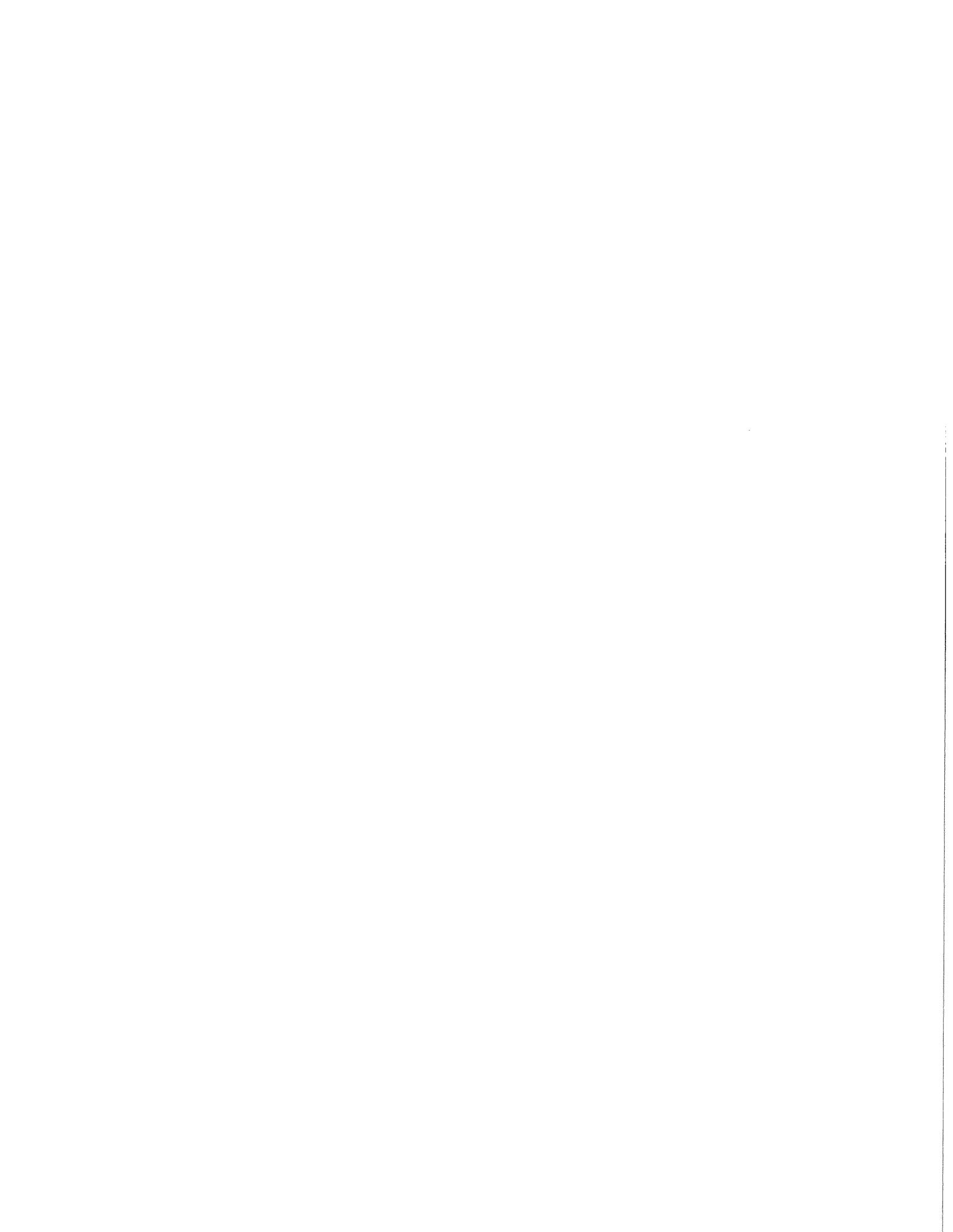
The primary advantage of private participation in a project is the potential for more efficient and cost-effective operation compared to public operation. This advantage is somewhat hypothetical and cannot be estimated for the generic confined disposal alternatives that are being examined in the funding analysis. For specific projects, these efficiencies could be measured by comparing private responses to bid requests with estimates of public agency costs. Another advantage of private participation is that it can relieve the public agency of some or all of the burden of directly managing development and/or operation of a facility.

The main disadvantages of private ownership or operation are loss of control by the public agency and potentially higher borrowing costs. Both of these disadvantages can be mitigated by negotiating appropriate contractual relations and designing public/private arrangements that allow tax exempt financing. However, current restrictions on tax exempt financing limit the flexibility of these arrangements.

Risks and the Feasibility of Public/Private Options

The feasibility of the various public/private options depends on the extent to which the public shares in the risks and liabilities involved of the developing, operating and closing the disposal facilities. There are four areas of significant risks in the development and operation of a multiuser disposal site for contaminated sediments:

1. Unpredictability of siting costs: delays and difficulties in siting this type of facility can drastically increase the costs of development and tend to be unpredictable (under existing circumstances).
2. Unpredictability of customer use: a multiuser site that is dependent on income from user fees may experience cash flow problems and difficulty in meeting debt payments if use is erratic over a period of years, as may be the case for dredging projects. Use can also be erratic if a major user has an alternative means of disposal, and chooses not to use the multi-user site. The unpredictability of customer use affects 1) how much materials is disposed of at a site, 2) when it is disposed and 3) whether a multiuser site or an alternative site would be used.
3. Potential liability for facility failure during and after closure. Where the responsibility for liability is undefined or unlimited, the owner,



developer, operator and users of site are vulnerable to a significant economic risk.

4. Regulatory risk, or the risk that new environmental regulations that were not in place when the facility was designed, built and operated, if imposed on the facility retroactively, would result in unanticipated costs or correction or cleanup.

Some options for addressing these risks are briefly outlined below.

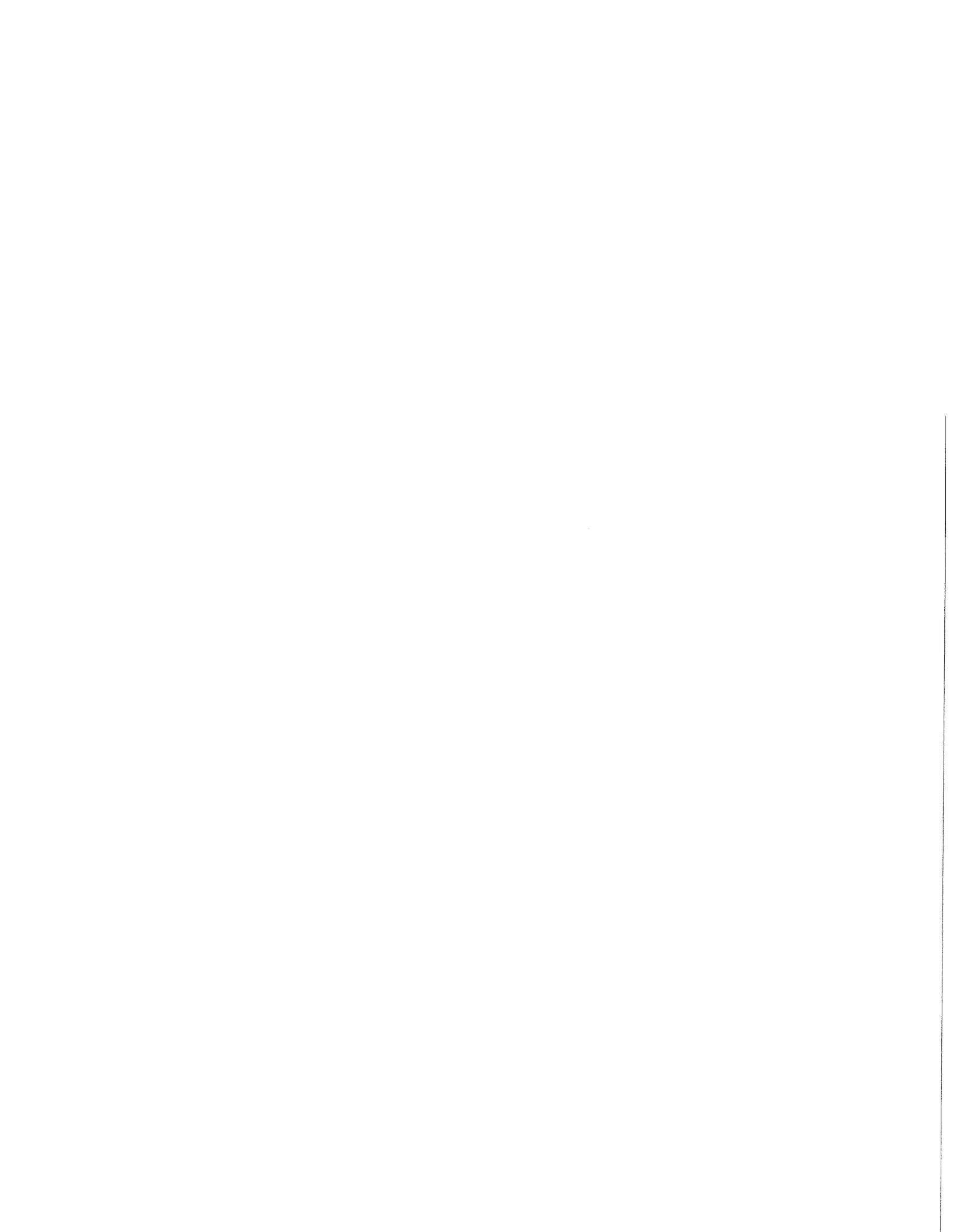
1. Siting Risks

- a. Develop institutional arrangements that, given compliance with permitting requirements (e.g. for site testing, etc.), ensure that permit approval occurs within a set time period, and that the permit issuing authority will assume financial responsibility if delays occur.
- b. Develop institutional arrangements whereby the actual permitting of sites (all site testing, public hearings, etc.) is done by a central agency with multi-jurisdictional authority, and the cost of this process is supported by a general revenue source (taxes, federal funds, etc.).
- c. Develop institutional arrangements for a multi-jurisdictional siting effort and a method for sharing siting costs among jurisdictions.

2. Unpredictability of Use:

- a. Provide some type of "flow control" authority for the multi-user disposal site that requires all dredged contaminated sediments within a specified geographic region to be disposed of at that site.
- b. Develop a more accurate assessment of the volume of materials needing confined disposal, for example by inventorying contaminated sediments.
- c. Subsidize income from user fees with other sources of revenue (taxes, grants, etc.).
- d. Establish operating reserve accounts that could be used to cover all operating costs, including debt service payments, for a period of time if revenue from user fees declines temporarily.
- e. Establish lease agreements with users that allow them to reserve a certain amount of disposal space for future use. Lease charges could be based on the costs of developing the disposal site to meet the projected capacity requirements of users. Other operating costs could be met by a volume charge on actual use.

3. Liability for System Failure: There are many unresolved questions on the issue of liability that impact funding feasibility. Outlined below

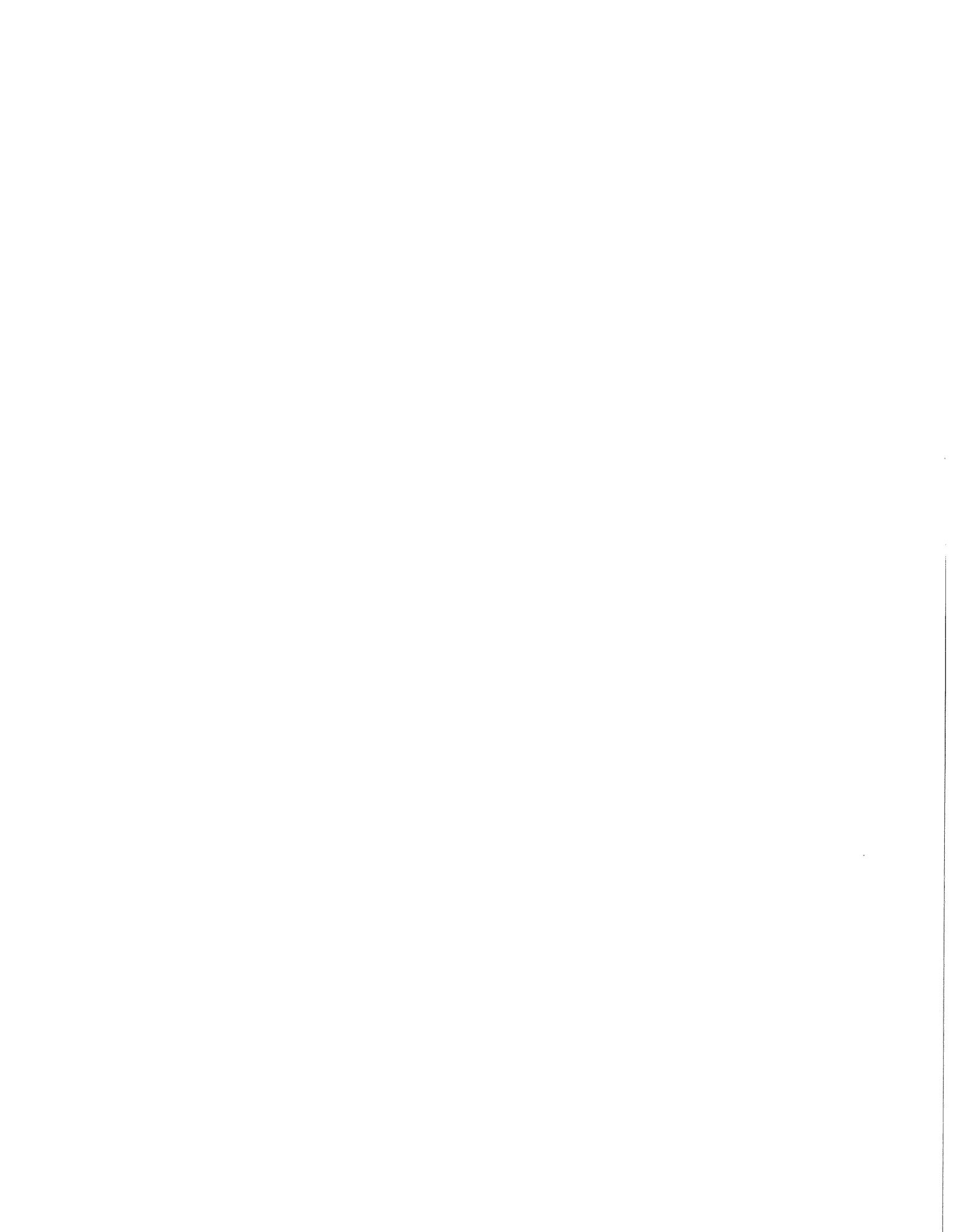


are possible mechanisms for dealing with the risk of unpredictable liability costs; some of these may have legal limitations not identified below.

- a. Specify a dollar limit on the liability of the owner/operator of the facility, and specify that the State will assume liability for any cost beyond that amount. The liability of the owner/operator could then be funded as part of the operating costs (through an insurance premium or guarantee bond), and as part of the financial assurance account set up to meet the cost of a post-closure plan. A general source of revenue to meet potential State liability costs would need to be identified and could be used to fund some type of "liability reserve account".
 - b. Set up a pooled insurance fund that would charge premiums to disposal site owners, would be guaranteed by the State, and would cover all liability costs. The pooled insurance concept could be extended to other users with similar environmental liability problems in order to spread the risks over a larger group. By guaranteeing the fund, the State shares in the risk that liability costs may exceed the amount accumulated in the insurance fund.
 - c. Specify a formula for sharing liability costs among the State, facility owners, and users. This cost sharing formula could be specified in a lease agreement or use agreement required of site users.
4. Regulatory risk is difficult to mitigate or control as new regulations are often imposed at the federal level, or may be created in response to new knowledge about environmental impacts.

Ownership Assumptions

The scenarios examined in the funding analysis are based on a range of financing costs. The low end financing costs (tax exempt revenue bonds) represent the type of funding available to public agencies for public purpose projects. This type of financing could be used where the facility is owned by a public agency, whether or not some of the functions are contracted out to private enterprise. Depending on the level and type of private participation, the bonds are designated as either public purpose bonds or private purpose bonds. Public purpose bonds are tax exempt and, under special provisions for solid waste and hazardous waste facilities, some private purpose bonds would also be tax exempt. However, if the bonds are designated as private purpose, they would fall under a state wide cap limiting the total amount of tax exempt private purpose bonds issued each year. Designation of the bonds would be based on a legal examination of the characteristics of a specific bond issue, and cannot be determined for this generic analysis. The low end financing costs represent the type of borrowing available under public ownership of a facility.



The high end financing costs (private financing) represent the type of borrowing available under private ownership of a facility. No estimates were made of potential cost savings through more efficient operation by private enterprise. A profit margin is included in the private financing scenarios. For these reasons, the private financing scenarios result in high costs, compared to the tax exempt revenue bond financing.

DISCUSSION OF FINANCING TECHNIQUES

Description of Financing Techniques

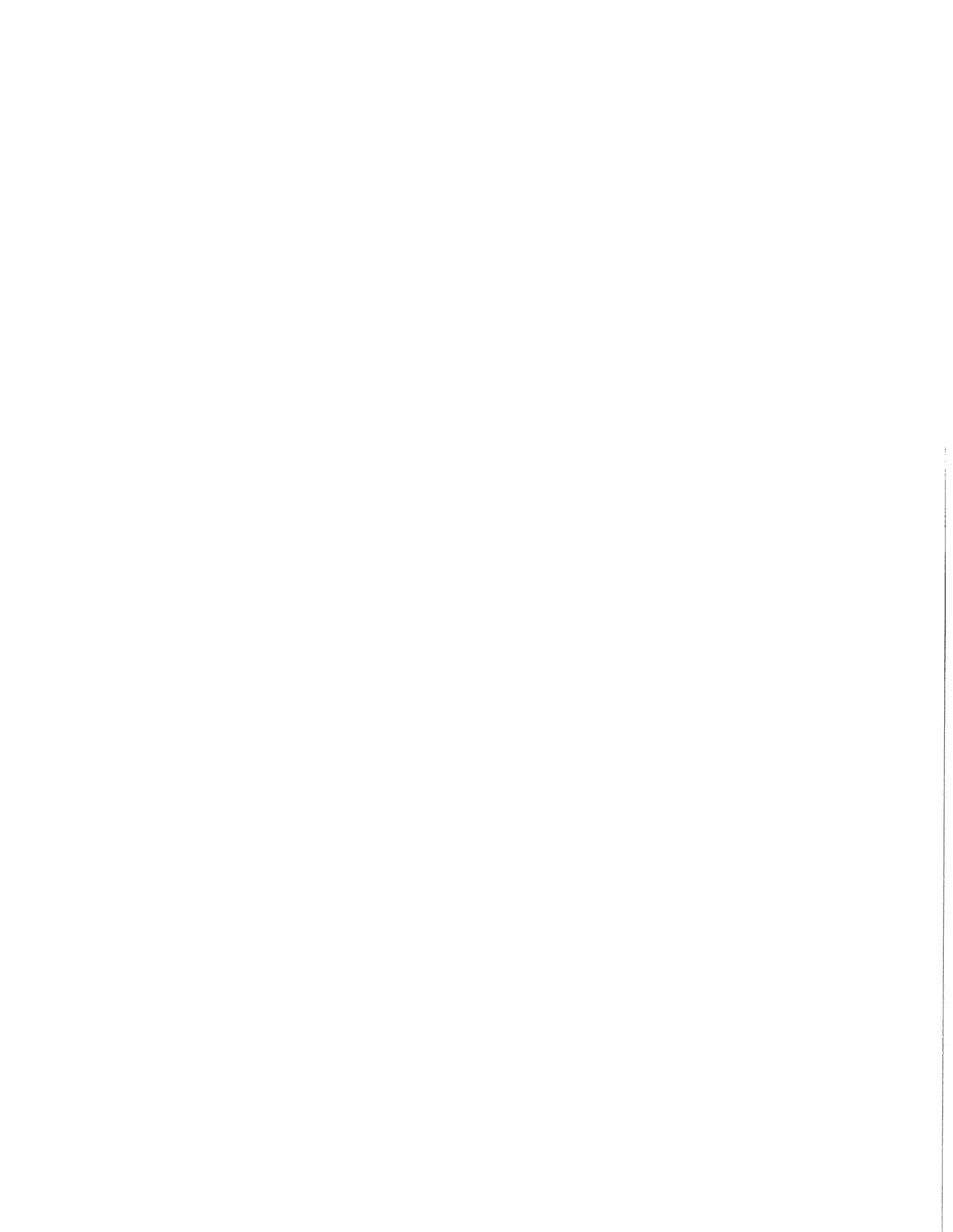
The range of alternative financing techniques for capital projects from high to low costs include private financing, taxable bonds, tax exempt bonds (general purpose or private activity tax exempt bonds), subsidized low interest loans (e.g. through a revolving loan fund or government loan guarantees), grants, and pay-as-you-go. The subsidized loan, grants and pay-as-you-go options would require the use of funding sources other than user fees. For example, under the subsidized loan or grant options some form of general tax revenue would be used to support facility development and construction costs. Under the pay-as-you-go option an agency would use available cash balances that had been accumulated from other funding sources and could legally be used for this purpose.

Private financing is provided through a variety of loan instruments that have the following general characteristics:

1. Borrowing rates are set at some level above the prime lending rate, based on the level of risk associated with the private client and the financed project.
2. The borrower is required to provide an equity contribution; the size of the equity contribution (i.e. as a percent of project costs) depends on the total project costs and the perceived project risks: the higher the costs and larger the risk, the larger the equity contribution required.
3. Some form of collateral or guarantee is required to secure the loan; a guarantee might include long term contracts with facility users providing secure source of revenue over the life of the loan.
4. Usually the term of the loan is less than the operating life of the facility.

By comparison, financing for public agencies through taxable or tax exempt bonds have the following characteristics:

1. Borrowing rates are based on market demand for municipal securities; the lower rates for these instruments reflect the demand for low risk and tax free investments.



2. The public agency can borrow up to 100 percent of the project costs.
3. The public agency secures the loan by pledging its "full faith" and/or an allocation of revenues towards payment of debt.
4. The term of the loan can be for the full operating life of the facility.

Impact of Financing on Project Costs

There are four different disposal site options (aquatic, upland, near-shore unsaturated and near-shore saturated) each with different cost profiles. Some sites, such as the upland site, have relatively large development costs, requiring large borrowings and higher long term debt than less capital intensive sites, such as aquatic disposal. The ongoing operating costs for the four disposal sites also differ. This means that each disposal site will show a different "sensitivity" to financing assumptions and costs. Sites with higher capital costs will be most sensitive. This relationship is summarized in the following table.

<u>Site</u>	<u>Capital Costs Sensitivity to Financing Costs</u>	<u>Operating Costs Sensitivity to Inflation</u>
Confined Aquatic	low	high
Near-shore Saturated	high	medium
Near-shore Unsaturated	high	medium
Upland	high - medium	high

Comparison of Financing Costs

As discussed above, actual financing costs are related to the project development costs. A general comparison of financing techniques can be provided by comparing current annual interest rates for each type of borrowing. The borrowing interest rates provided below are estimates based on current (June, 1989) market conditions, and a general assumption that outstanding issues related to project risks (e.g. liability issues, user predictability, etc.) would be addressed prior to seeking project financing.

<u>Financing Techniques</u>	<u>Est. Rate</u>	<u>Assumption</u>
Private Financing	13.00%	prime rate + 2%
Taxable Revenue Bonds	10.50%	tax exempt rate + 3%
Tax Exempt Revenue Bonds	7.50%	revenue bond index
Subsidized Loans	6.00%	depends on subsidy level
Grants/Pay-as-you-go	0%	no interest



Financing Assumptions

The funding analysis examines two scenarios for each disposal site. The two scenarios selected are 1) with private financing and 2) with tax exempt revenue bonds financing. These financing alternatives were selected to show a range of financing costs that would occur under a system that is supported completely by user fees, without funding from grants, taxes or other sources.

DISCUSSION OF FUNDING SOURCES

A primary purpose of the funding analysis is to assess the feasibility of funding multiuser sites with user fees. For this reason, the funding scenarios include calculations of the potential range of user fees. However, funding sources could also include a wide range of taxes or assessments, and federal assistance. There are a variety of policy issues related to the question of whether the cost of a multiuser sediments disposal site should be funded solely from user fees or not. The following discussion provides a general framework for examining these policy issues.

Cost Allocation Issues

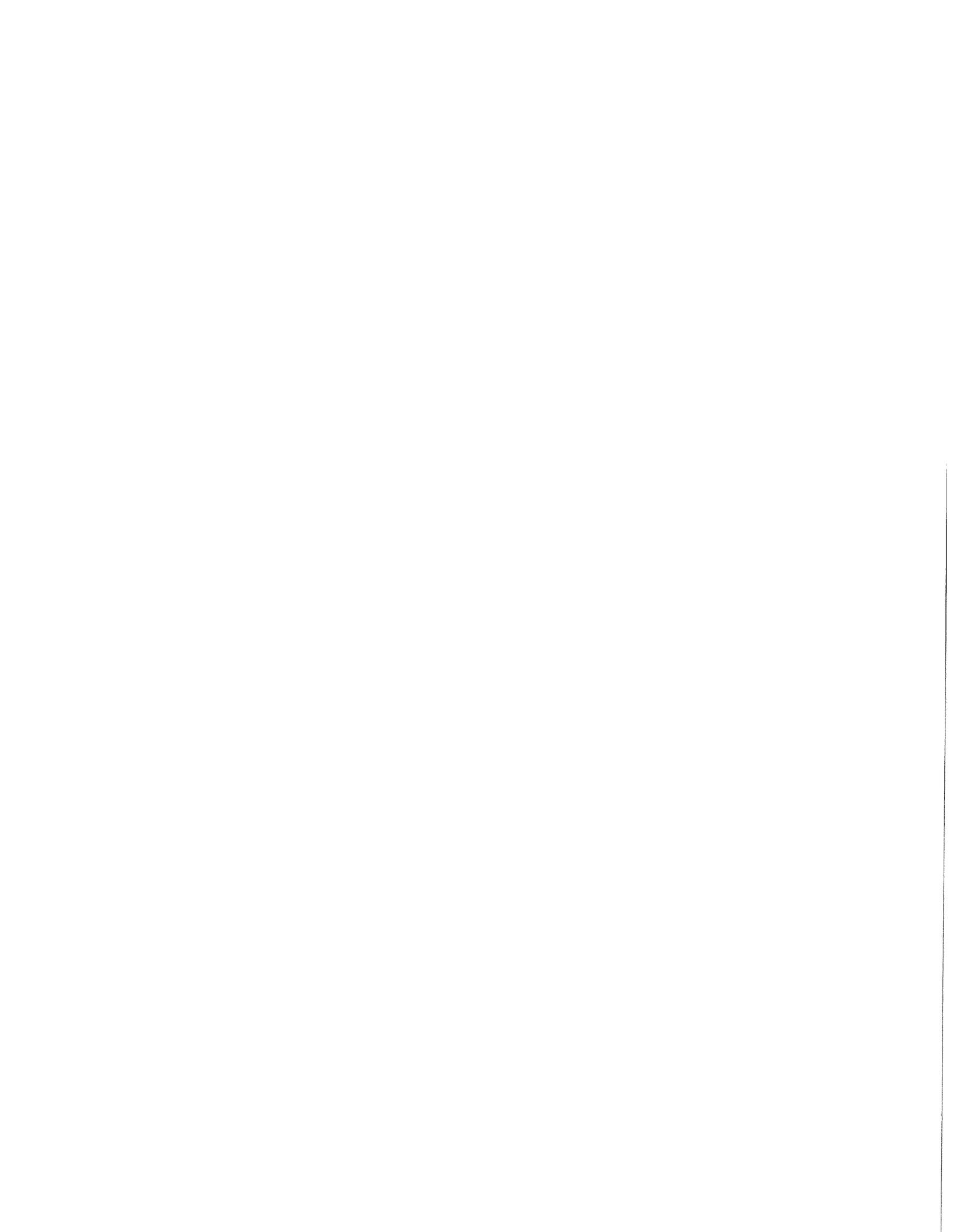
The Discussion of Ownership Options addressed the issue of risks and alternatives for allocating risk associated costs in order to make the development and operation of contaminated sediment disposal sites more feasible. This discussion addresses cost allocation from the perspective of equity. The issue of fairness or equity in allocating cost can be clarified by posing the following questions:

1. Who contributed or contributes to the problem?
2. Who benefits from the solution?

1. Who contributed to the problem? It is important to recognize that the actors who contributed to the contamination of sediments are not necessarily the same as the actors who benefit from the removal of contaminated sediments. Contributors to the contamination of sediments include all sources of discharges into the waters of Puget Sound, from general surface water runoff and sewer discharges to specific industrial discharges, for an unspecified time period. In general, it would not be feasible or worthwhile to attempt to identify the specific sources and timing of contamination. While it is not feasible to make direct claims of liability on individual prior contributors, it might be equitable to recover a portion of the costs of disposing of contaminated sediments from the general contributor classes. Some alternatives for recovering such costs include:

Use existing or new general fund resources, based on the argument that the public bears a general responsibility for contamination of sediments;

Use taxes or charges generally related to sources of contamination in



the Puget Sound region: sewer discharges (e.g. a tax on sewer utilities), surface water runoff (e.g. a tax on developed properties), commercial/industrial (e.g. business and occupation tax),

Use a regional tax (e.g. sales tax, gas tax, property tax), based on the argument that the regional public bears a general responsibility for contamination of sediments.

2. Who benefits from the solution? The dredging and safe disposal of contaminated sediments benefits both the users (i.e. project proponents) who need to clear waterways for various purposes, and the general public, who benefits from the removal of contaminated sediments from state waters and the environmentally safe disposal of these sediments. Some of the users, such as ports and the Corps of Engineers, also serve some regional public purposes. Dredging by ports or the Corps may be done to improve navigation or create wharves and docks (benefiting the shipping industry or pleasure boaters), prevent flooding and erosion (benefiting property owners), maintain or improve recreational areas (benefiting the general public or recreational users), improve fish habitat (benefiting recreational and commercial fishing), or remove toxic wastes (benefiting the general public). These regional public benefits could be considered in allocating costs for multi-user disposal sites, for example by having different fees for "public purpose" users and "private purpose" users (marinas, boat repair facilities, industrial and commercial transportation). A fully burdened user charge may be more appropriate for Navy dredging, since the public "benefits" of this dredging extend beyond the Puget Sound region.

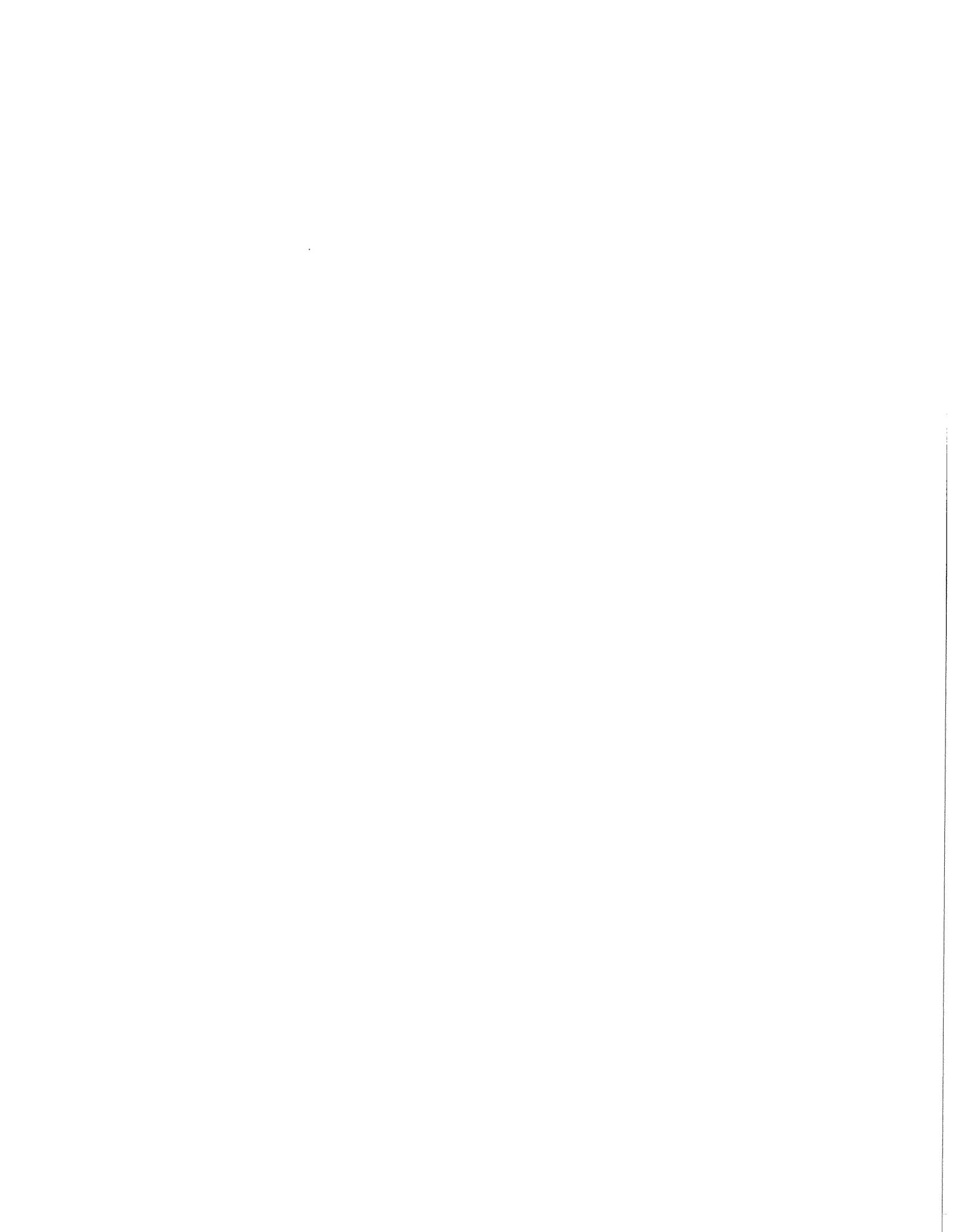
Some alternatives for allocating cost among those who benefit include:

Recover a portion of the costs through a general tax, in recognition that there is a general benefit to "environmentally safe" disposal, and recover the remaining costs through user fees.

Recover costs through a "sliding scale" of user fees, with lower fees for users that serve a regional public purpose.

Recover a portion of the costs through benefit assessments related to the purposes served by dredging. For example, assess ships based on hull depth (for navigational benefits), assess waterfront or flood zone properties (for flooding and erosion control benefits), etc.

If costs are allocated differently to different users then the geographic location of disposal sites becomes an issue. As described in the **Assessment of Needs**, the mix of users for disposal sites varies significantly by geographic location. For example, the Central Puget Sound/Elliot Bay location has a balanced mix of public purpose users (Port, Corps of Engineers) and private purpose users (marinas, boat repair, industrial/commercial transportation), whereas other locations have a much higher proportion of public purpose users. Therefore, if users were charged at different rates, the location of disposal sites will affect the funding feasibility.



Risk/Liability Issues

The **Discussion of Ownership Options** identified several risks that affect the feasibility of a confined disposal project: unpredictability of siting costs, unpredictability of customer use, potential liability for facility failure, and regulatory changes. To a large extent, these risks can be mitigated by identifying secure sources for funding unanticipated costs associated with the risks. Some key possibilities are 1) establishing an agreement for sharing liability costs among jurisdictions, owners and users, and 2) securing user fee revenues through flow control or long term contracts with users.

Baseline Assumption

In the scenarios examined in the funding analysis, the baseline assumption is that facility costs are supported 100 percent by user fees, and that user fees are the same for all users. This provides a baseline for examining alternative site costs and financing costs.

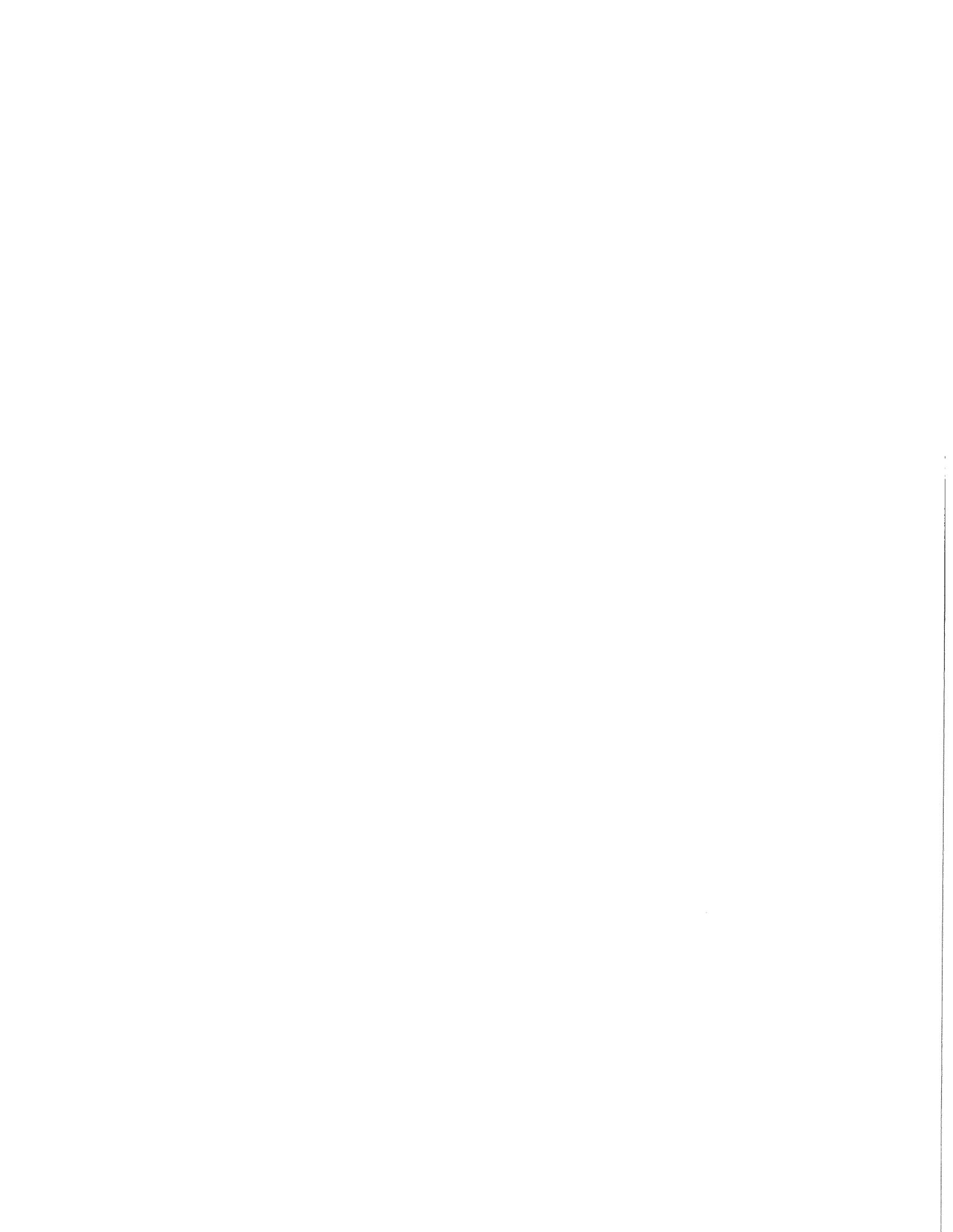
SUMMARY OF ASSUMPTIONS

The assumptions used to develop eight funding scenarios are briefly summarized below:

Costs

Costs for 1) siting and initial construction (Year 0), 2) operation and periodic construction and closure (Years 1-20), and 3) closure and post closure were included in the funding analysis to develop projections of total life cycle costs. Costs are for a single site (with four siting alternatives: upland, nearshore unsaturated, nearshore saturated and aquatic) with a 20 year capacity of 1,250,000 cubic yards. It is assumed that the use of the 20 year capacity is at an even 62,500 cubic yards per year.

Periodic construction and closure costs (i.e. occurring every two or three years) are assumed to be funded through annual contributions to a Construction Reserve Account; this annual contribution is treated as an operating cost. Post closure monitoring, site maintenance and administration (years 21-30) are funded through a "financial assurance account" which is accumulated during the operating lifetime of the facility (under requirements similar to those specified in WAC 173-304-467 for solid waste facilities). The funding analysis assumes a monthly contribution is made to the financial assurance account, and the annual total for this contribution appears as a cost in years 1-20. The eight funding scenarios do not include the following undetermined, but potentially significant, costs: regulatory costs, liability costs, cost for lease of aquatic sites from DNR, and total system costs.



The following table briefly summarizes the total construction costs and the annual operating costs (in the first year) for each funding scenario.

	CONSTRUCTION COST	ANNUAL COSTS IN FIRST YEAR			TOTAL ANNUAL
		ANNUAL DEBT PAYMENT	ANNUAL OPERATIONS	PROFIT	
1. Upland Disposal/Tax Exempt	14,263,018	1,427,073	1,171,413	0	2,598,486
2. Upland Disposal/Private	14,263,018	1,986,376	1,167,404	315,378	3,469,158
3. Aquatic Disposal/Tax Exempt	670,450	67,081	1,025,034	0	1,092,115
4. Aquatic Disposal/Private	670,450	93,372	1,016,034	110,941	1,220,347
5. Nearshore Saturated/Tax Exempt	16,005,125	1,601,377	2,424,873	0	4,026,250
6. Nearshore Saturated/Private	16,005,125	2,228,995	2,418,493	464,749	5,112,237
7. Nearshore Unsaturated/Tax Exempt	12,064,099	1,207,062	1,743,286	0	2,950,348
8. Nearshore Unsaturated/Private	12,064,099	1,680,138	1,736,877	341,701	3,758,716

Ownership

The scenarios examined in the funding analysis are based on a range of financing costs. The low end financing costs (tax exempt revenue bonds) represent the type of funding available under public ownership of a facility, with or without a public/private partnership. The high end financing costs (private financing) represent the type of borrowing available under private ownership of a facility. No estimates were made of potential cost savings through more efficient operations by private enterprise. A profit margin is included in the private financing scenarios. For these reasons, the private financing scenarios result in higher costs compared to the public ownership options.

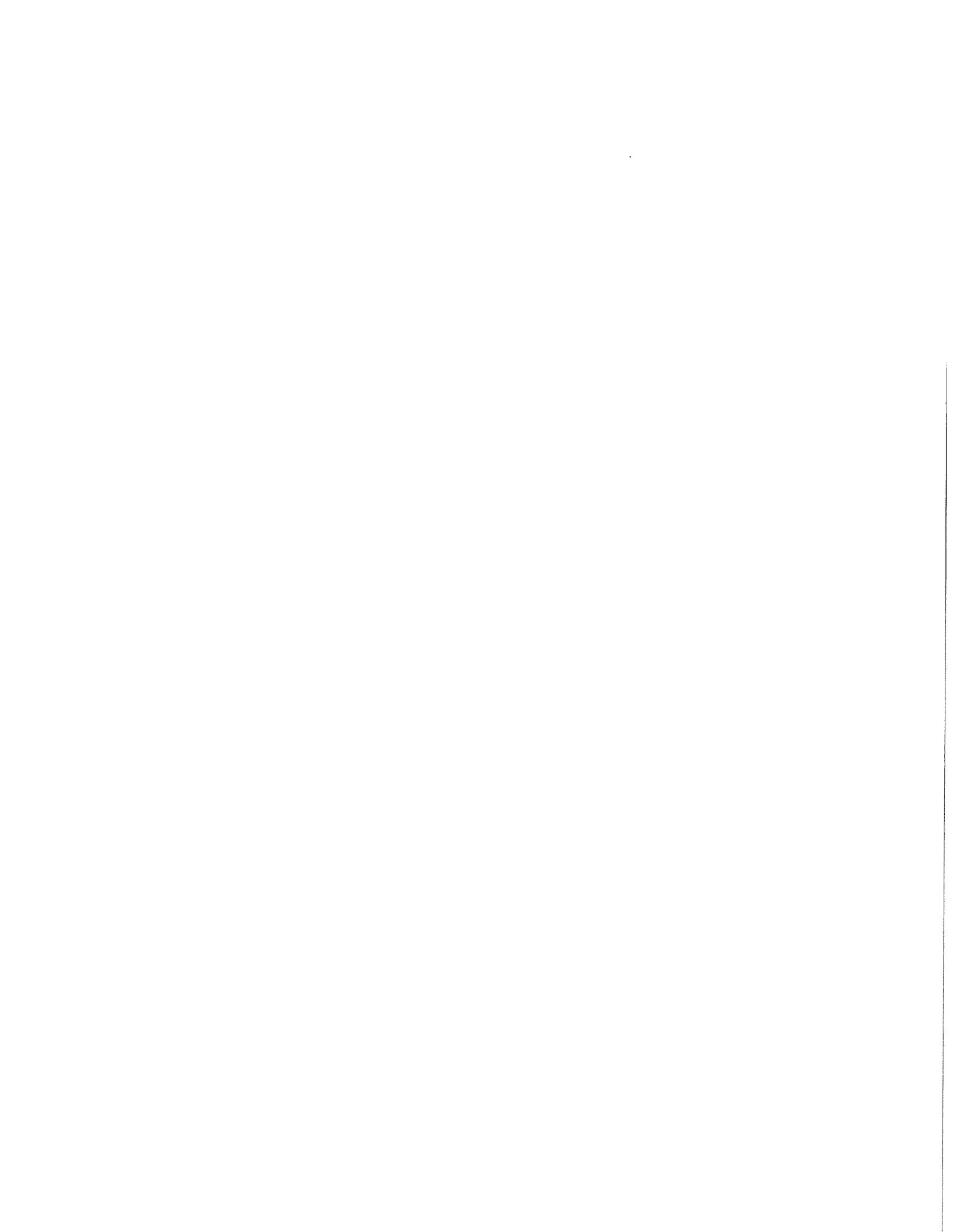
Financing Techniques

The funding analysis examines two scenarios for each disposal site. The two scenarios are 1) with private financing and 2) with tax exempt revenue bond financing. These alternatives show a range of financing costs that would occur under a system that is supported completely by user fees, without funding from grants, taxes or other sources. The assumptions used for borrowing interest rates are based on current (June, 1989) market conditions as follows:

<u>Financing Techniques</u>	<u>Est. Rate</u>	<u>Assumption</u>
Private Financing	13.00%	prime rate + 2%
Tax Exempt Revenue Bonds	7.50%	revenue bond index

Funding Sources

The baseline assumption used in the eight funding scenarios is that the facility costs are supported 100 percent by user fees, and that user fees are the same for all users.



RESULTS AND DISCUSSION

Projections of total life cycle costs, including financing costs, were developed for eight scenarios. Revenue requirements and the per unit user fee required to obtain the revenue requirements were also developed. The eight scenarios are briefly described below:

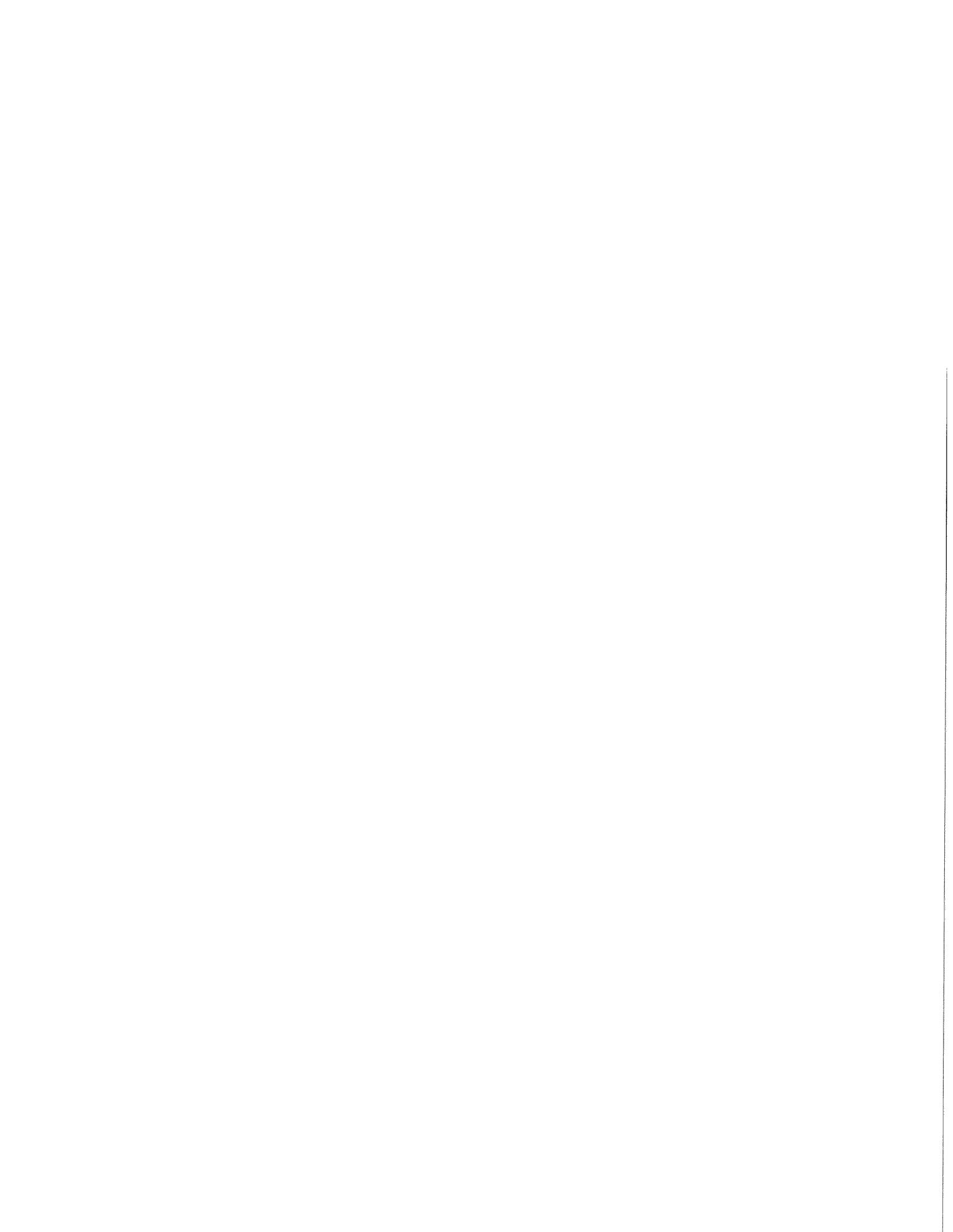
<u>Disposal Site Type</u>	<u>Financing Assumption</u>
Upland Disposal	Tax Exempt Revenue Bonds
Upland Disposal	Private Financing
Confined Aquatic Disposal	Tax Exempt Revenue Bonds
Confined Aquatic Disposal	Private Financing
Nearshore Saturated Disposal	Tax Exempt Revenue Bonds
Nearshore Saturated Disposal	Private Financing
Nearshore Unsaturated Disposal	Tax Exempt Revenue Bonds
Nearshore Unsaturated Disposal	Private Financing

Because aquatic sites are owned by the Department of Natural Resource (DNR), an aquatic facility would require a lease arrangement between DNR and the public or private owner/operator of the facility. Therefore, the alternatives for confined aquatic disposal would include a lease cost. As discussed in the section on costs, the lease costs are undetermined at this time, but would have an impact on funding feasibility. In comparing the aquatic disposal option to the other disposal alternatives, it is helpful to think of the lease cost as comparable to amortized land acquisition costs.

A major difference between the lease and purchase of land is that, with a land purchase, there is a residual value from the land (and improvements, if any) at the end of the project life. However, in this analysis, the residual value is not included for the following reasons:

1. The economic feasibility of a confined disposal project will depend on the actual cost of operation during the life of the facility, not on a return on investment that could occur in 20 to 30 years from the sale or end use of a disposal site;
2. Use of land for disposing of contaminated sediments, post closure monitoring and maintenance requirements, and the potential for system failure (environmental release) could, in some locations, reduce the value of the land below its initial purchase price, and
3. The residual value of the land is highly dependent on specific location and potential end use, and these are unknown.

In order to show the real impact of financing capital costs through level debt service or loan payments, the projections of costs in the funding analysis include inflation. As operating costs increase over the life of a facility, due to inflation, the capital costs, represented by a level debt payment,



become a relatively smaller portion of total costs. These projections are useful for comparing the costs of disposal site alternatives with high initial capital costs and lower operating costs to sites with low initial capital costs and higher operating costs.

The life cycle cost projections include:

1. Debt or loan payments: the estimate of this cost is based on initial borrowing requirements for Year 0 costs (siting and construction) amortized over 20 years (for tax exempt bonds) or 15 years (for private financing).
2. Financial Assurance Account contributions: the Financial Assurance Account is a trust fund that is required by State law for covering post closure costs. During the operating life of a facility, annual contributions must be made to the account from a portion of user fees. The estimate for this annual contribution is based on the total reserve required in Year 20 to fund post closure costs in Years 21-30. The estimate assumes that the trust fund is invested at current long term interest rates.
3. Construction Reserve Fund contribution: during the life of the disposal facilities there are periodic (biennial or triennial) capital costs for closure of old cells and construction of new cells. It was assumed that these costs would be financed by establishing a "Construction Reserve Fund" with annual payments invested at short term interests rates.
4. Annual operation and maintenance costs.

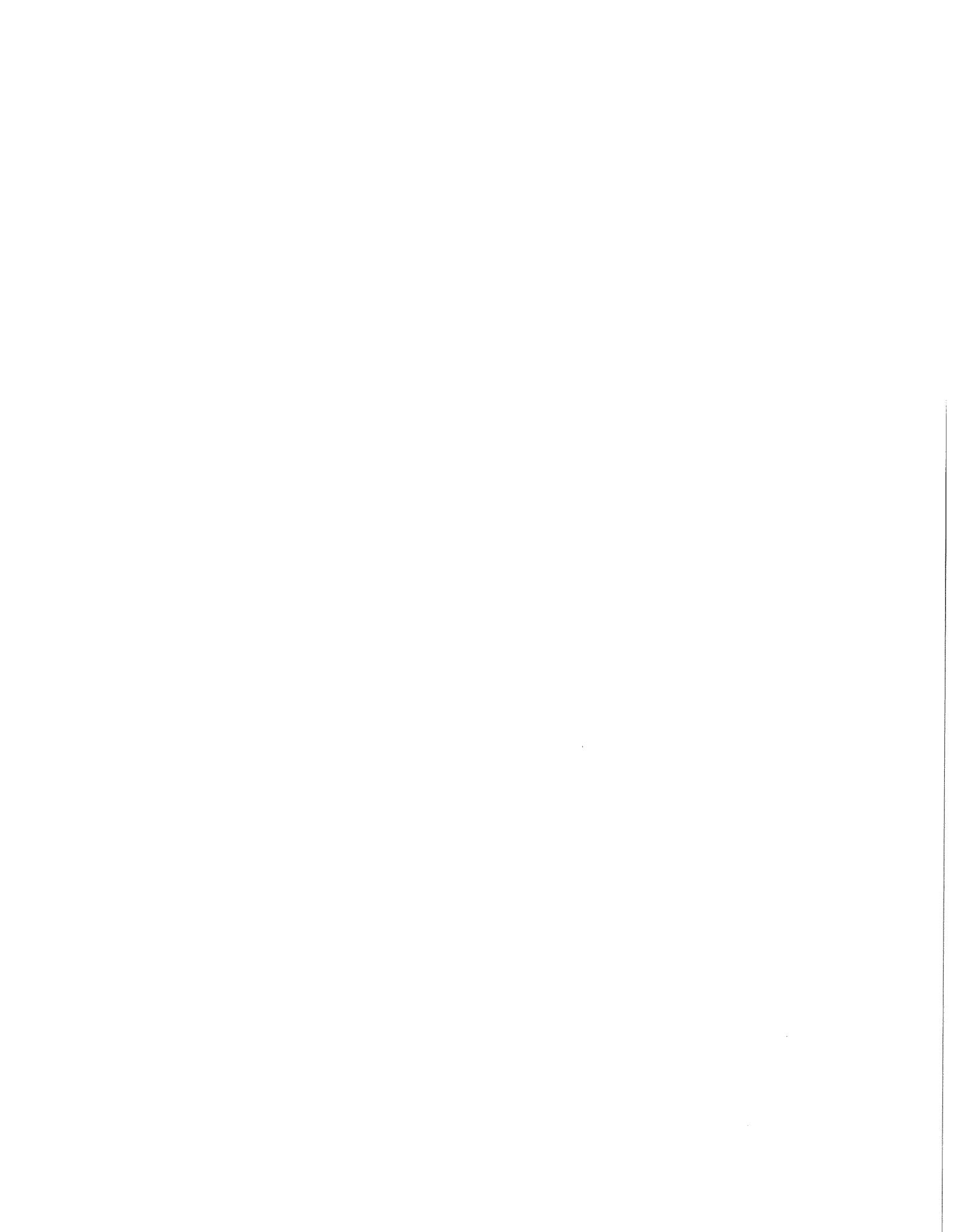
Details on the specific financing rate, investment rate and inflation assumptions used in the funding analysis are provided in the appendix.

RESULTS

The primary purpose of the funding analysis is to examine the feasibility of funding multiuser confined disposal sites. In this context, the feasibility is determined by two criteria:

1. Users would be willing to dispose of dredged materials at the price required to support all facility costs, and
2. Institutions responsible for facility construction and operation can bear the debt burden and risk burden for total system costs without undue financial hardship.

Given these criteria, the results of the funding analysis that provide a useful comparison among alternatives are user fees and the present value of life cycle costs. These are shown in the tables below. The figures in these tables summarize the results of the funding analysis; the appendix contains tables for each of the funding alternatives that specify the assumptions used and contain 20 year projections of all costs.



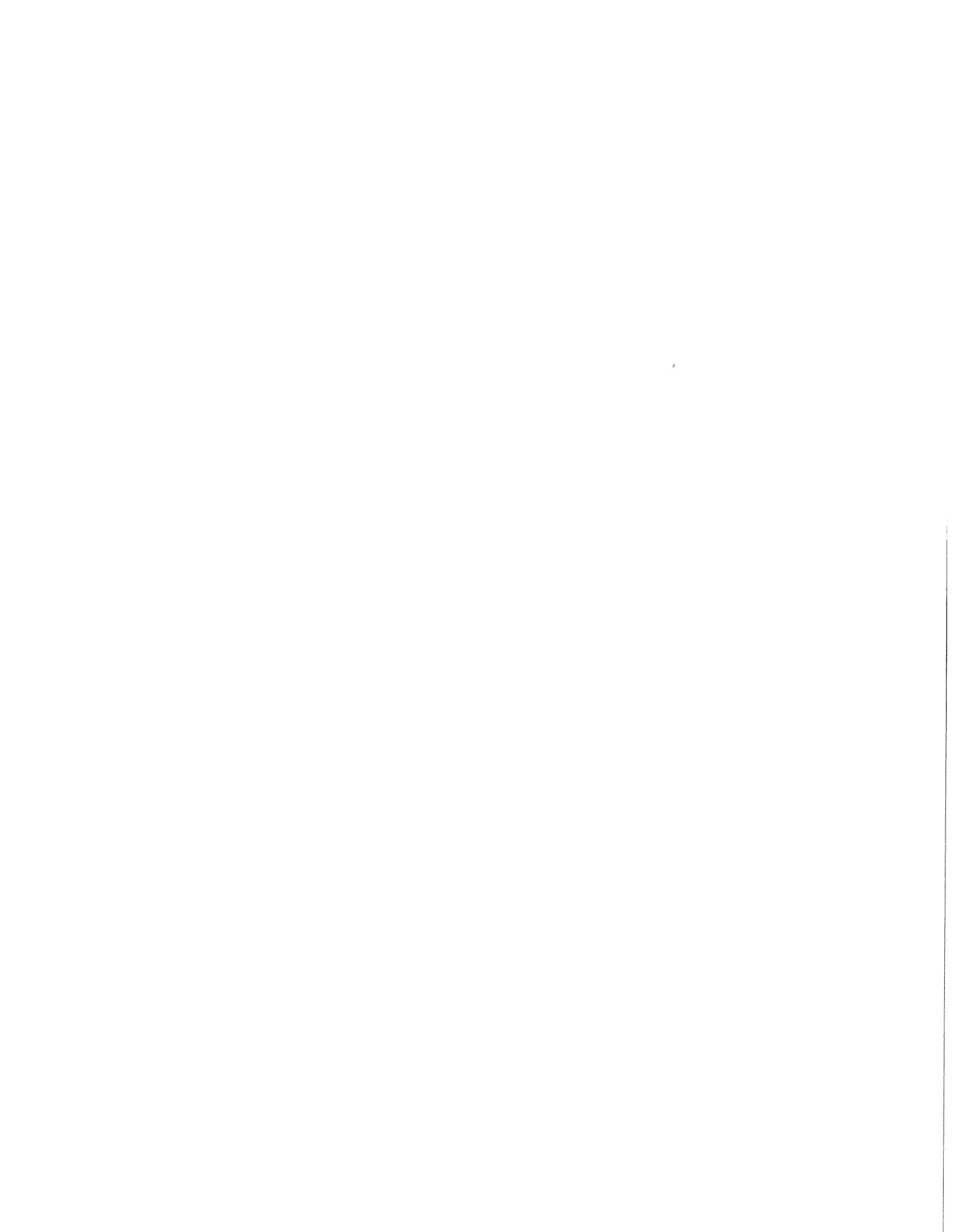
COMPARISON OF USER FEES PER CUBIC YARD

	Inflated Dollars		1989 Dollars	
	Year 1	Year 15	Year 1	Year 15
1.Upland Disposal/Tax Exempt	\$41.58	\$59.40	\$39.60	\$28.57
2.Upland Disposal/Private	\$55.51	\$75.11	\$52.87	\$36.13
3.Aquatic Disposal/Tax Exempt	\$17.47	\$49.30	\$16.64	\$23.71
4.Aquatic Disposal/Private	\$19.53	\$54.53	\$18.60	\$26.23
5.Nearshore Saturated/Tax Exempt	\$64.42	\$104.11	\$61.35	\$50.08
6.Nearshore Saturated/Private	\$81.80	\$125.46	\$77.90	\$60.35
7.Nearshore Unsaturated/Tax Exempt	\$47.21	\$74.04	\$44.96	\$35.61
8.Nearshore Unsaturated/Private	\$60.14	\$89.65	\$57.28	\$43.12

COMPARISON OF PRESENT VALUE AND ANNUAL COSTS
(in millions of dollars)

	1989 Present Value*	Year 1 Inflated Cost	Year 2 Inflated Cost	Year 20 Inflated Cost
Upland Disposal/Tax Exempt	31.37	2.60	2.66 ...	3.01
Upland Disposal/Private	40.70	3.47	3.53 ...	3.92
Aquatic Disposal/Tax Exempt	20.11	1.09	1.19 ...	3.77
Aquatic Disposal/Private	22.32	1.22	1.33 ...	4.17
Nearshore Saturated/Tax Exempt	50.63	4.03	4.17 ...	2.19
Nearshore Saturated/Private	63.04	5.11	5.27 ...	3.90
Nearshore Unsaturated/Tax Exempt	34.86	2.95	3.02 ...	1.90
Nearshore Unsaturated/Private	43.58	3.76	3.84 ...	2.61

*Discount Rate = 7.50%



User fees are shown for Year 1 and 15. For some facilities, cost in Years 16-20 are lower due to reduced costs for cell construction and closure, as the last cells are built two to four years before closure. Comparison of user fees for Year 1-15 (1989 dollars) shows the differing impacts of projects with high capital and lower operating costs versus low capital and higher operating costs. For example, the aquatic disposal option, with low capital costs, show an increase in user fees, whereas the other options all show a decrease.

User fees for all options are in a reasonable range when compared to current disposal rates for solid waste and hazardous waste in the Puget Sound Region. The user fee estimates for Year 1 range from \$17-82 per cubic yard. Dredged sediment weighs an average of 1.2 tons per cubic yard; based on this factor, user fees range from \$14-68 per ton. Disposal fees for solid waste disposal at landfills in the Puget Sound Region are in the \$20-40 per ton range. Hazardous waste disposal fees are often over \$100 per ton range. However, disposal fees for construction and demolition debris are much less, ranging from \$30-40 for 5 cubic yards of material (\$6-8 per cubic yard).

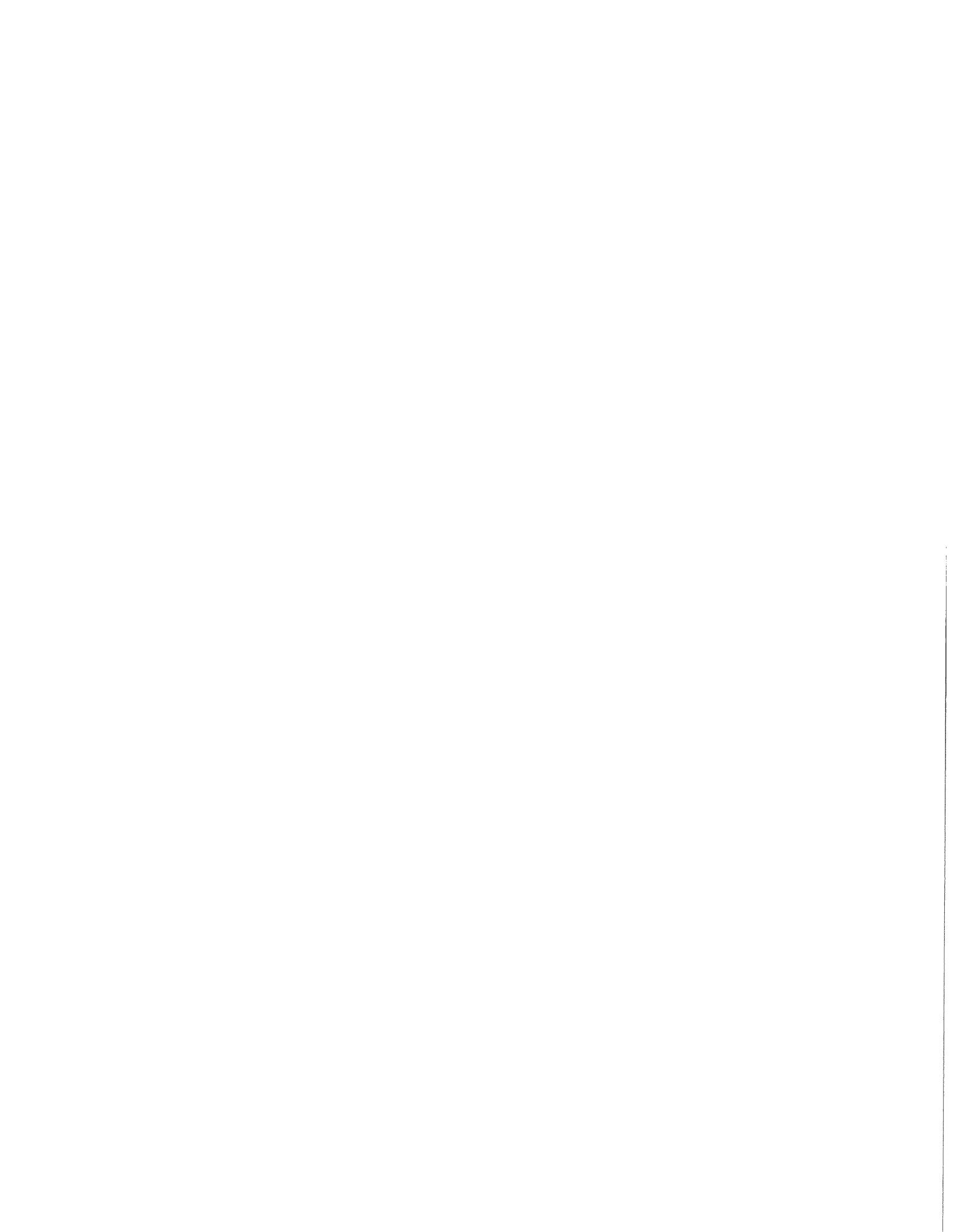
As noted before, the disposal fee is only part of the costs incurred by the user, and the economic feasibility for the user will depend on variables that are not included in this analysis. For example, although the disposal fees for the nearshore unsaturated disposal options are higher than the upland options, the user might have higher transportation costs with upland disposal.

At any rate, the range of user fees indicates that it would be feasible to fund the confined disposal of sediments through user fees, as long as the use of a facility is stable, providing a predictable source of income.

The 1989 present value for the life cycle costs of each disposal option provides a useful comparison among the alternatives. Because the analysis does not incorporate any assumptions of increased efficiency under private ownership, in all cases the private financing option is more expensive than financing with tax exempt revenue bonds. Based on the present value, the ranking of options from lowest to highest costs (note that aquatic disposal costs do not include any lease costs):

- Aquatic Disposal, Tax Exempt
- Aquatic Disposal, Private
- Upland Disposal, Tax Exempt
- Nearshore Unsaturated Disposal, Tax Exempt
- Upland Disposal, Private
- Nearshore Unsaturated, Private
- Nearshore Saturated, Tax Exempt
- Nearshore Saturated, Private

The feasibility of funding any of these options depends on the debt capacity and overall financial condition of an individual jurisdiction or institution, and the total number of disposal sites that need to be built.

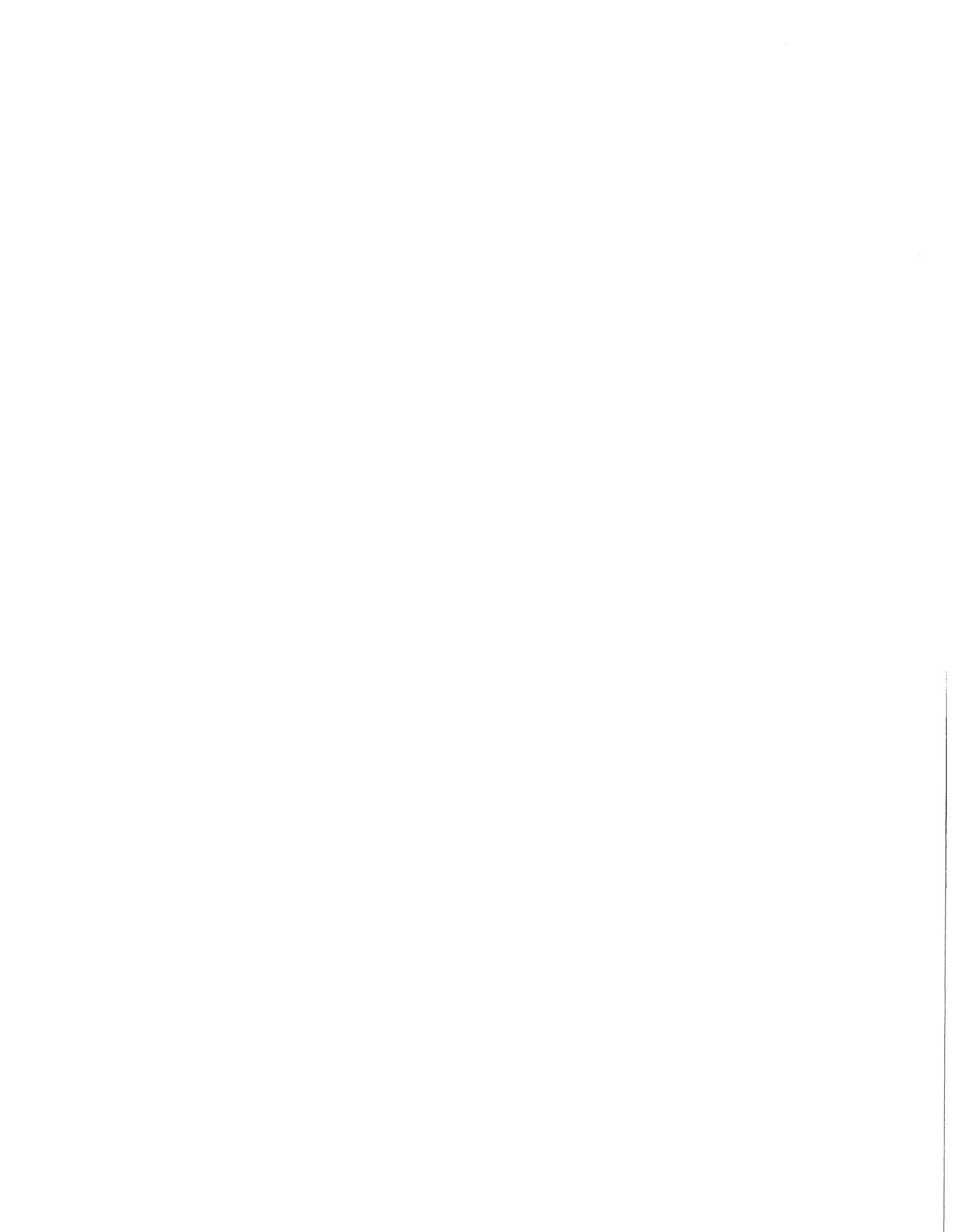


CONCLUSIONS AND RECOMMENDATIONS

Summary of Approach and Assumptions

The funding analysis identifies several factors that affect the feasibility of multiuser disposal sites and makes assumptions about these factors in order to develop a quantitative analysis of funding alternatives. These factors and assumptions are summarized below:

- o The funding analysis focuses on the facility costs for alternative disposal options; other costs such as regulatory costs, liability costs, costs to users and total system costs are not quantified in the analysis but could impact funding feasibility.
- o Some costs are undetermined at this time: regulatory costs, liability costs, lease costs for aquatic disposal sites, and total system costs. All of these costs might be significant, but have different impacts in comparing the funding feasibility of disposal options:
 - Regulatory costs would be similar for all four disposal options and would not affect the comparison of fundings among options,
 - Liability costs have an impact on funding feasibility and may differ among disposal options due to different levels of environmental risk.
 - Lease costs for aquatic disposal facilities have not been included in the cost estimates because these costs could not be determined. However, since the other disposal options include estimates for land acquisition costs, the funding analysis for the aquatic site is not directly comparable.
 - Total system costs, as determined by the total number of sites needed for Puget Sound, could impact funding feasibility depending on the financial capacity of the institutions responsible for funding multiuser sites.
- o The funding analysis incorporates several assumptions about costs:
 - only measurable costs that would be the direct responsibility of a facility owner/operator are included,
 - user costs (other than disposal), liability costs and regulatory costs are not included,
 - debt financing is used for initial construction and site development costs,
 - periodic construction costs (for closing old cells and opening new cells) are treated as an operating cost through monthly payments to a construction reserve account,
 - post-closure costs are funded through annual payments to a financial reserve account.
- o The funding analysis does not make specific assumptions about



institutional arrangements, although the overall financial capacity (debt capacity, bond rating, control over funding sources, etc.) of an institution can affect funding feasibility.

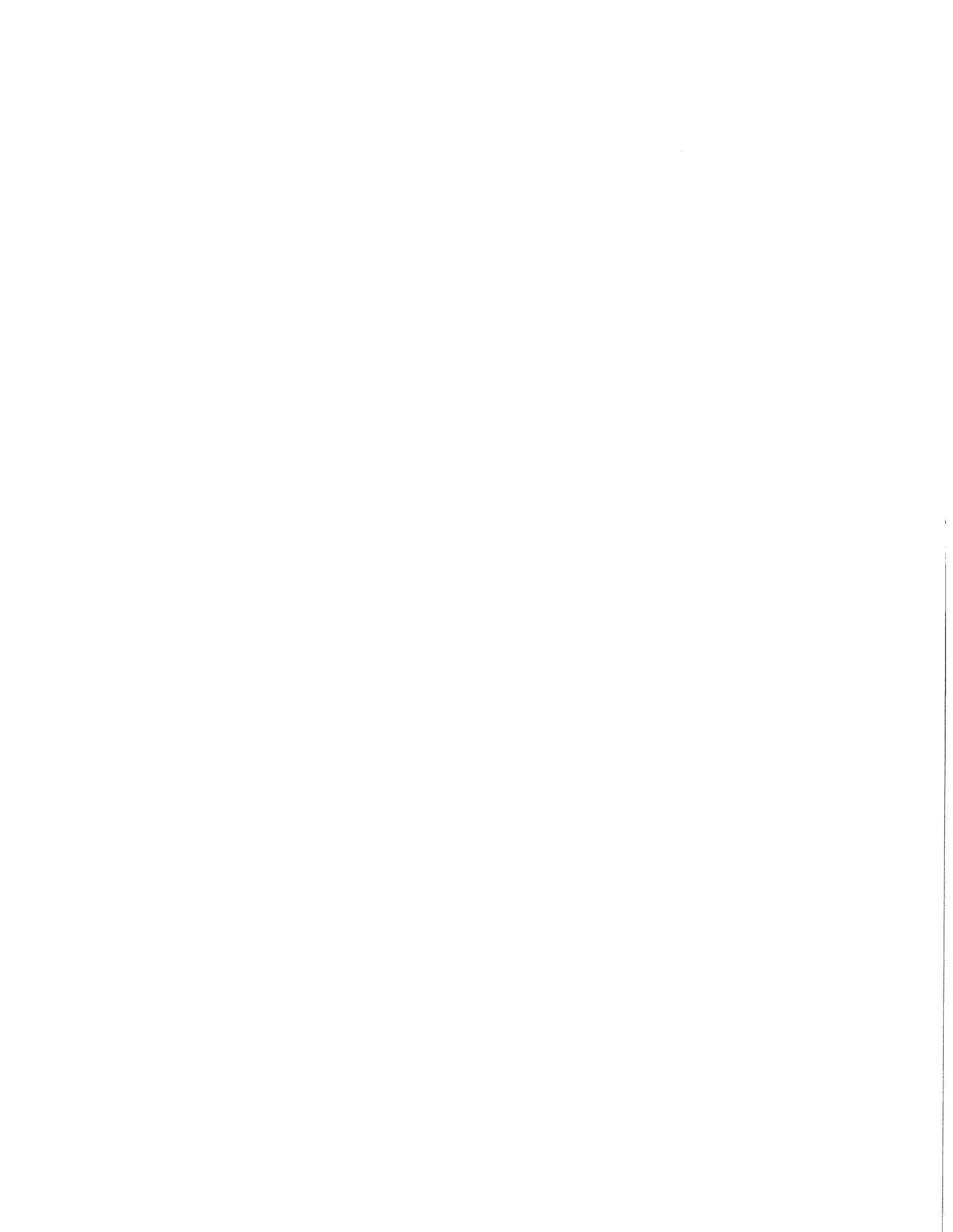
- o Eight public/private options are discussed in the funding analysis. A potential advantage of private ownership or operations is greater efficiency and cost effectiveness, but it is difficult to assess this impact in a generic analysis, and therefore is not addressed here. The funding analysis does examine the impact of private borrowing versus public borrowing on the financing costs for disposal facilities.
- o The feasibility of funding disposal sites under the various public/private options is affected by several risk factors: unpredictability of siting costs (due to the siting process), unpredictability of customer use, potential liability for site failure, and regulatory risk (unanticipated changes in regulations).
- o Alternative financing techniques for capital project include private financing, taxable bonds, tax exempt bonds, subsidized low interest loans, grants and pay-as-you-go. The funding analysis examines the range of unsubsidized options using two scenarios for each disposal option: private financing and tax exempt revenue bond financing.
- o As a baseline assumption, the funding analysis assumes that the sole funding source for multiuser disposal sites is user fees. Alternative funding sources (taxes, assessment, federal assistance) may be used in order to reduce risks by allocating costs over a broader funding base, or may be used to address issues of equity or fairness by allocating some costs to other parties that contribute to the contamination of sediments or benefit from the dredging and safe disposal of contaminated sediments.

Conclusions and Recommendations

The feasibility of funding multiuser confined disposal sites depends on the economic impacts on users and public and private institutions. The funding analysis provides an estimate of the range of costs to users and public and private institutions. The estimates of user fees resulting from this analysis appear to be reasonable when compared to current costs for solid waste disposal. However, the feasibility is affected by several factors that cannot be defined or estimated at this stage in the study. This includes A) factors affecting public and private institutions, B) factors affecting users, and C) risk and liability issues.

A) The feasibility for public and private institutions responsible for providing for disposal of contaminated sediments is affected by factors such as:

1. Overall debt capacity and financial condition;
2. Availability of and authority over suitable sites;



3. Authority to control or regulates users (flow control);
4. Capital planning capabilities;
5. Ability to assume liability for risks, and
6. Ability to handle siting process.

Since most of these factors will depend on the specific institution, their impact on the feasibility of funding multiuser disposal sites cannot be assessed until a specific institution is designated.

B) The feasibility for users is affected by factors such as:

1. Source of funding for public users, return on investment for private users;
2. Other dredging costs, such as sediment testing and transport of dredged material, and
3. Available alternatives for disposing of dredged sediments.

Some of these user factors are project specific and can only be assessed on a project by project basis. However, a better assessment of these factors could be developed by surveying users and inventorying specific alternative disposal sites.

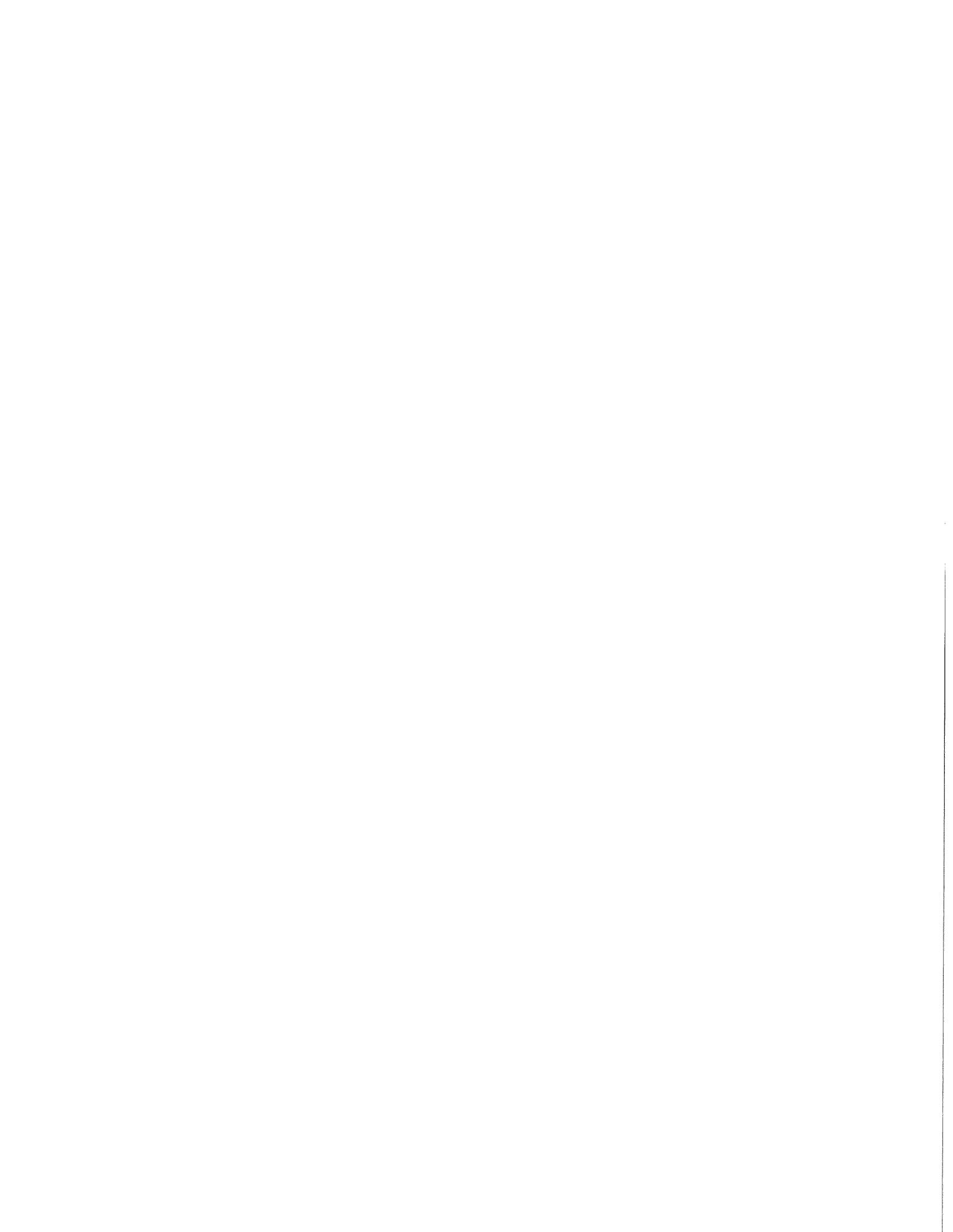
C) The feasibility of funding confined disposal sites is also affected by risk and liability issues:

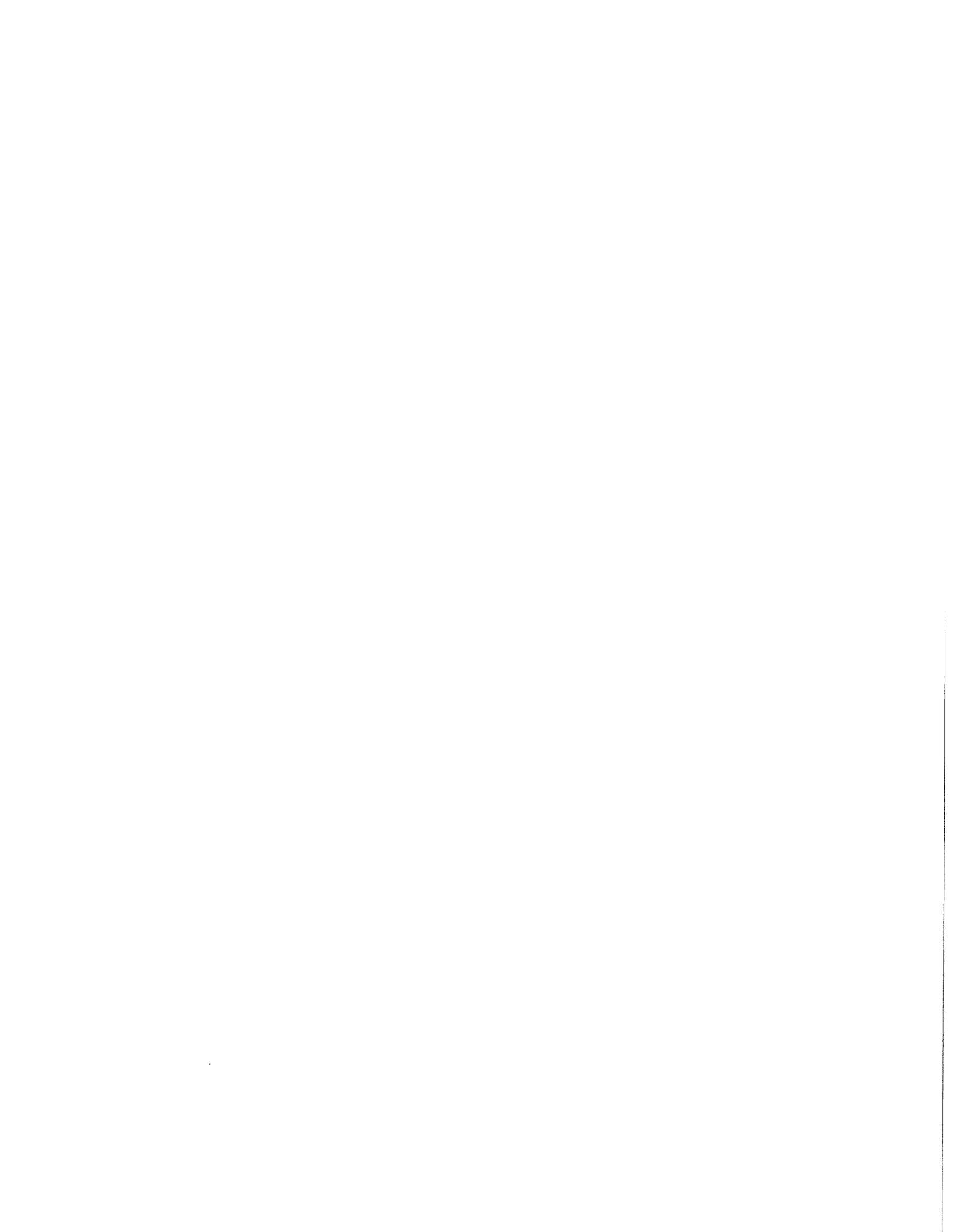
1. Unpredictability of siting costs;
2. Unpredictability of customer user;
3. Potential liability for system failure, and
4. Regulatory risks.

Some of these risk and liability issues are being addressed in the context of this and other studies on contaminated sediments. As these issues are resolved, a better assessment of the overall funding feasibility can be made. The key actions that will help resolve these issues are:

1. Establishing appropriate institutional arrangements to facilitate the siting process;
2. Establishing control over disposal of contaminated sediments through standards and flow control authority; or a commitment on the part of dredgers to buy future capacity in a disposal site;
3. Developing more accurate projections of dredged materials requiring confined disposal by inventorying contaminated sediments;
4. Developing a mechanism for sharing liability among public agencies, site owners and users, and
5. Developing regulatory standards and institutional arrangements for regulatory oversight of disposal of contaminated sediments.

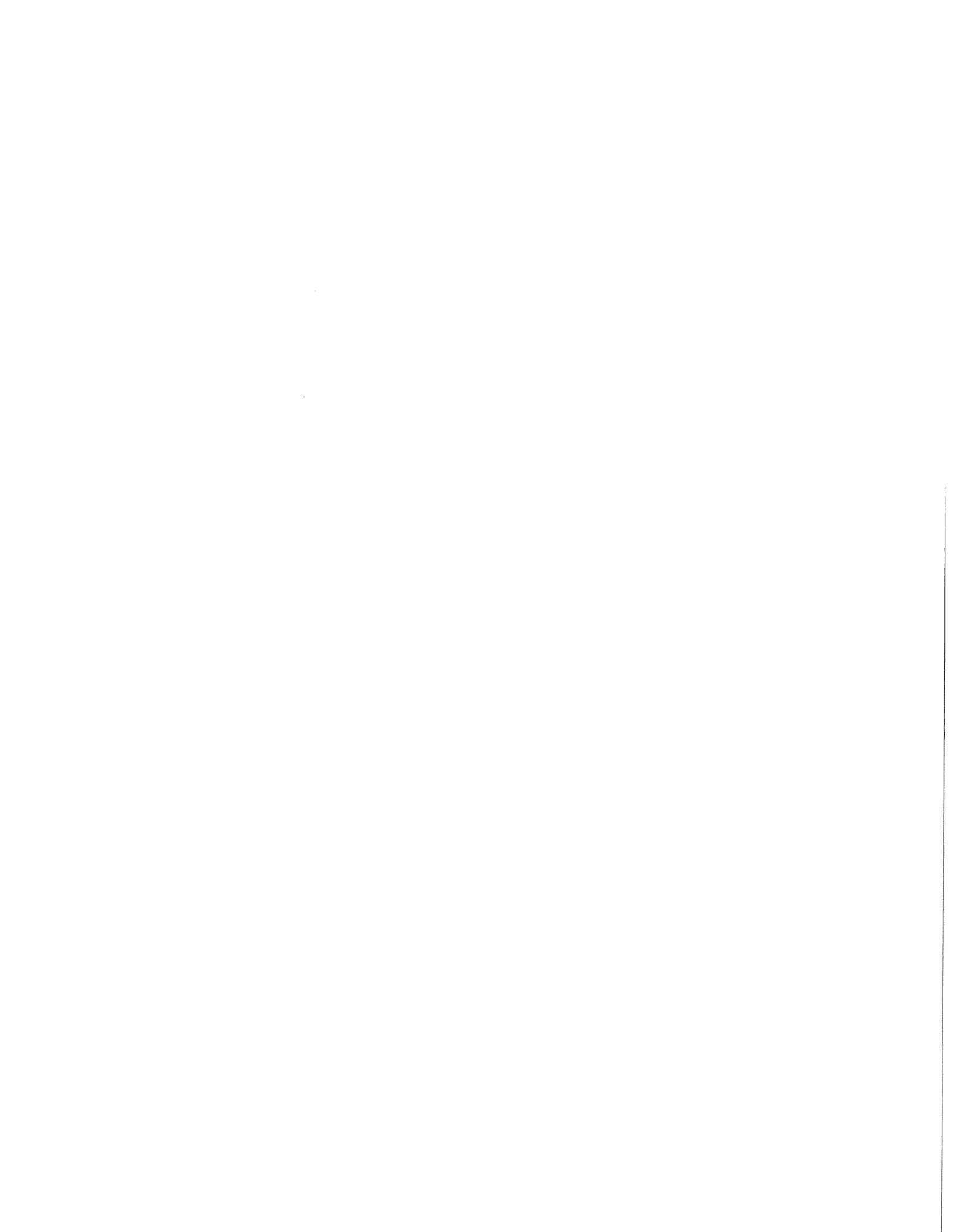
As outlined above, several steps can be taken to more accurately assess the feasibility of mulituser confined disposal sites. However, even if all this is done, several site specific factors still affect funding feasibility, and cannot be resolved until specific sites are investigated.





APPENDIX

Table 1	Upland Disposal, Tax Exempt Revenue Bonds
Table 2	Upland Disposal, Private Financing
Table 3	Aquatic Disposal, Tax Exempt Revenue Bonds
Table 4	Aquatic Disposal, Private Financing
Table 5	Nearshore Saturated, Tax Exempt Revenue Bonds
Table 6	Nearshore Saturated, Private Financing
Table 7	Nearshore Unsaturated, Tax Exempt Revenue Bonds
Table 8	Nearshore Unsaturated, Private Financing



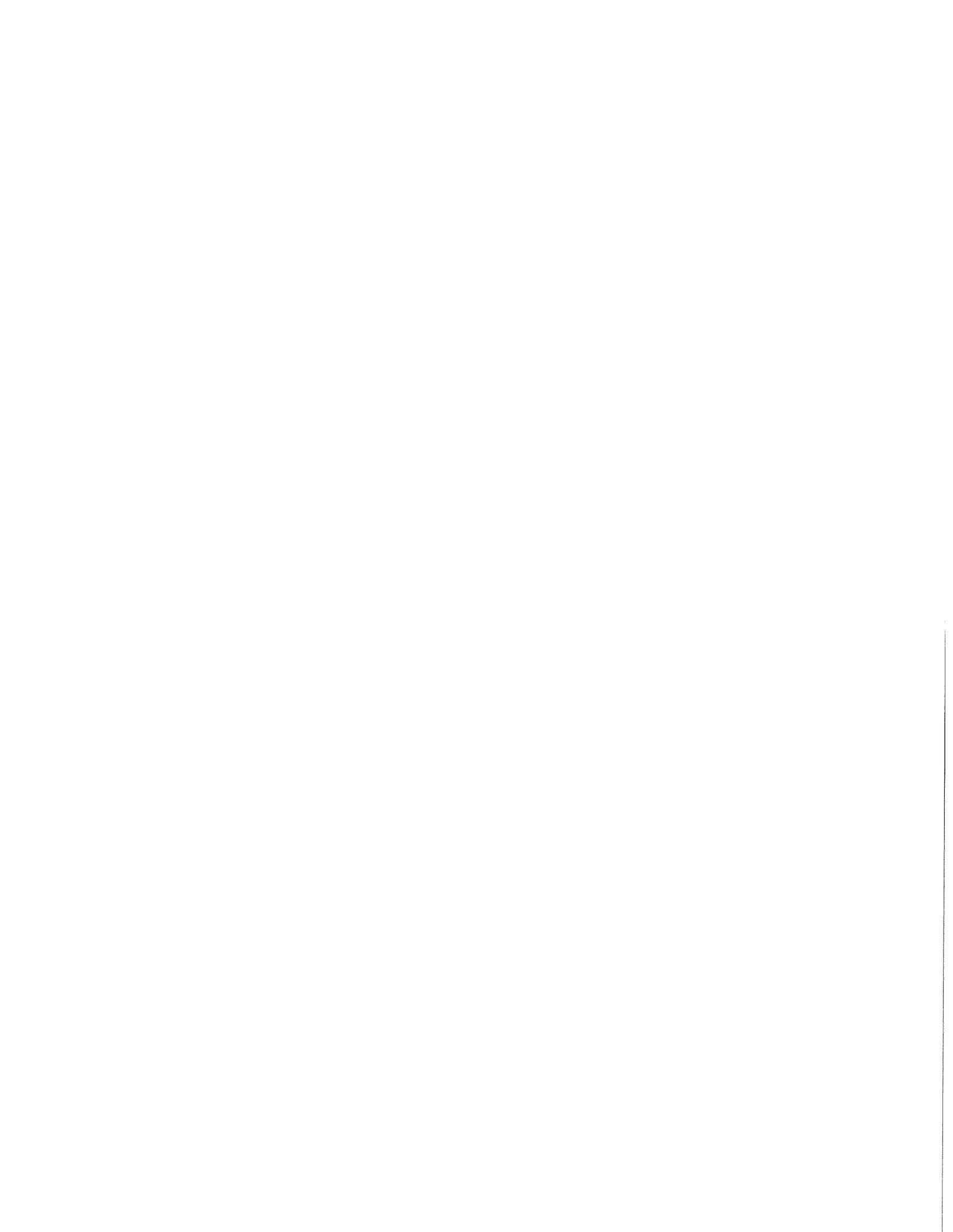


TABLE 1: UPLAND DISPOSAL, TAX EXEMPT REVENUE BOND FINANCING

PARAMETERS	ASSUMPTIONS	SOURCE
Tax Exempt Borrowing:		
Number of Borrowings	1	assumption
Bond Rate	7.50%	Revenue Bond Index, 5/89
Financing Costs, % of Principal	2.00%	usual terms
Debt Period, years	20	usual terms
Borrowed Amount, % of Year 0 Costs	100.00%	usual terms
Borrowing Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Costs Analysis Paper
Site Acquisition	1,250,000	Costs Analysis Paper
Site Preparation	363,060	Costs Analysis Paper
Construct: site/leachate/liner	8,628,375	Costs Analysis Paper
Dewatering Facility	0	Costs Analysis Paper
Monitoring Wells	20,000	Costs Analysis Paper
Other Facilities	529,650	Costs Analysis Paper
Design & Permitting	276,960	Costs Analysis Paper
Mobilization/Engineering/Admin	1,109,840	Costs Analysis Paper
Contingency	1,860,133	Costs Analysis Paper
Total Year 0 Costs	14,263,018	Costs Analysis Paper
Financing Costs	285,260	calculation
Total Borrowing	14,548,278	calculation
Level Debt Payments	1,427,073	calculation
Construction Reserve Account (for periodic construction costs, monthly contribution is invested at beginning of month, compounded monthly; withdrawal is made at end of withdrawal period):		
Investment rate	9.15%	one year CD
Withdrawal Period, years	2	Cost Analysis Paper
Biennial Costs Thru Year 18:		
Site Preparation	363,060	Cost Analysis Paper
Construct: site/leachate/liner	628,375	Cost Analysis Paper
Closure	112,377	Cost Analysis Paper
Contingency 15%	165,572	calculation
Total Biennial Costs	1,269,384	calculation
Annual contribution	576,600	mthly X 12 (footnote 2)
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment rate	10.15%	one year CD + 1%
Trust Fund Term, years	20	assumption
Post Closure Term, years	10	PTI and DOE
Discount rate	7.50%	public cost of capital
Year 20 Reserve Requirement	\$2,218,936	calculation (footnote 1)
F.A. Account Annual Payment	\$34,580	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89

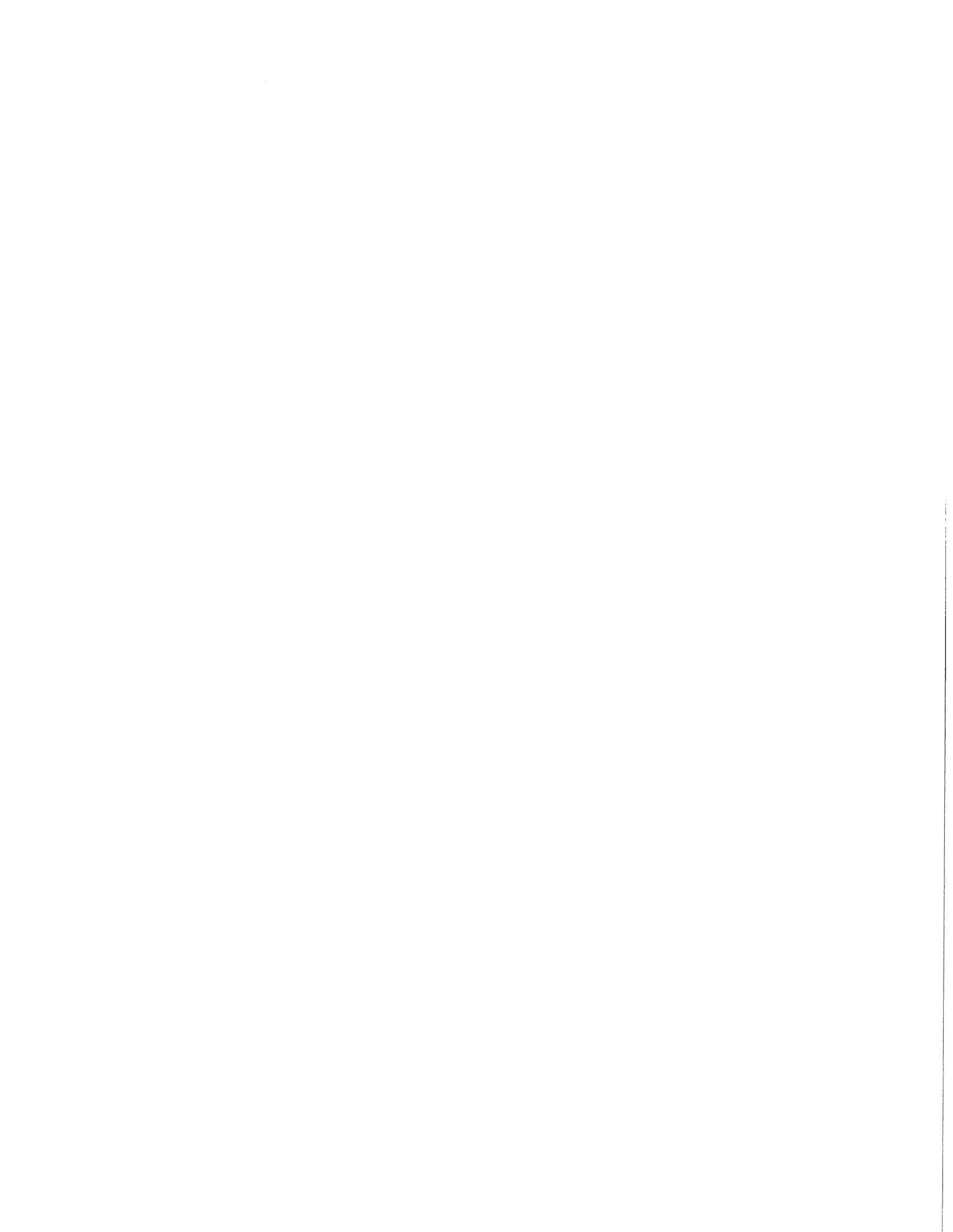


TABLE 1: UPLAND DISPOSAL, TAX EXEMPT REVENUE BOND FINANCING

 FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:

Year 20 Reserve Requirement = 2,218,936

Post Closure Costs

Year 1989 Dollars Inflated

	Year 1989 Dollars	Inflated
21	94,967	264,575
22	94,967	277,803
23	94,967	291,693
24	94,967	306,278
25	94,967	321,592
26	94,967	337,672
27	94,967	354,555
28	94,967	372,283
29	94,967	390,897
30	94,967	410,442

* Monitoring, Site Maintenance/Admin, Contingency

2. Calculation of Reserve Account Contributions

Construction Reserve		F.A. Account:	
Mthly Pymt	48,050	Annual Pymt	34,580

Month	Cumulative	Year	Cumulative
1	48,416	1	38,090
2	97,202	2	80,046
3	146,359	3	126,260
4	195,892	4	177,166
5	245,802	5	233,238
6	296,093	6	295,001
7	346,767	7	363,034
8	397,827	8	437,972
9	449,277	9	520,516
10	501,119	10	611,438
11	553,356	11	711,589
12	605,992	12	821,905
13	659,029	13	943,418
14	712,471	14	1,077,265
15	766,320	15	1,224,697
16	820,579	16	1,387,094
17	875,253	17	1,565,974
18	930,343	18	1,763,010
19	985,853	19	1,980,045
20	1,041,786	20	2,219,110
21	1,098,146		
22	1,154,936		
23	1,212,159		
24	1,269,818		

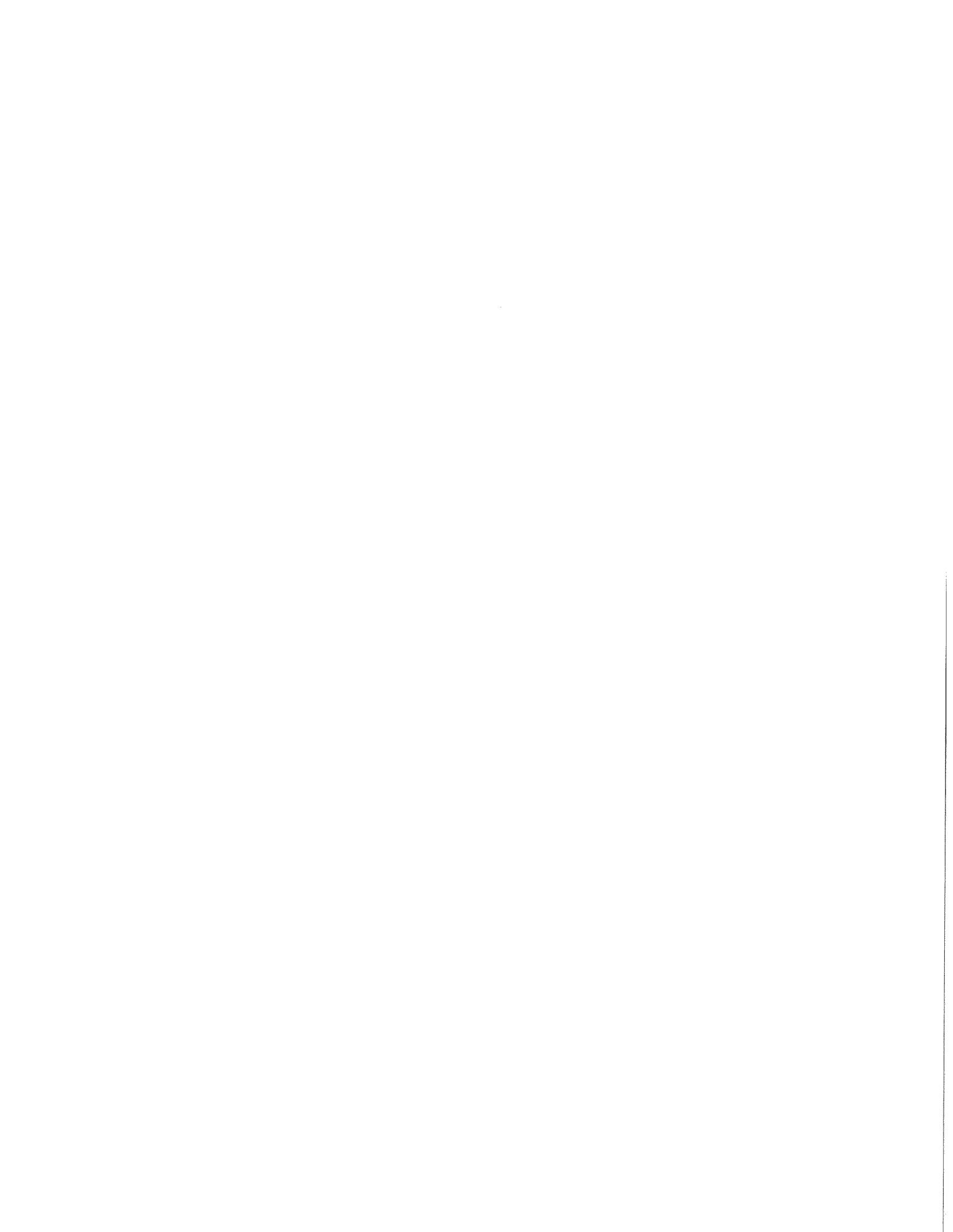


TABLE 1: UPLAND DISPOSAL, TAX EXEMPT REVENUE BOND FINANCING

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073
F.A. ACCOUNT	34,580	34,580	34,580	34,580	34,580	34,580	34,580	34,580	34,580	34,580
CONSTRUCTION RESERVE	605,430	635,702	667,487	700,861	735,904	772,699	811,334	851,901	894,496	939,221
OPERATION										
Leachate Treatment	98,438	103,359	108,527	113,954	119,651	125,634	131,916	138,511	145,437	152,709
Disposal/O&M/Administration	337,401	357,937	371,984	394,625	410,113	435,074	452,149	479,669	498,495	528,835
Monitoring	26,252	27,565	28,943	30,390	31,910	33,505	35,180	36,939	38,786	40,726
Contingency 15%	69,314	73,329	76,418	80,845	84,251	89,132	92,887	98,268	102,408	108,340
TOTAL COSTS	2,598,486	2,659,544	2,715,012	2,782,328	2,843,481	2,917,697	2,985,119	3,066,941	3,141,274	3,231,483
COST/CHARGE PER CUBIC YARD	41.58	42.55	43.44	44.52	45.50	46.68	47.76	49.07	50.26	51.70
USER FEE REVENUES	2,598,486	2,659,544	2,715,012	2,782,328	2,843,481	2,917,697	2,985,119	3,066,941	3,141,274	3,231,483

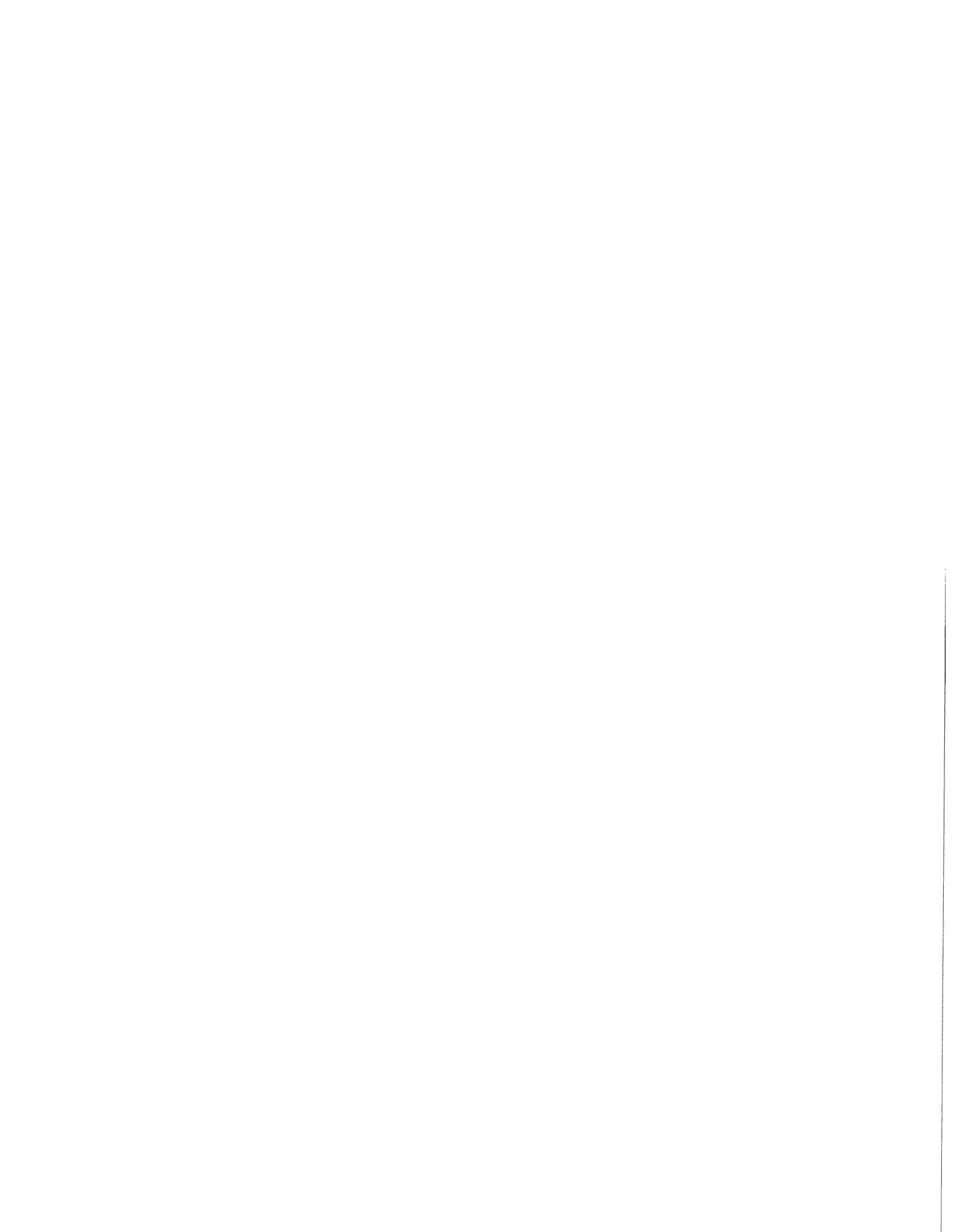


TABLE 1: UPLAND DISPOSAL, TAX EXEMPT REVENUE BOND FINANCING

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073	1,427,073
F.A. ACCOUNT	34,580	34,580	34,580	34,580	34,580	34,580	34,580	34,580	34,580	34,580
CONSTRUCTION RESERVE	986,182	1,035,491	1,087,265	1,141,629	1,198,710	1,258,645	1,321,578	1,387,657	190,049	199,552
OPERATION										
Leachate Treatment	160,344	168,362	176,780	185,619	194,900	204,644	214,877	225,621	236,902	248,747
Disposal/O&M/Administration	549,590	583,041	605,923	642,803	668,030	708,690	736,503	781,331	811,995	861,417
Monitoring	42,762	44,900	47,145	49,502	51,977	54,576	57,305	60,170	63,179	66,338
Contingency 15%	112,904	119,445	124,477	131,689	137,236	145,187	151,303	160,068	166,811	176,475
TOTAL COSTS	3,313,435	3,412,891	3,503,243	3,612,893	3,712,506	3,833,395	3,943,218	4,076,499	2,930,589	3,014,181
COST/CHARGE PER CUBIC YARD	53.01	54.61	56.05	57.81	59.40	61.33	63.09	65.22	46.89	48.23
USER FEE REVENUES	3,313,435	3,412,891	3,503,243	3,612,893	3,712,506	3,833,395	3,943,218	4,076,499	2,930,589	3,014,181

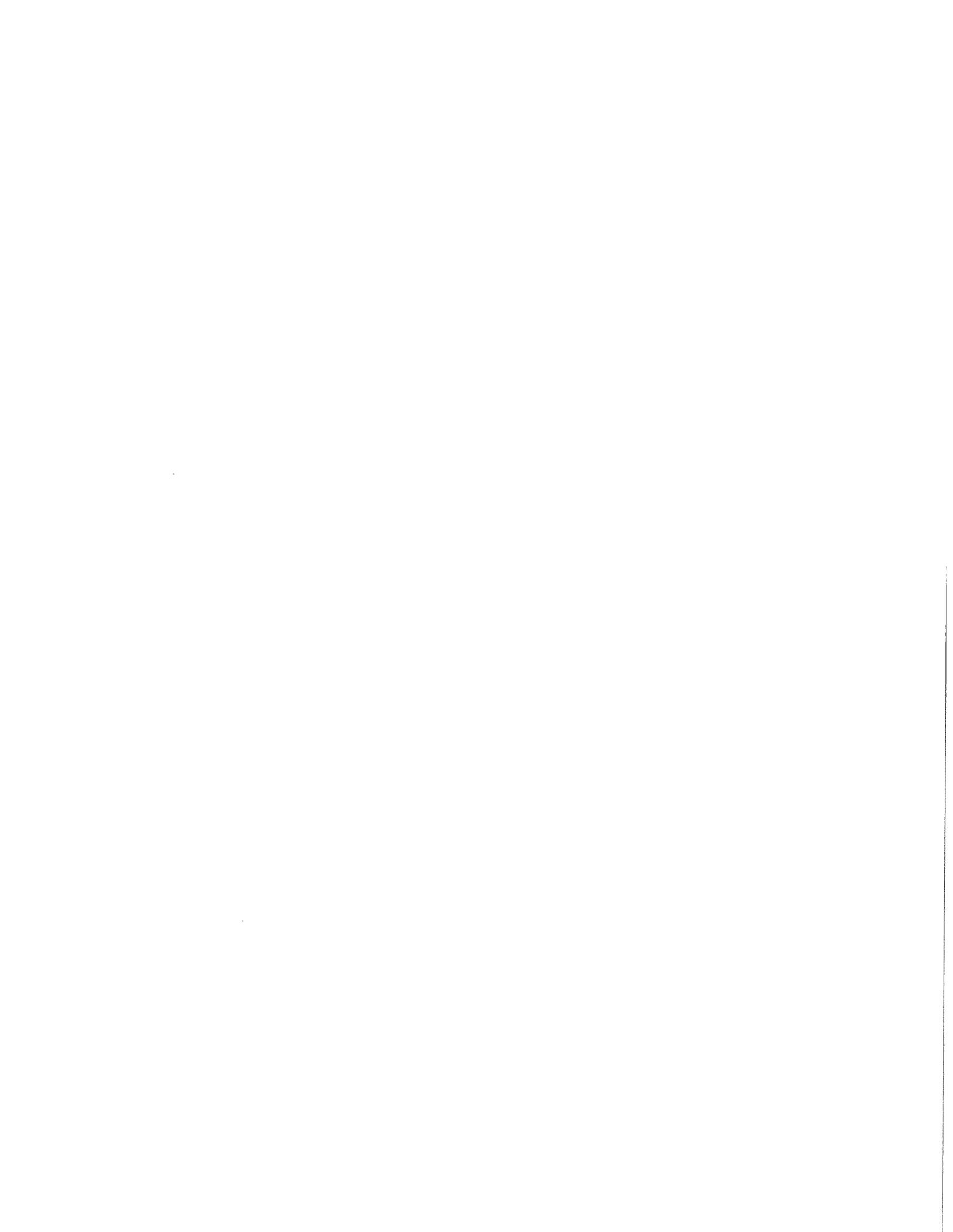


TABLE 2: UPLAND DISPOSAL, PRIVATE FINANCING

PARAMETERS	ASSUMPTION	SOURCE
Loan Terms:		
Number of Borrowings	1	assumption
Borrowing Rate	13.00%	prime rate + 2%
Financing Costs--% of Principal	2.00%	usual terms
Debt Period, Years	15	usual terms
Borrowed Amount--% of Year 0 Costs	90.00%	usual terms
Equity Contribution--% of Year 0	10.00%	usual terms
Loan Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Cost Analysis Paper
Site Acquisition	1,250,000	Cost Analysis Paper
Site Preparation	363,060	Cost Analysis Paper
Construct: site/leachate/liner	8,628,375	Cost Analysis Paper
Dewatering Facility	0	Cost Analysis Paper
Monitoring Wells	20,000	Cost Analysis Paper
Other Facilities	529,650	Cost Analysis Paper
Design & Permitting	276,960	Cost Analysis Paper
Mobilization/Engineering/Admin	1,109,840	Cost Analysis Paper
Contingency	1,860,133	Cost Analysis Paper
Total Year 0 Costs	14,263,018	Cost Analysis Paper
Equity Contribution	1,426,302	calculation
Total Borrowing	12,836,716	calculation
Level Debt Payments	1,986,376	calculation
Profit Margin	10.00%	return on equity + profit
Construction Reserve Account (for periodic construction costs, monthly contribution is invested at beginning of month, compounded monthly; withdrawal is made at end of withdrawal period):		
Investment rate, Reserve Account	9.15%	one year CD rate
Withdrawal Period, years	2	based on cost projections
Biennial Costs Thru Year 18:		
Site Preparation	363,060	Cost Analysis Paper
Construct: site/leachate/liner	628,375	Cost Analysis Paper
Closure	112,377	Cost Analysis Paper
Contingency 15%	165,572	calculation
Total Biennial Costs	1,269,384	calculation
Total Annual Contribution	576,600	mtly X 12 (footnote 2)
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment Rate for Trust Fund	11.15%	one year CD + 2%
Trust Fund Term, years	20	assumption
Post Closure Term, years	10	PTI and DOE
Discount Rate, Years 21-30	7.50%	public cost of capital
Year 20 Reserve Requirement	\$2,218,936	calculation (footnote 1)
F.A. Account Annual Payment	\$30,570	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89

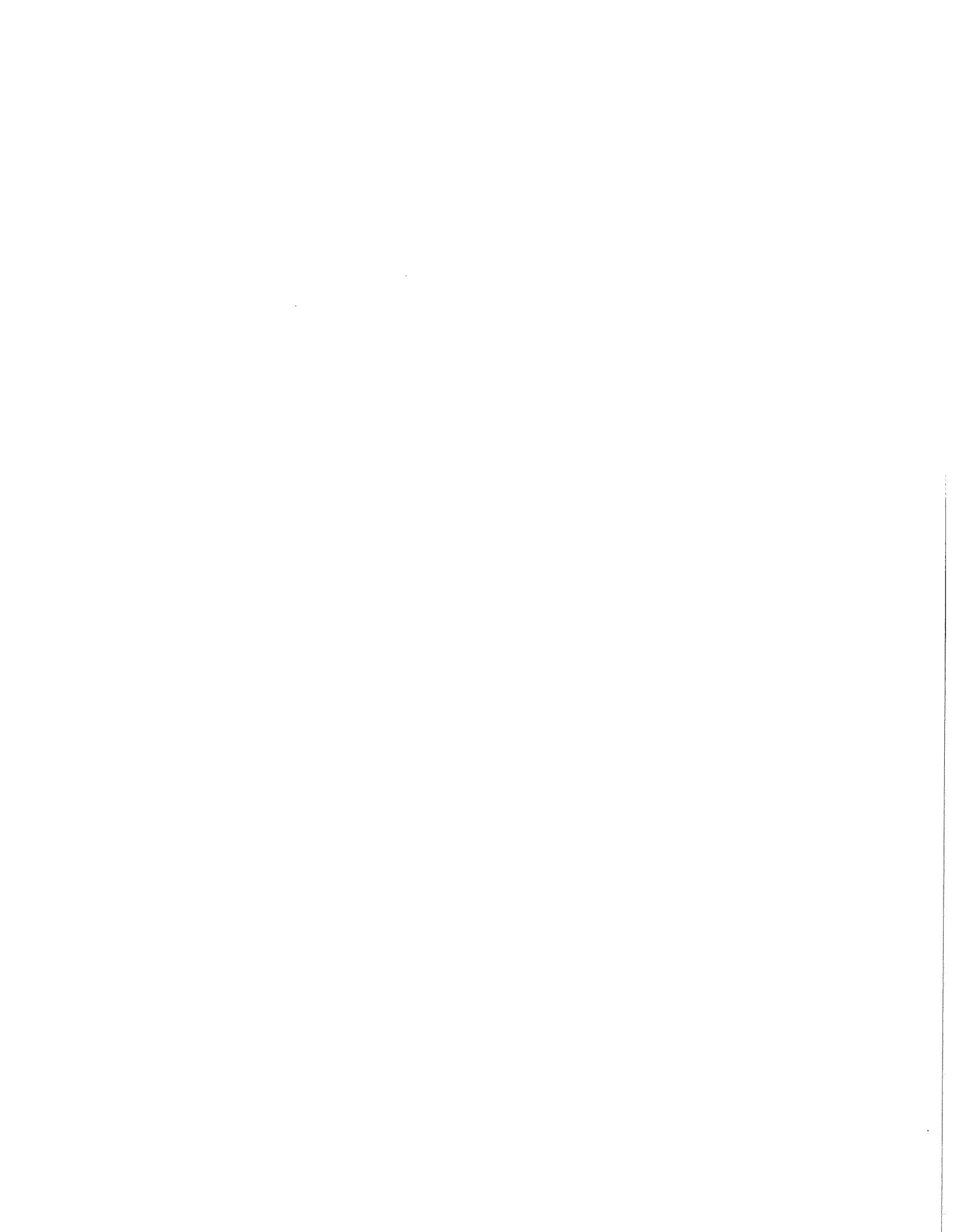


TABLE 2: UPLAND DISPOSAL, PRIVATE FINANCING

 FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:
 Year 20 Reserve Requirement = \$2,218,936 (Year 20 NPV of inflated costs)

Post Closure Costs*		
Year	1989 Dollars	Inflated
21	94,967	264,575
22	94,967	277,803
23	94,967	291,693
24	94,967	306,278
25	94,967	321,592
26	94,967	337,672
27	94,967	354,555
28	94,967	372,283
29	94,967	390,897
30	94,967	410,442

* Source: Cost Analysis Issue Paper

2. Calculation of Reserve Account Contributions: (1989 Dollars)

Construction Reserve:		F.A. Account:	
Mthly Pymt	48,050	Annual Pymt	\$30,570

Month	Cumulative	Year	Cumulative
1	48,416	1	33,979
2	97,202	2	71,746
3	146,359	3	113,724
4	195,892	4	160,383
5	245,802	5	212,244
6	296,093	6	269,888
7	346,767	7	333,959
8	397,827	8	405,174
9	449,277	9	484,329
10	501,119	10	572,310
11	553,356	11	670,101
12	605,992	12	778,796
13	659,029	13	899,611
14	712,471	14	1,033,896
15	766,320	15	1,183,154
16	820,579	16	1,349,054
17	875,253	17	1,533,452
18	930,343	18	1,738,411
19	985,853	19	1,966,222
20	1,041,786	20	2,219,434
21	1,098,146		
22	1,154,936		
23	1,212,159		
24	1,269,818		

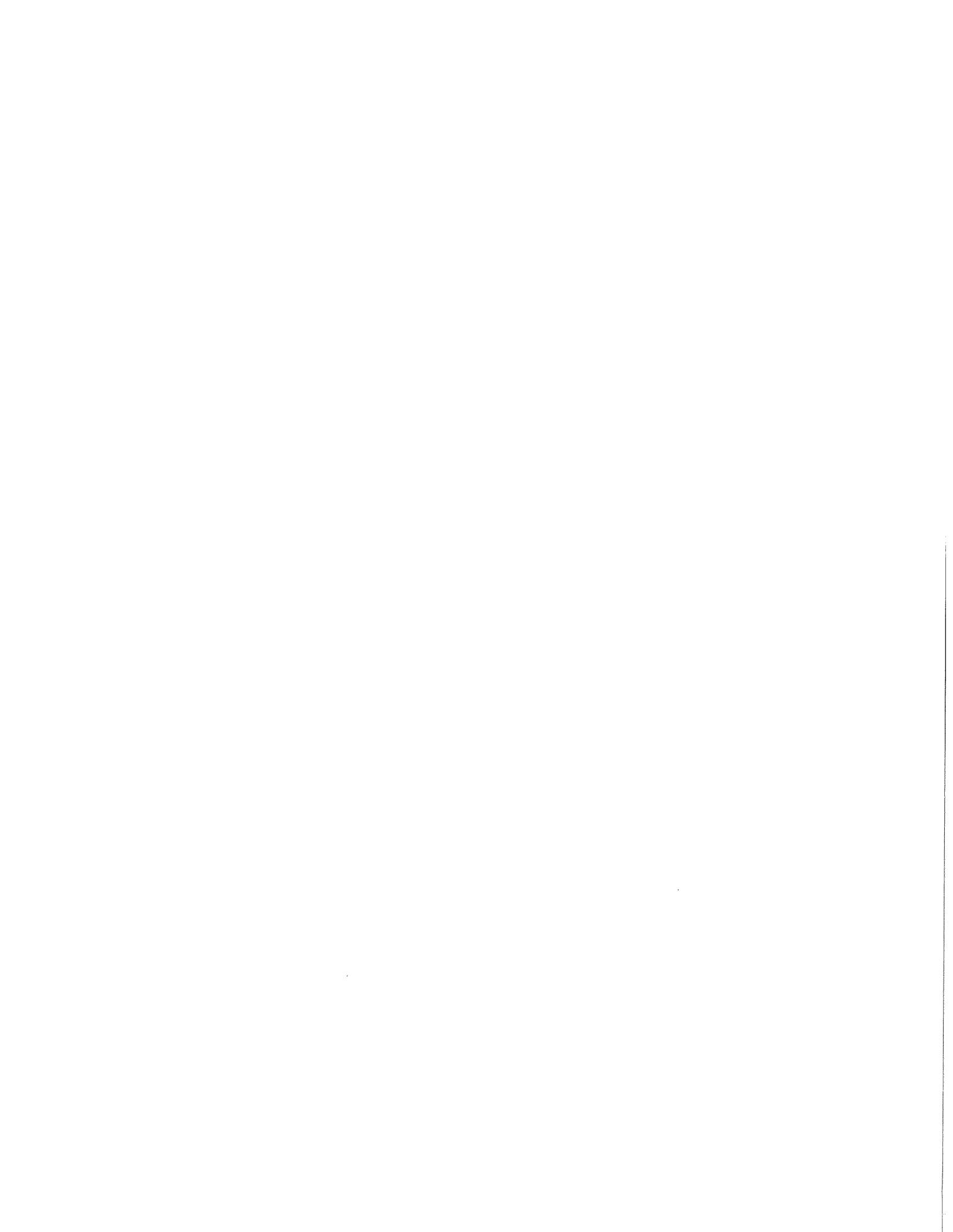


TABLE 2: UPLAND DISPOSAL, PRIVATE FINANCING

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376
F.A. ACCOUNT	30,570	30,570	30,570	30,570	30,570	30,570	30,570	30,570	30,570	30,570
CONSTRUCTION RESERVE	605,430	635,702	667,487	700,861	735,904	772,699	811,334	851,901	894,496	939,221
OPERATION										
Leachate Treatment	98,438	103,359	108,527	113,954	119,651	125,634	131,916	138,511	145,437	152,709
Disposal/O&M/Administration	337,401	354,271	371,984	390,583	410,113	430,618	452,149	474,757	498,495	523,419
Monitoring	26,252	27,565	28,943	30,390	31,910	33,505	35,180	36,939	38,786	40,726
Contingency 15%	69,314	72,779	76,418	80,239	84,251	88,464	92,887	97,531	102,408	107,528
TOTAL COSTS	3,153,780	3,210,622	3,270,306	3,332,974	3,398,775	3,467,866	3,540,412	3,616,586	3,696,568	3,780,549
PROFIT	315,378	321,062	327,031	333,297	339,877	346,787	354,041	361,659	369,657	378,055
COST/CHARGE PER CUBIC YARD	\$55.51	\$56.51	\$57.56	\$58.66	\$59.82	\$61.03	\$62.31	\$63.65	\$65.06	\$66.54
USER FEE REVENUES	3,469,158	3,531,684	3,597,336	3,666,271	3,738,652	3,814,653	3,894,454	3,978,244	4,066,224	4,158,604

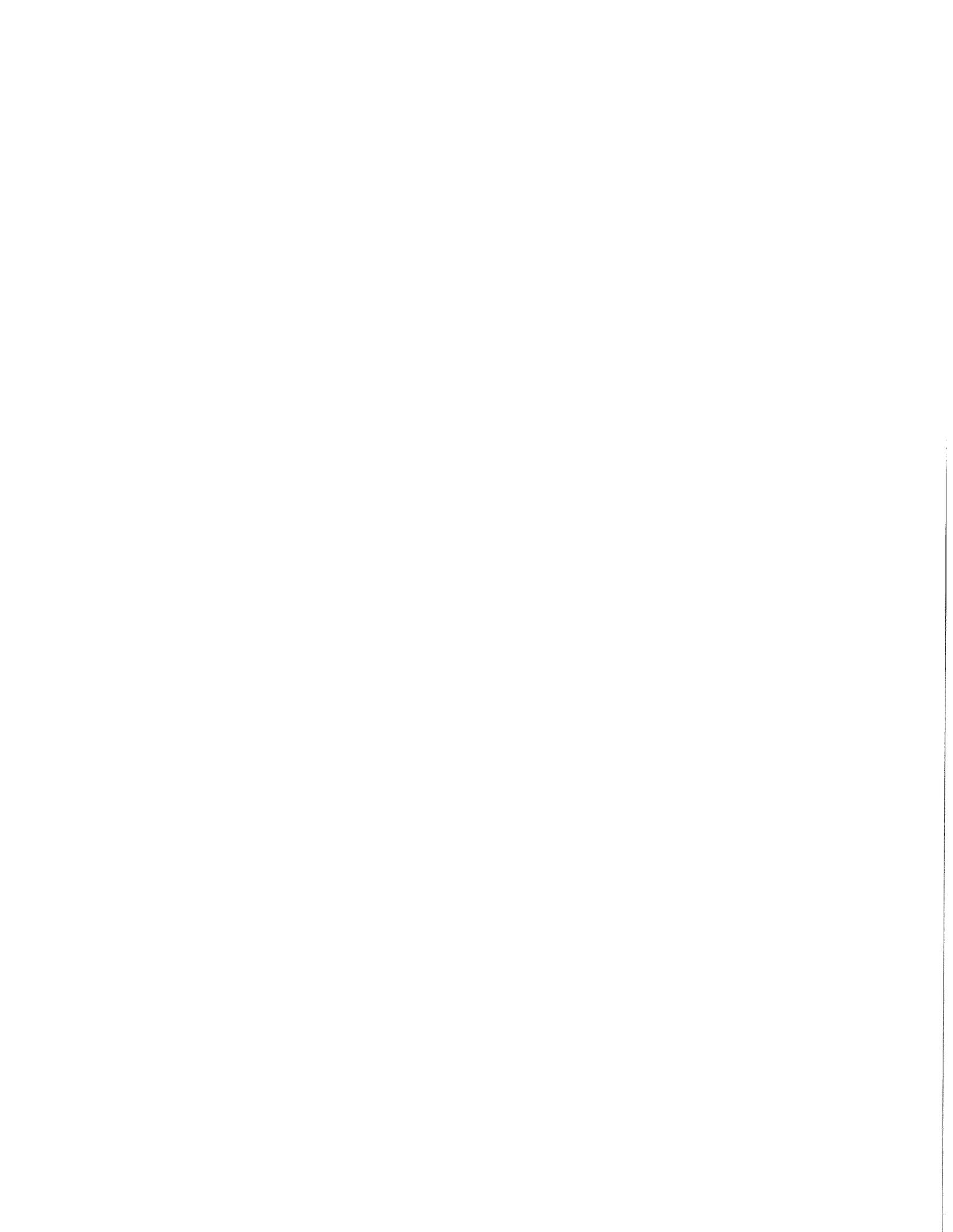


TABLE 2: UPLAND DISPOSAL, PRIVATE FINANCING

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376	1,986,376
F.A. ACCOUNT	30,570	30,570	30,570	30,570	30,570	30,570	30,570	30,570	30,570	30,570
CONSTRUCTION RESERVE	986,182	1,035,491	1,087,265	1,141,629	1,198,710	1,258,645	1,321,578	1,387,657	190,049	199,552
OPERATION										
Leachate Treatment	160,344	168,362	176,780	185,619	194,900	204,644	214,877	225,621	236,902	248,747
Disposal/O&M/Administration	549,590	577,070	605,923	636,219	668,030	701,432	736,503	773,329	811,995	852,595
Monitoring	42,762	44,900	47,145	49,502	51,977	54,576	57,305	60,170	63,179	66,338
Contingency 15%	112,904	118,550	124,477	130,701	137,236	144,098	151,303	158,868	166,811	175,152
TOTAL COSTS	3,868,729	3,961,318	4,058,537	4,160,616	4,267,800	4,380,342	4,498,512	4,622,590	3,485,882	3,559,329
PROFIT	386,873	396,132	405,854	416,062	426,780	438,034	449,851	462,259	348,588	355,933
COST/CHARGE PER CUBIC YARD	\$68.09	\$69.72	\$71.43	\$73.23	\$75.11	\$77.09	\$79.17	\$81.36	\$61.35	\$62.64
USER FEE REVENUES	4,255,602	4,357,450	4,464,390	4,576,678	4,694,580	4,818,376	4,948,363	5,084,849	3,834,471	3,915,262

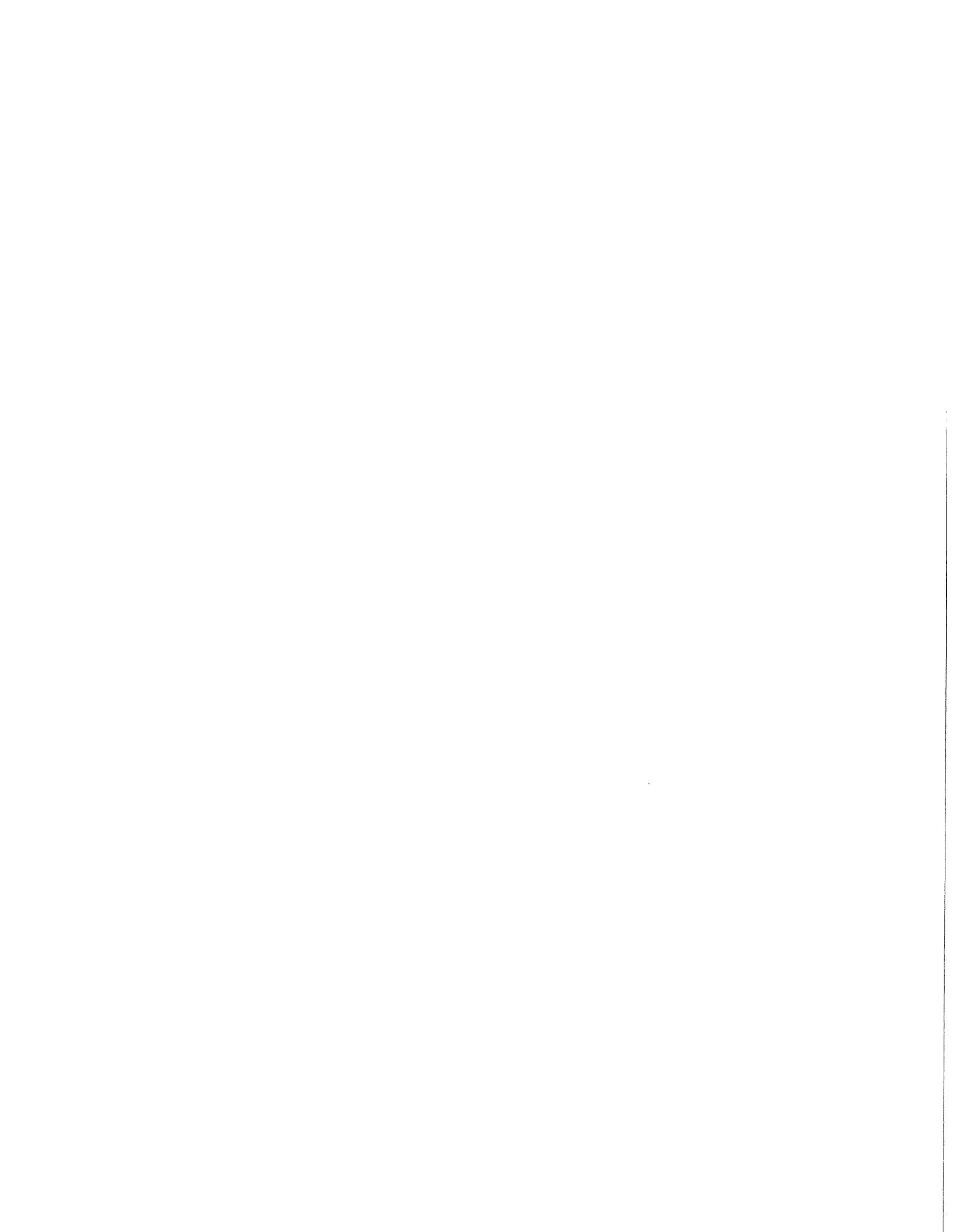


TABLE 3: CONFINED AQUATIC DISPOSAL, TAX EXEMPT REVENUE BONDS

PARAMETERS	ASSUMPTIONS	SOURCE
Tax Exempt Borrowing:		
Number of Borrowings	1	assumption
Bond Rate	7.50%	Revenue Bond Index, 5/89
Financing Costs, % of Principal	2.00%	usual terms
Debt Period, years	20	usual terms
Borrowed Amount, % of Year 0 Costs	100.00%	usual terms
Borrowing Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Costs Analysis Paper
Site Acquisition	0	Costs Analysis Paper
Design/Permitting	325,000	Costs Analysis Paper
Mobilization/Engineering/Admin	33,000	Costs Analysis Paper
Contingency	87,450	Costs Analysis Paper
	670,450	
Total Year 0 Costs	670,450	
Financing Costs	13,409	calculation
Total Borrowing	683,859	calculation
Level Debt Payments	67,081	calculation
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment rate	10.15%	one year CD + 1%
Trust Fund Term, years	20	assumptiong
Post Closure Term, years	10	PTI and DOE
Discount rate	7.50%	public cost of capital
Year 20 Reserve Requirement	\$4,971,561	calculation (footnote 1)
F.A. Account Annual Payment	\$77,480	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89

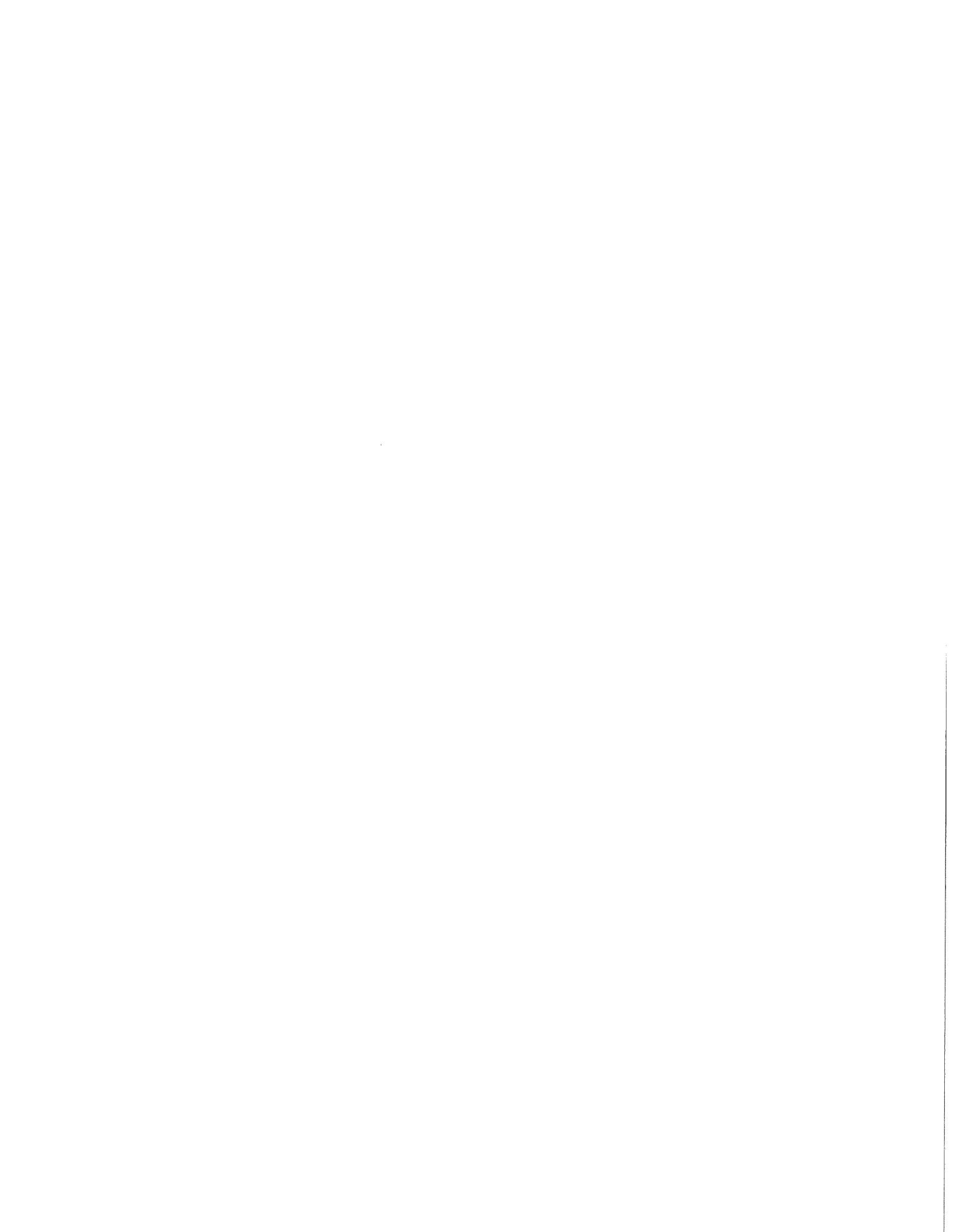


TABLE 3: CONFINED AQUATIC DISPOSAL, TAX EXEMPT REVENUE BONDS

 FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:

Year 20 Reserve Requirement = 4,971,561

Post Closure Costs

Year 1989 Dollars Inflated

	Year 1989 Dollars	Inflated
21	423,434	1,179,671
22	330,690	967,354
23	284,320	873,296
24	237,949	767,409
25	191,578	648,751
26	191,578	681,189
27	145,207	542,125
28	98,837	387,452
29	98,837	406,825
30	52,466	226,754

* Monitoring, Site Maintenance/Admin, Contingency

2. Calculation of F.A. Account Contribution:

Annual Pymt \$77,480

Year	Cumulative
1	85,344
2	179,351
3	282,899
4	396,958
5	522,593
6	660,981
7	813,414
8	981,320
9	1,166,268
10	1,369,989
11	1,594,387
12	1,841,561
13	2,113,824
14	2,413,721
15	2,744,058
16	3,107,924
17	3,508,723
18	3,950,203
19	4,436,492
20	4,972,141

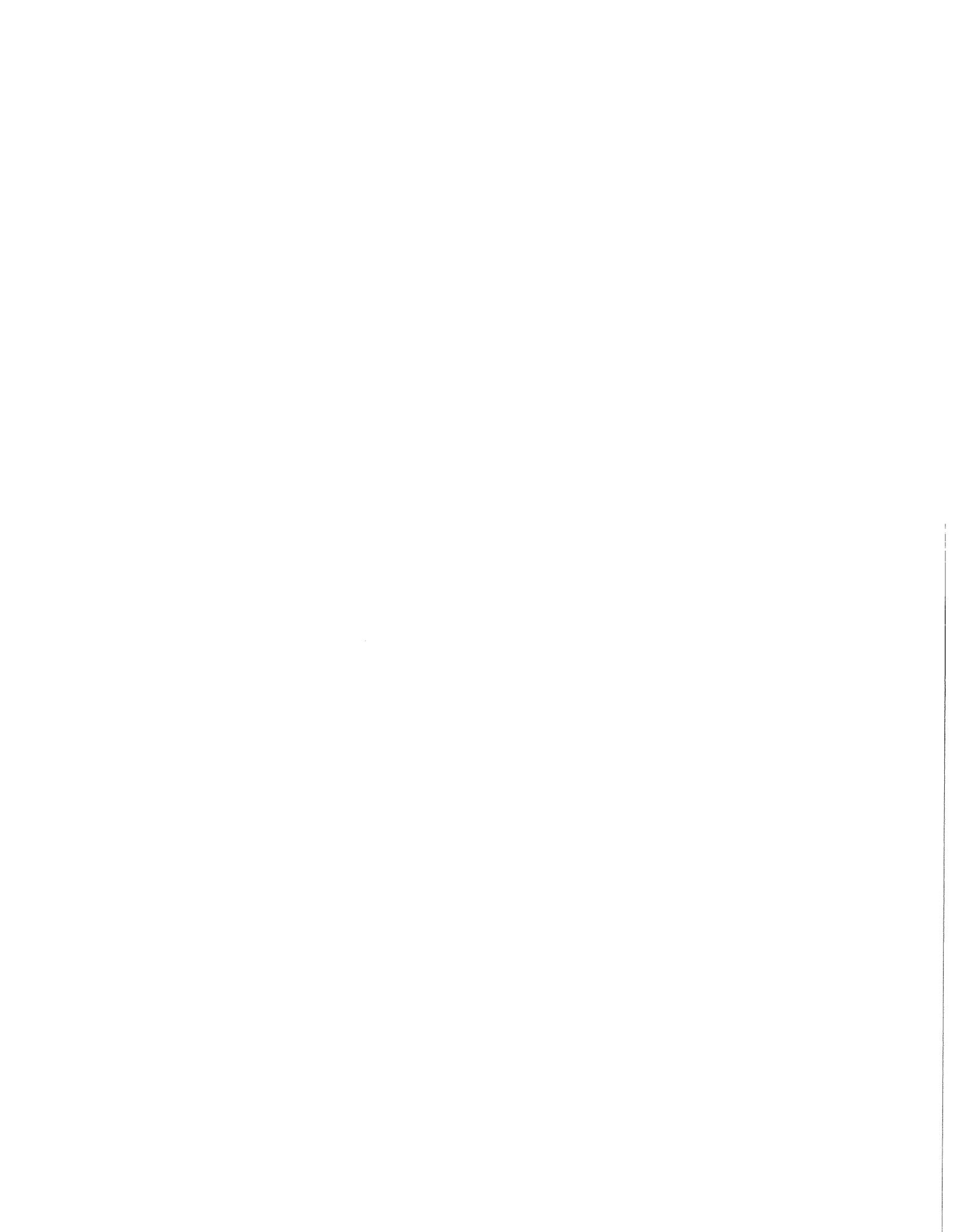


TABLE 3: CONFINED AQUATIC DISPOSAL, TAX EXEMPT REVENUE BONDS

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	67,081	67,081	67,081	67,081	67,081	67,081	67,081	67,081	67,081	67,081
F.A. ACCOUNT	77,480	77,480	77,480	77,480	77,480	77,480	77,480	77,480	77,480	77,480
OPERATION										
Administration	46,639	51,488	56,704	59,539	65,430	68,701	75,347	79,115	83,071	90,941
Monitoring	45,192	89,391	137,896	144,791	200,580	210,609	274,666	288,399	302,819	379,923
Closure (Capping)	732,129	768,736	807,173	847,531	889,908	934,403	981,123	1,030,179	1,081,688	1,135,773
Contingency 15%	123,594	136,442	150,266	157,779	173,388	182,057	199,671	209,654	220,137	240,996
TOTAL COSTS	1,092,115	1,190,618	1,296,600	1,354,202	1,473,867	1,540,332	1,675,368	1,751,909	1,832,276	1,992,194
COST/CHARGE PER CUBIC YARD	\$17.47	\$19.05	\$20.75	\$21.67	\$23.58	\$24.65	\$26.81	\$28.03	\$29.32	\$31.88
USER FEE REVENUES	1,092,115	1,190,618	1,296,600	1,354,202	1,473,867	1,540,332	1,675,368	1,751,909	1,832,276	1,992,194



TABLE 3: CONFINED AQUATIC DISPOSAL, TAX EXEMPT REVENUE BONDS

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	67,081	67,081	67,081	67,081	67,081	67,081	67,081	67,081	67,081	67,081
F.A. ACCOUNT	77,480	77,480	77,480	77,480	77,480	77,480	77,480	77,480	77,480	77,480
OPERATION										
Administration	95,488	124,857	131,100	137,655	144,537	151,764	159,353	167,320	175,686	178,413
Monitoring	398,920	828,752	870,189	913,699	959,384	1,007,353	1,057,721	1,110,607	1,166,137	1,123,512
Closure (Capping)	1,192,561	1,252,190	1,314,799	1,380,539	1,449,566	1,522,044	1,598,146	1,678,054	1,761,956	1,850,054
Contingency 15%	253,045	330,870	347,413	364,784	383,023	402,174	422,283	443,397	465,567	472,797
TOTAL COSTS	2,084,576	2,681,229	2,808,063	2,941,238	3,081,072	3,227,897	3,382,064	3,543,939	3,713,908	3,769,338
COST/CHARGE PER CUBIC YARD	\$33.35	\$42.90	\$44.93	\$47.06	\$49.30	\$51.65	\$54.11	\$56.70	\$59.42	\$60.31
USER FEE REVENUES	2,084,576	2,681,229	2,808,063	2,941,238	3,081,072	3,227,897	3,382,064	3,543,939	3,713,908	3,769,338

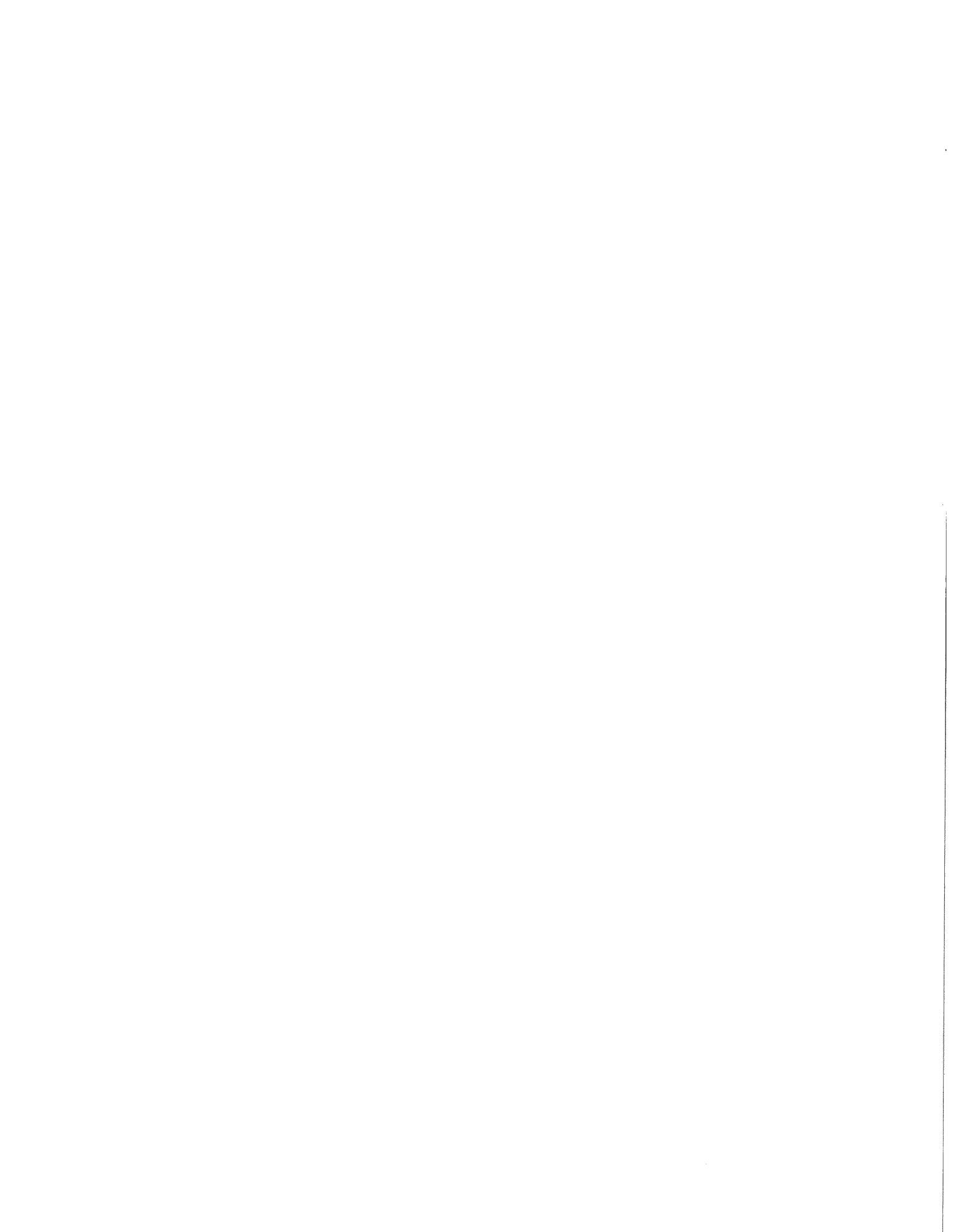


TABLE 4: AQUATIC DISPOSAL, PRIVATE FINANCING

TABLE 4: AQUATIC DISPOSAL, PRIVATE FINANCING

PARAMETERS	ASSUMPTION	SOURCE
Loan Terms:		
Number of Borrowings	1	assumption
Borrowing Rate	13.00%	prime rate + 2%
Financing Costs--% of Principal	2.00%	usual terms
Debt Period, Years	15	usual terms
Borrowed Amount--% of Year 0 Costs	90.00%	usual terms
Equity Contribution--% of Year 0	10.00%	usual terms
Loan Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Cost Analysis Paper
Site Acquisition	0	Cost Analysis Paper
Design & Permitting	325,000	Cost Analysis Paper
Mobilization/Engineering/Admin	33,000	Cost Analysis Paper
Contingency	87,450	Cost Analysis Paper
Total Year 0 Costs	670,450	Cost Analysis Paper
Equity Contribution	67,045	calculation
Total Borrowing	603,405	calculation
Level Debt Payments	93,372	calculation
Profit Margin	10.00%	return on equity + profit
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment Rate for Trust Fund	11.15%	one year CD + 2%
Trust Fund Term, years	20	assumption
Post Closure Term, years	10	PTI and DOE
Discount Rate, Years 21-30	7.50%	public cost of capital
Year 20 Reserve Requirement	\$4,971,563	calculation (footnote 1)
F.A. Account Annual Payment	\$68,480	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89

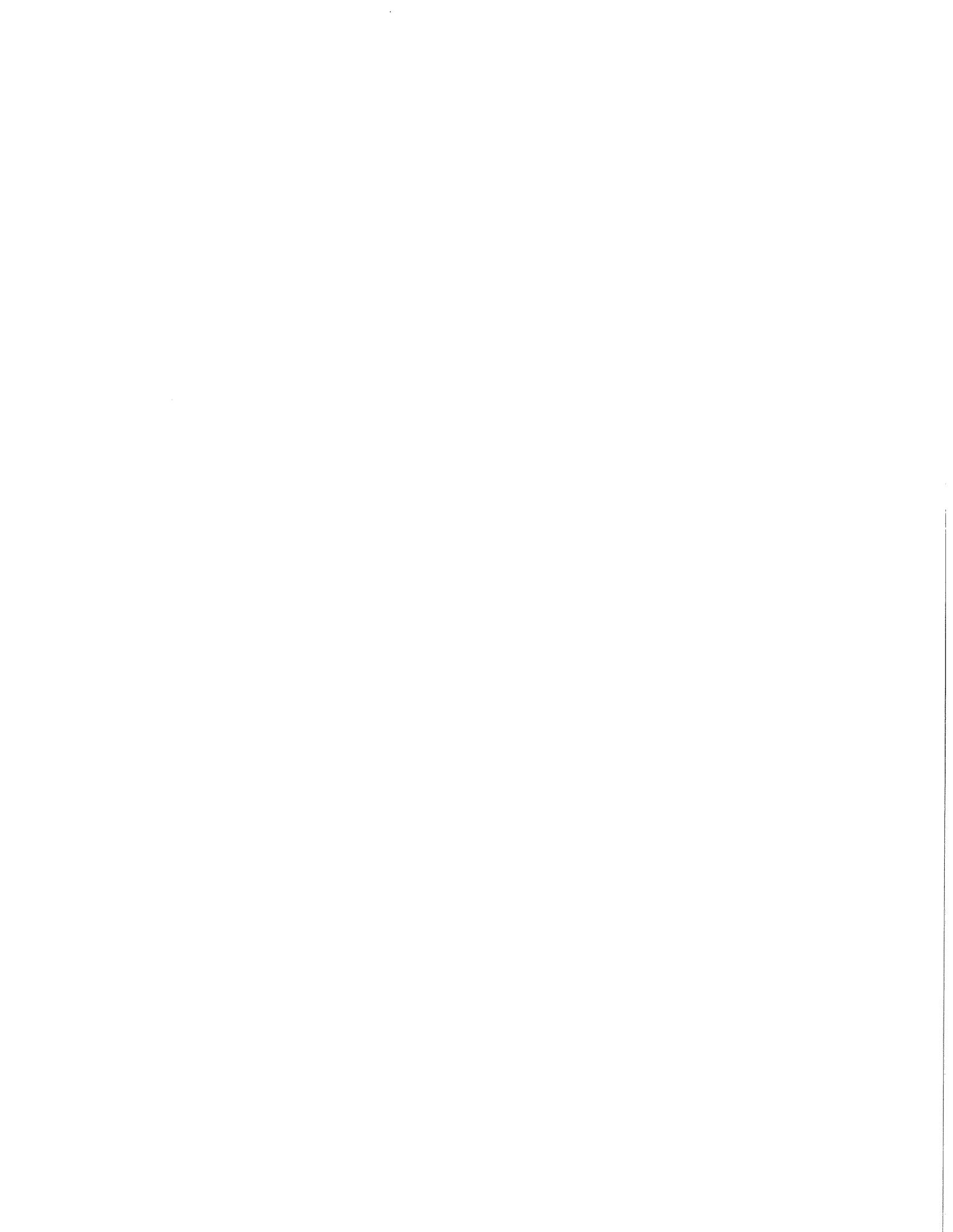


TABLE 4: AQUATIC DISPOSAL, PRIVATE FINANCING

FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:
 Year 20 Reserve Requirement = \$4,971,563 (Year 20 NPV of inflated costs)

Year	Post Closure Costs*	
	1989 Dollars	Inflated
21	423,434	1,179,671
22	330,690	967,354
23	284,320	873,296
24	237,949	767,409
25	191,578	648,751
26	191,578	681,189
27	145,207	542,124
28	98,837	387,454
29	98,837	406,826
30	52,466	226,755

* Source: Cost Analysis Issue Paper

2. Calculation of F.A.Account Contributions:

F.A. Account:
 Annual Pym \$68,480

Year	Cumulative
1	76,116
2	160,718
3	254,753
4	359,274
5	475,449
6	604,577
7	748,102
8	907,631
9	1,084,948
10	1,282,035
11	1,501,097
12	1,744,585
13	2,015,222
14	2,316,035
15	2,650,388
16	3,022,022
17	3,435,093
18	3,894,222
19	4,404,543
20	4,971,765

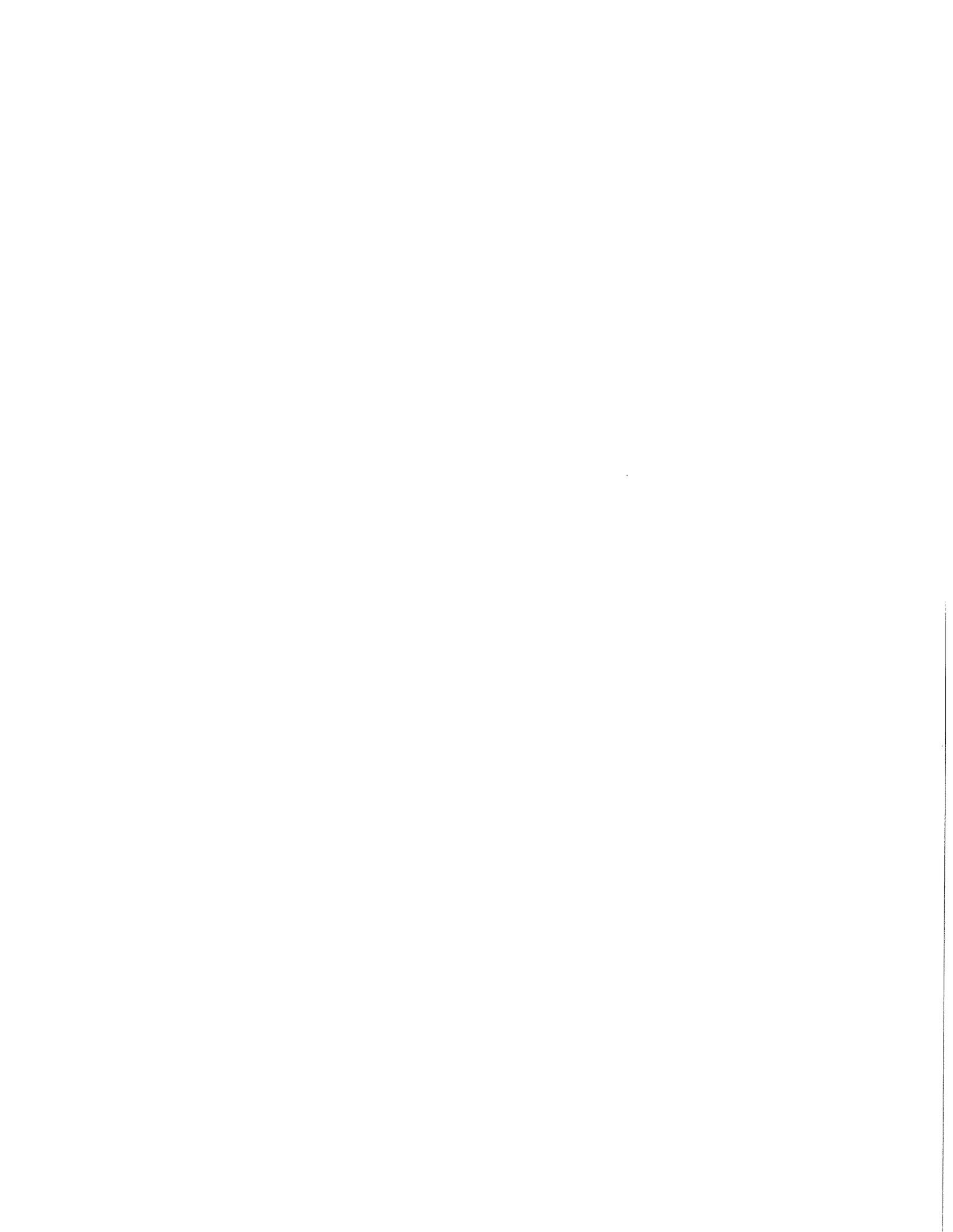


TABLE 4: AQUATIC DISPOSAL, PRIVATE FINANCING

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	93,372	93,372	93,372	93,372	93,372	93,372	93,372	93,372	93,372	93,372
F.A. ACCOUNT	68,480	68,480	68,480	68,480	68,480	68,480	68,480	68,480	68,480	68,480
OPERATION										
Administration	46,639	51,488	56,704	59,539	65,430	68,701	75,347	79,115	83,071	90,941
Monitoring	45,192	89,391	137,896	144,791	200,580	210,609	274,666	288,399	302,819	379,923
Closure (Capping)	732,129	768,736	807,173	847,531	889,908	934,403	981,123	1,030,179	1,081,688	1,135,773
Contingency 15%	123,594	136,442	150,266	157,779	173,388	182,057	199,671	209,654	220,137	240,996
TOTAL COSTS	1,109,406	1,207,908	1,313,891	1,371,493	1,491,158	1,557,623	1,692,659	1,769,200	1,849,567	2,009,485
PROFIT	110,941	120,791	131,389	137,149	149,116	155,762	169,266	176,920	184,957	200,948
COST/CHARGE PER CUBIC YARD	\$19.53	\$21.26	\$23.12	\$24.14	\$26.24	\$27.41	\$29.79	\$31.14	\$32.55	\$35.37
USER FEE REVENUES	1,220,347	1,328,699	1,445,280	1,508,642	1,640,273	1,713,385	1,861,925	1,946,119	2,034,524	2,210,433

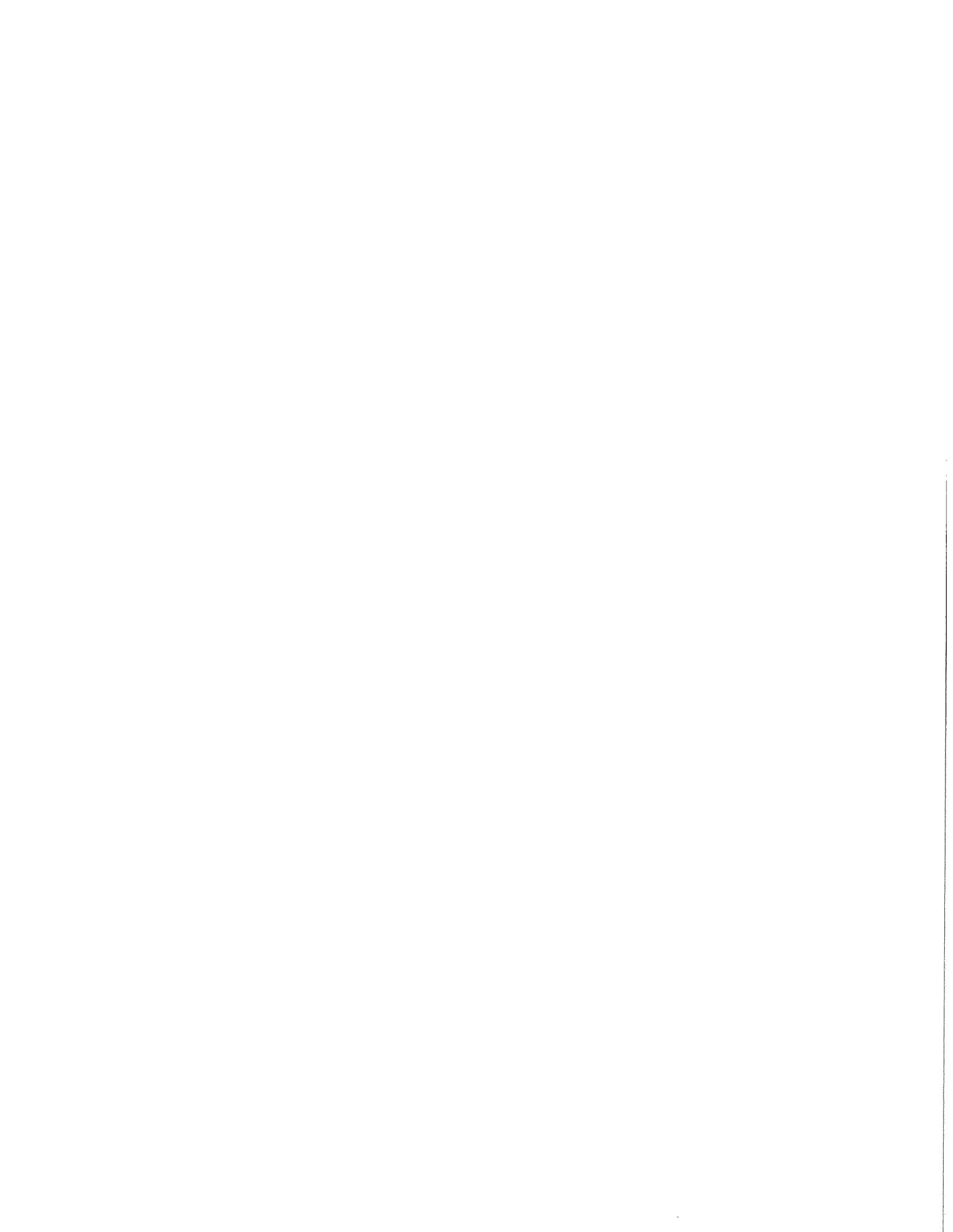


TABLE 4: AQUATIC DISPOSAL, PRIVATE FINANCING

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	93,372	93,372	93,372	93,372	93,372	93,372	93,372	93,372	93,372	93,372
F. A. ACCOUNT	68,480	68,480	68,480	68,480	68,480	68,480	68,480	68,480	68,480	68,480
OPERATION										
Administration	95,488	124,857	131,100	137,655	144,537	151,764	159,353	167,320	175,686	178,413
Monitoring	398,920	828,752	870,189	913,699	959,384	1,007,353	1,057,721	1,110,607	1,166,137	1,123,512
Closure (Clapping)	1,192,561	1,252,190	1,314,799	1,380,539	1,449,566	1,522,044	1,598,146	1,678,054	1,761,956	1,850,054
Contingency 15%	253,045	330,870	347,413	364,784	383,023	402,174	422,283	443,397	465,567	472,797
TOTAL COSTS	2,101,867	2,698,520	2,825,353	2,958,528	3,098,362	3,245,188	3,399,355	3,561,230	3,731,199	3,786,629
PROFIT	210,187	269,852	282,535	295,853	309,836	324,519	339,935	356,123	373,120	378,663
COST/CHARGE PER CUBIC YARD	\$36.99	\$47.49	\$49.73	\$52.07	\$54.53	\$57.12	\$59.83	\$62.68	\$65.67	\$66.64
USER FEE REVENUES	2,312,053	2,968,372	3,107,889	3,254,381	3,408,198	3,569,707	3,739,290	3,917,353	4,104,318	4,165,291

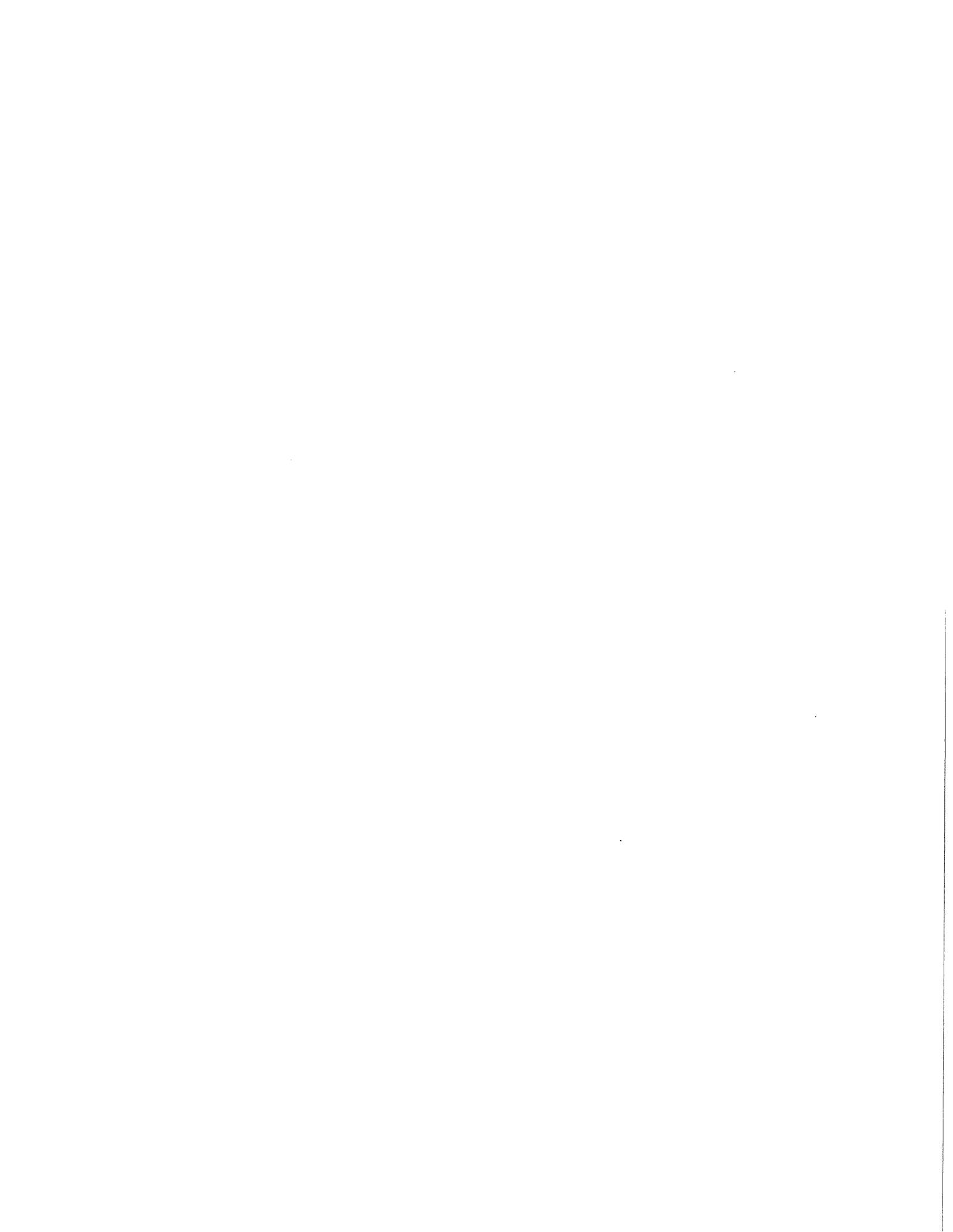


TABLE 5: NEARSHORE SATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

PARAMETERS	ASSUMPTIONS	SOURCE
Tax Exempt Borrowing:		
Number of Borrowings	1	assumption
Bond Rate	7.50%	Revenue Bond Index, 5/89
Financing Costs, % of Principal	2.00%	usual terms
Debt Period, years	20	usual terms
Borrowed Amount, % of Year 0 Costs	100.00%	usual terms
Borrowing Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Costs Analysis Paper
Site Acquisition	7,318,080	Costs Analysis Paper
Site Preparation	3,750	Costs Analysis Paper
Berm Construction	2,841,370	Costs Analysis Paper
Monitoring Wells	9,000	Costs Analysis Paper
Design & Permitting	508,743	Costs Analysis Paper
Mobilization/Engineering/Admin	2,474,057	Costs Analysis Paper
Habitat Mitigation	537,500	Costs Analysis Paper
Contingency	2,087,625	Costs Analysis Paper
Total Year 0 Costs	16,005,125	
Financing Costs	320,103	calculation
Total Borrowing	16,325,228	calculation
Level Debt Payments	1,601,377	calculation
Construction Reserve Account (for periodic construction costs, monthly contribution is invested at beginning of month, compounded monthly; withdrawal is made at end of withdrawal period):		
Investment rate	9.15%	one year CD
Withdrawal period thru year 18, year	2	Cost Analysis Paper
Biennial Costs:		
Site Preparation	3,750	Cost Analysis Paper
Berm Construction	2,841,370	Cost Analysis Paper
Monitoring Wells	9,000	Cost Analysis Paper
Habitat Mitigation	537,500	Cost Analysis Paper
Cell Capping	676,076	Cost Analysis Paper
Contingency 15%	610,154	calculation
Total Biennial Costs	4,677,850	calculation
Annual contribution	2,124,240	mthly X 12 (footnote 2)
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment rate	10.15%	one year CD + 1%
Trust Fund Term, years	20	assumptiong
Post Closure Term, years	10	PTI and DOE
Discount rate	7.50%	public cost of capital
Year 20 Reserve Requirement	\$3,525,755	calculation (footnote 1)
F.A. Account Annual Payment	\$54,950	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89

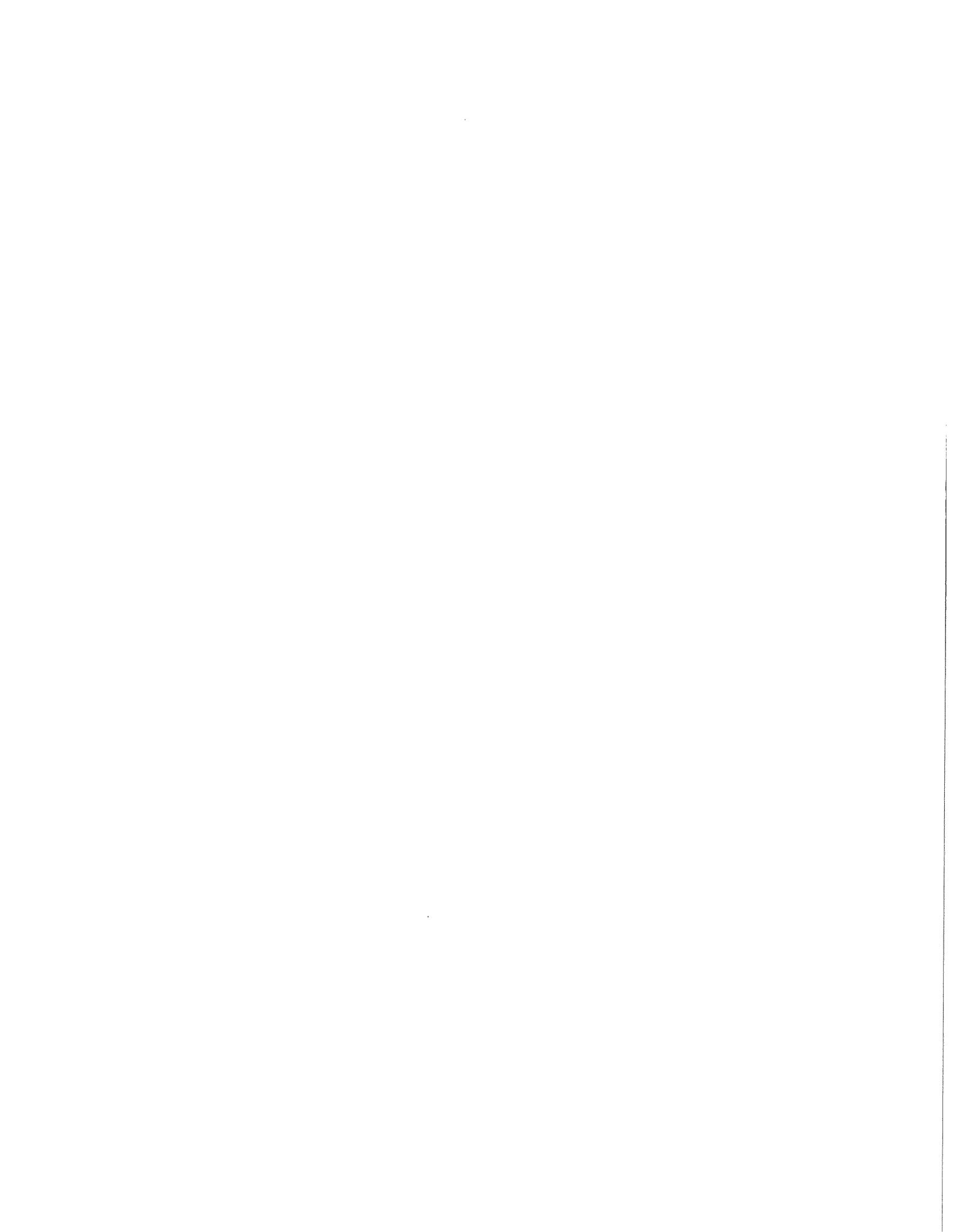


TABLE 5: NEARSHORE SATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

 FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:

Year 20 Reserve Requirement	=	3,525,755
		Post Closure Costs
		Year 1989 Dollars Inflated
21	209,129	582,626
22	142,041	415,507
23	185,169	568,751
24	142,041	458,096
25	161,209	545,911
26	144,511	513,835
27	122,873	458,741
28	142,041	556,819
29	122,873	505,762
30	122,873	531,050

* Monitoring, Site Maintenance/Admin, Contingency

2. Calculation of Reserve Account Contributions

Construction Reserve		F.A. Account:	
Mthly Pymt	\$177,020	Annual Pymt	\$54,950

Month	Cumulative		Year		Cumulative
1	178,370		1		60,527
2	358,100		2		127,198
3	539,200		3		200,636
4	721,681		4		281,528
5	905,554		5		370,631
6	1,090,828		6		468,778
7	1,277,516		7		576,886
8	1,465,626		8		695,967
9	1,655,172		9		827,135
10	1,846,162		10		971,617
11	2,038,609		11		1,130,763
12	2,232,523		12		1,306,063
13	2,427,916		13		1,499,156
14	2,624,798		14		1,711,848
15	2,823,182		15		1,946,128
16	3,023,079		16		2,204,187
17	3,224,500		17		2,488,440
18	3,427,456		18		2,801,544
19	3,631,960		19		3,146,428
20	3,838,024		20		3,526,318
21	4,045,659				
22	4,254,876				
23	4,465,690				
24	4,678,110				

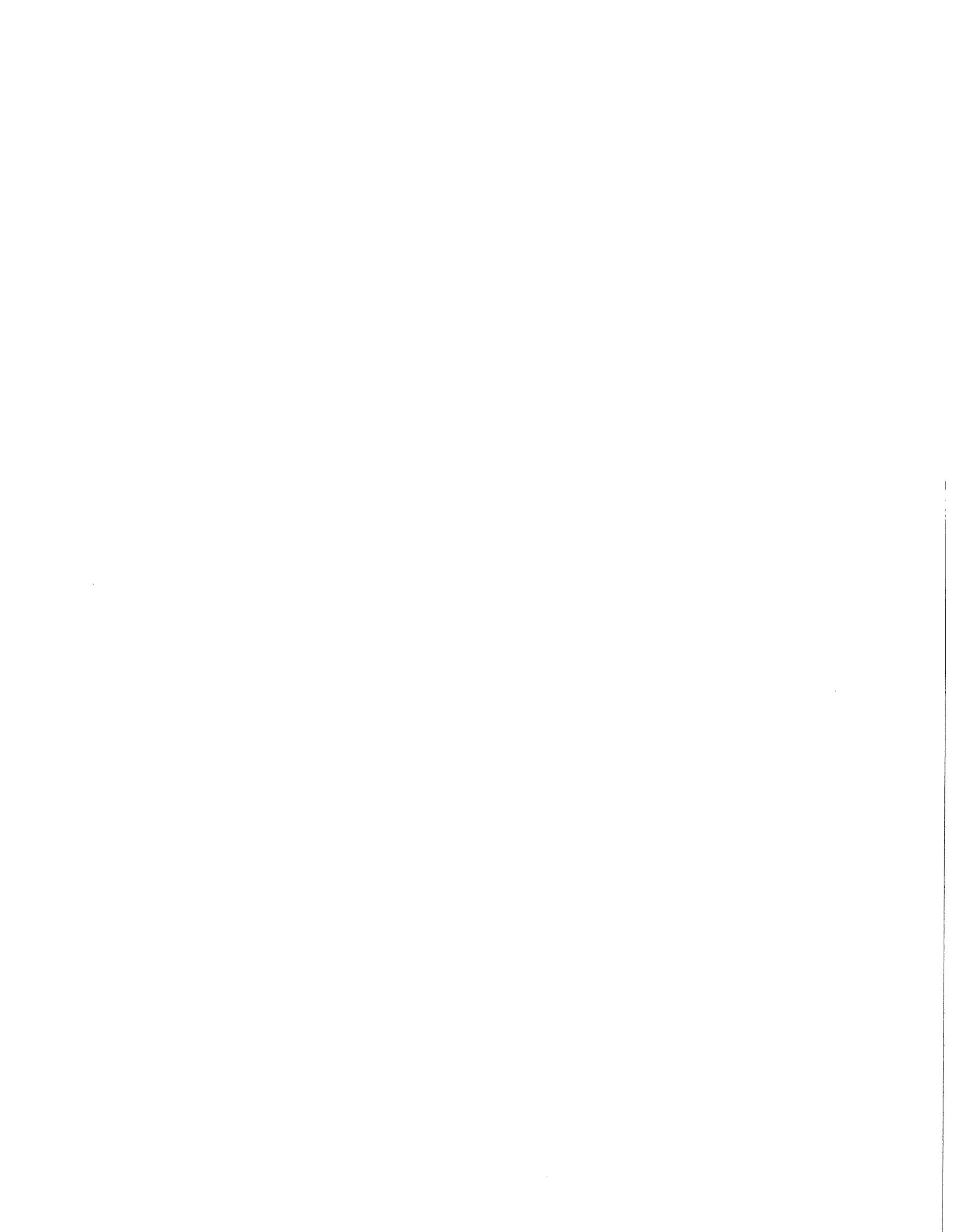


TABLE 5: NEARSHORE SATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377
F.A. ACCOUNT	54,950	54,950	54,950	54,950	54,950	54,950	54,950	54,950	54,950	54,950
CONSTRUCTION RESERVE	2,230,452	2,341,975	2,459,073	2,582,027	2,711,128	2,846,685	2,989,019	3,138,470	3,295,393	3,460,163
OPERATION										
Disposal/O&M/Administration	68,775	115,834	77,271	127,707	86,787	140,797	97,443	155,229	107,431	174,398
Monitoring	52,504	36,753	82,005	40,520	117,002	44,673	158,311	49,252	174,538	108,602
Contingency 15%	18,192	22,888	23,891	25,234	30,568	27,821	38,363	30,672	42,295	42,450
TOTAL COSTS	4,026,250	4,173,777	4,298,569	4,431,816	4,601,813	4,716,303	4,939,464	5,029,951	5,275,986	5,441,940
COST/CHARGE PER CUBIC YARD	64.42	66.78	68.78	70.91	73.63	75.46	79.03	80.48	84.42	87.07
USER FEE REVENUES	4,026,250	4,173,777	4,298,569	4,431,816	4,601,813	4,716,303	4,939,464	5,029,951	5,275,986	5,441,940

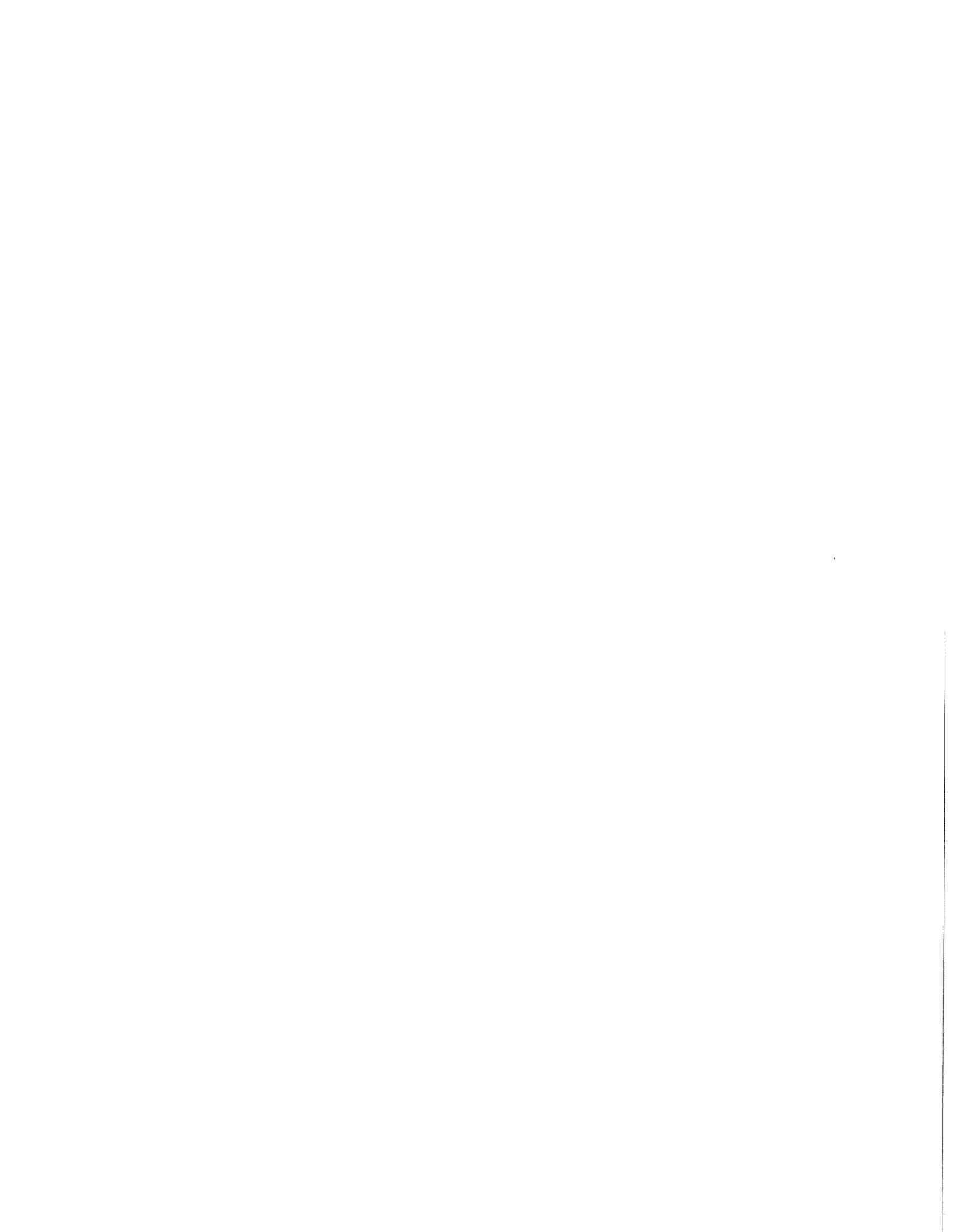


TABLE 5: NEARSHORE SATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION										
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377	1,601,377
F.A. ACCOUNT	54,950	54,950	54,950	54,950	54,950	54,950	54,950	54,950	54,950	54,950
CONSTRUCTION RESERVE	3,633,171	3,814,830	4,005,571	4,205,850	4,416,142	4,636,950	4,868,797	5,112,237	0	0
OPERATION										
Disposal/O&M/Administration	118,443	192,273	130,583	211,981	143,968	233,709	158,725	257,665	174,994	284,075
Monitoring	192,429	119,733	212,152	132,006	233,898	145,537	257,873	160,454	284,305	176,901
Contingency 15%	46,631	46,801	51,410	51,598	56,680	56,887	62,490	62,718	68,895	69,146
TOTAL COSTS	5,647,001	5,829,965	6,056,045	6,257,763	6,507,016	6,729,410	7,004,211	7,249,401	2,184,521	2,186,450
COST/CHARGE PER CUBIC YARD	90.35	93.28	96.90	100.12	104.11	107.67	112.07	115.99	34.95	34.98
USER FEE REVENUES	5,647,001	5,829,965	6,056,045	6,257,763	6,507,016	6,729,410	7,004,211	7,249,401	2,184,521	2,186,450

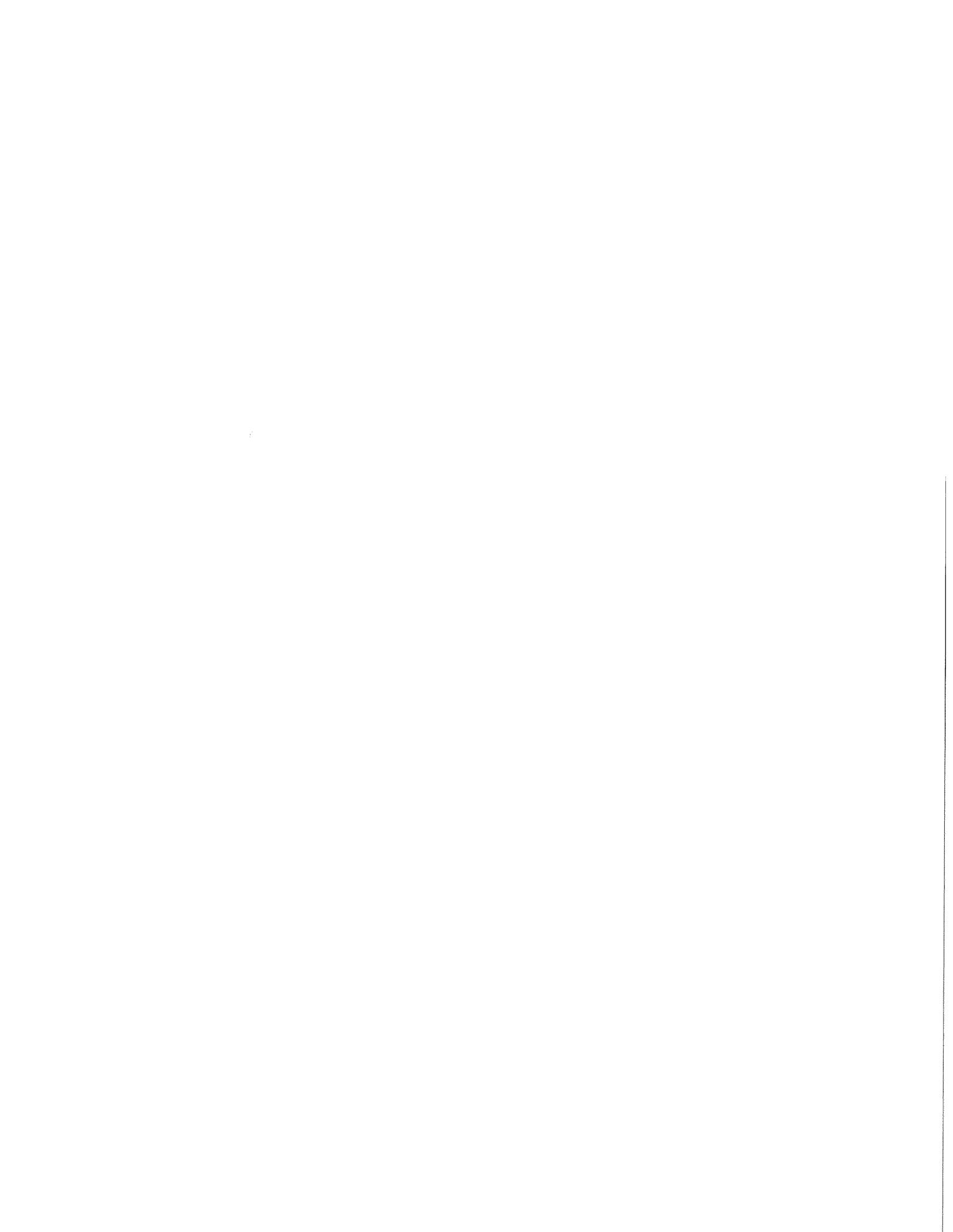


TABLE 6: NEARSHORE SATURATED DISPOSAL, PRIVATE FINANCING

PARAMETERS	ASSUMPTION	SOURCE
Loan Terms:		
Number of Borrowings	1	assumption
Borrowing Rate	13.00%	prime rate + 2%
Financing Costs--% of Principal	2.00%	usual terms
Debt Period, Years	15	usual terms
Borrowed Amount--% of Year 0 Costs	90.00%	usual terms
Equity Contribution--% of Year 0	10.00%	usual terms
Loan Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Cost Analysis Paper
Site Acquisition	7,318,080	Cost Analysis Paper
Site Preparation	3,750	Cost Analysis Paper
Berm Construction	2,841,370	Cost Analysis Paper
Monitoring Wells	9,000	Cost Analysis Paper
Design & Permitting	508,743	Cost Analysis Paper
Mobilization/Engineering/Admin	2,474,057	Cost Analysis Paper
Habitat Mitigation	537,500	Cost Analysis Paper
Contingency	2,087,625	Cost Analysis Paper
Total Year 0 Costs	16,005,125	Cost Analysis Paper
Equity Contribution	1,600,513	calculation
Total Borrowing	14,404,613	calculation
Level Debt Payments	2,228,995	calculation
Profit Margin	10.00%	return on equity + profi
Construction Reserve Account (for periodic construction costs, monthly contribution is invested at beginning of month, compounded monthly; withdrawal is made at end of withdrawal period):		
Investment Rate, Reserve Account	9.15%	one year CD rate
Withdrawal Period, years	2	based on cost projection
Biennial Costs Thru Year 18:		
Site Preparation	3,750	
Berm Construction	2,841,370	
Monitoring Wells	9,000	Cost Analysis Paper
Habitat Mitigation	537,500	Cost Analysis Paper
Cell Capping Thru Yr. 20	676,076	Cost Analysis Paper
Contingency 15%	610,154	calculation
Total Biennial Costs	4,677,850	calculation
Total Annual Contribution	2,124,240	mthly X 12 (footnote 2)
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment Rate for Trust Fund	11.15%	one year CD + 2%
Trust Fund Term, years	20	assumption
Post Closure Term, years	10	PTI and DOE
Discount Rate, Years 21-30	7.50%	public cost of capital
Year 20 Reserve Requirement	\$3,525,755	calculation (footnote 1)
F.A. Account Annual Payment	\$48,570	calculation (footnote 2)



TABLE 6: NEARSHORE SATURATED DISPOSAL, PRIVATE FINANCING

FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:
 Year 20 Reserve Requirement = \$3,525,755 (Year 20 NPV of inflated costs)

Post Closure Costs*
 Year 1989 Dollars Inflated

	Year 1989 Dollars	Inflated
21	209,129	582,626
22	142,041	415,507
23	185,169	568,751
24	142,041	458,096
25	161,209	545,911
26	144,511	513,835
27	122,873	458,741
28	142,041	556,819
29	122,873	505,762
30	122,873	531,050

* Source: Cost Analysis Issue Paper

2. Calculation of Reserve Account Contributions: (1989 Dollars)

Construction Reserve:		F.A. Account:	
Mthly Pymt	\$177,020	Annual Pymt	\$48,570

Month	Cumulative	Year	Cumulative
1	178,370	1	53,986
2	358,100	2	113,990
3	539,200	3	180,686
4	721,681	4	254,818
5	905,554	5	337,216
6	1,090,828	6	428,801
7	1,277,516	7	530,598
8	1,465,626	8	643,745
9	1,655,172	9	769,508
10	1,846,162	10	909,294
11	2,038,609	11	1,064,666
12	2,232,523	12	1,237,361
13	2,427,916	13	1,429,313
14	2,624,798	14	1,642,667
15	2,823,182	15	1,879,810
16	3,023,079	16	2,143,394
17	3,224,500	17	2,436,368
18	3,427,456	18	2,762,008
19	3,631,960	19	3,123,958
20	3,838,024	20	3,526,265
21	4,045,659		
22	4,254,876		
23	4,465,690		
24	4,678,110		

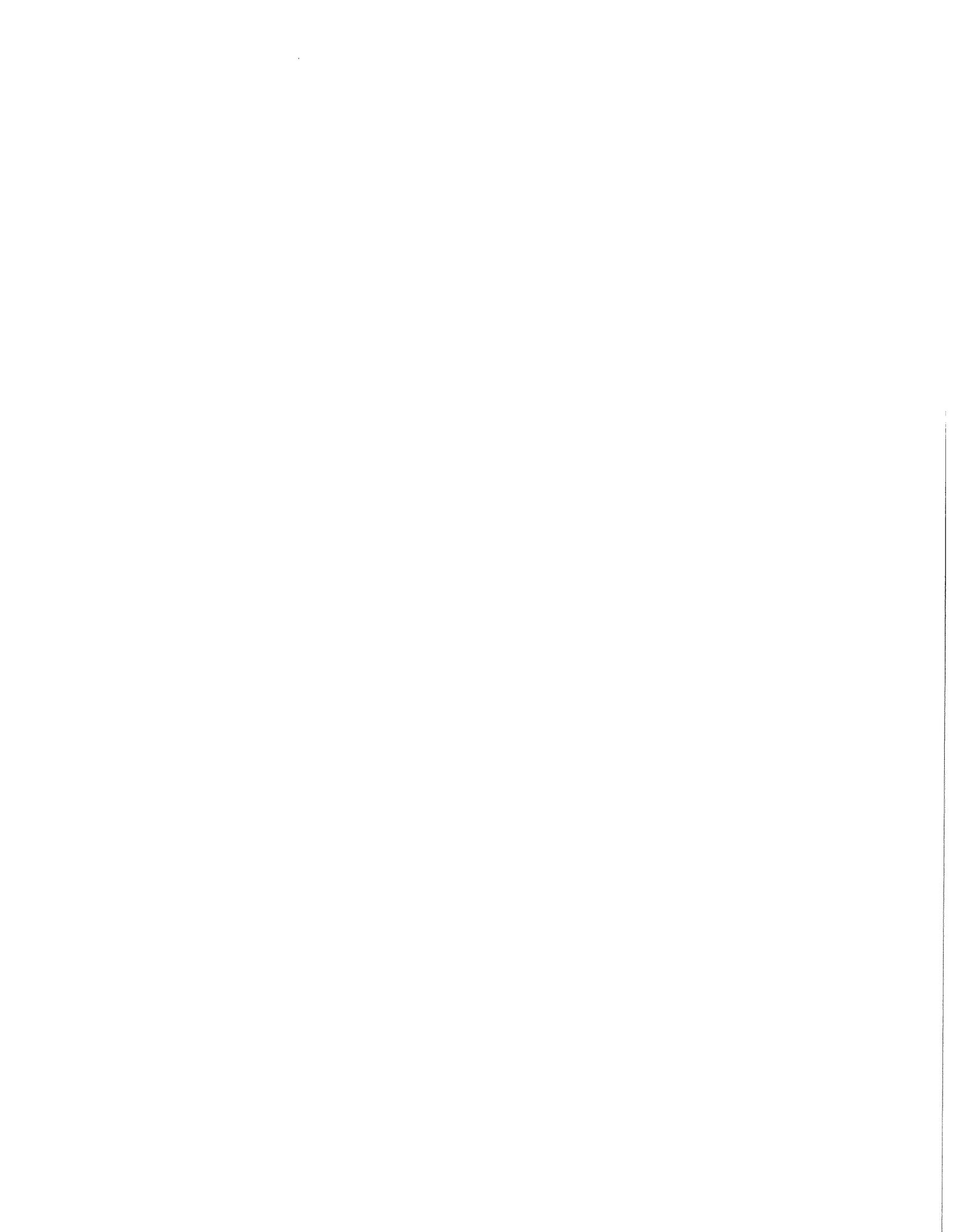


TABLE 6: NEARSHORE SATURATED DISPOSAL, PRIVATE FINANCING

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995
F.A. ACCOUNT	48,570	48,570	48,570	48,570	48,570	48,570	48,570	48,570	48,570	48,570
CONSTRUCTION RESERVE	2,230,452	2,341,975	2,459,073	2,582,027	2,711,128	2,846,685	2,989,019	3,138,470	3,295,393	3,460,163
OPERATION										
Disposal/O&M/Administration	68,775	115,834	77,271	127,707	86,787	140,797	97,443	155,229	107,431	174,398
Monitoring	52,504	36,753	82,005	40,520	117,002	44,673	158,311	49,252	174,538	108,602
Contingency 15%	18,192	22,888	23,891	25,234	30,568	27,821	38,363	30,672	42,295	42,450
TOTAL COSTS	4,647,488	4,795,015	4,919,807	5,053,054	5,223,051	5,337,541	5,560,702	5,651,189	5,897,224	6,063,178
PROFIT	464,749	479,502	491,981	505,305	522,305	533,754	556,070	565,119	589,722	606,318
COST/CHARGE PER CUBIC YARD	81.80	84.39	86.59	88.93	91.93	93.94	97.87	99.46	103.79	106.71
USER FEE REVENUES	5,112,237	5,274,517	5,411,787	5,558,359	5,745,356	5,871,295	6,116,772	6,216,308	6,486,946	6,669,495



TABLE 6: NEARSHORE SATURATED DISPOSAL, PRIVATE FINANCING

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995	2,228,995
F.A. ACCOUNT	48,570	48,570	48,570	48,570	48,570	48,570	48,570	48,570	48,570	48,570
CONSTRUCTION RESERVE	3,633,171	3,814,830	4,005,571	4,205,850	4,416,142	4,636,950	4,868,797	5,112,237	700,155	755,162
OPERATION										
Disposal/O&M/Administration	118,443	192,273	130,583	211,981	143,968	233,709	158,725	257,665	174,994	284,075
Monitoring	192,429	119,733	212,152	132,006	233,898	145,537	257,873	160,454	284,305	176,901
Contingency 15%	46,631	46,801	51,410	51,598	56,680	56,887	62,490	62,718	68,895	69,146
TOTAL COSTS	6,268,239	6,451,203	6,677,283	6,879,001	7,128,254	7,350,648	7,625,449	7,870,639	3,505,913	3,542,850
PROFIT	626,824	645,120	667,728	687,900	712,825	735,065	762,545	787,064	350,591	354,285
COST/CHARGE PER CUBIC YARD	110.32	113.54	117.52	121.07	125.46	129.37	134.21	138.52	61.70	62.35
USER FEE REVENUES	6,895,062	7,096,323	7,345,011	7,566,901	7,841,079	8,085,713	8,387,994	8,657,703	3,856,505	3,897,135

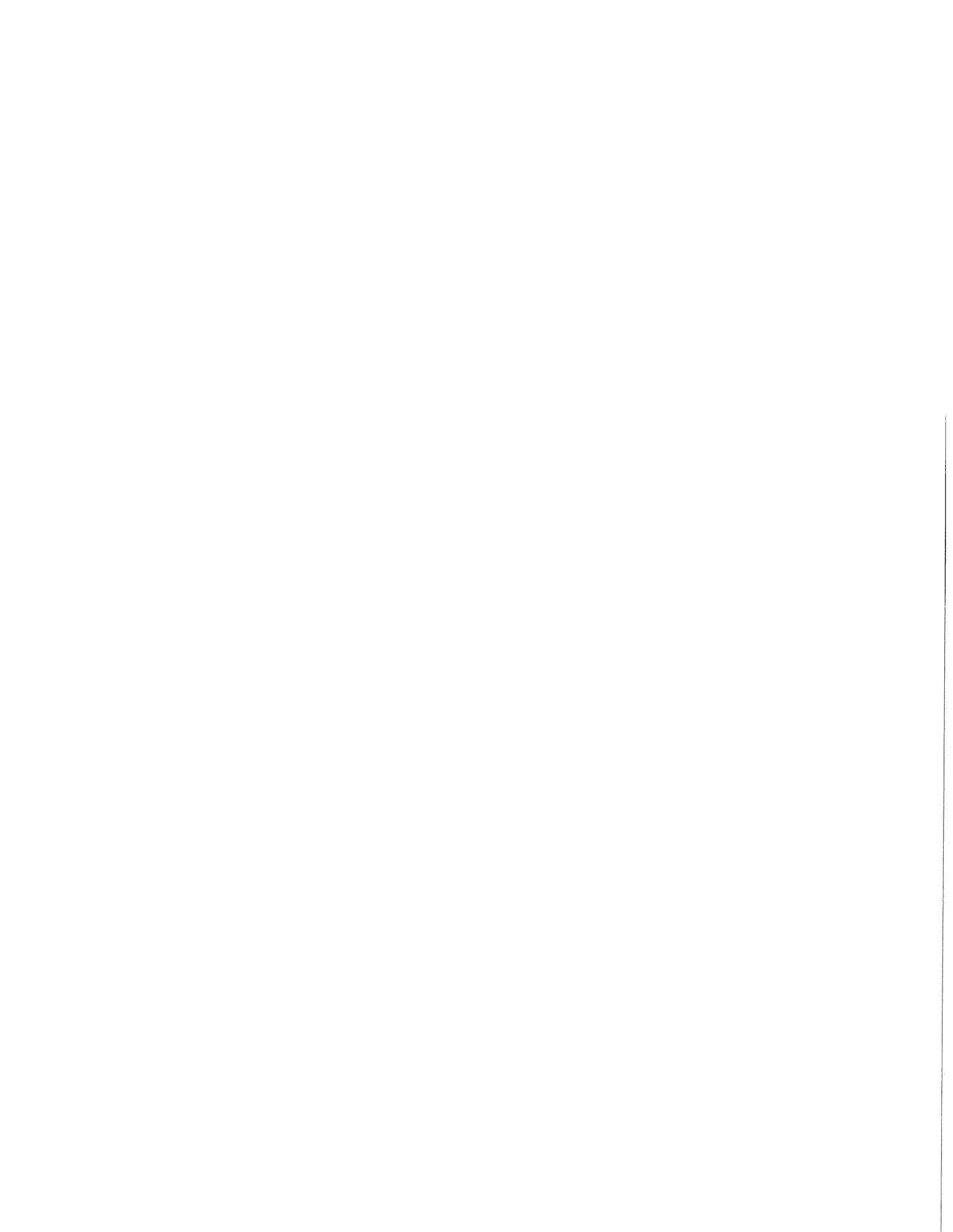


TABLE 7: NEARSHORE UNSATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

TABLE 7: NEARSHORE UNSATURATED DISPOSAL, TAX EXEMPT REVENUE BOND FINANCING

PARAMETERS	ASSUMPTIONS	SOURCE
Tax Exempt Borrowing:		
Number of Borrowings	1	assumption
Bond Rate	7.50%	Revenue Bond Index, 5/89
Financing Costs, % of Principal	2.00%	usual terms
Debt Period, years	20	usual terms
Borrowed Amount, % of Year 0 Costs	100.00%	usual terms
Borrowing Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Costs Analysis Paper
Site Acquisition	4,573,800	Costs Analysis Paper
Site Preparation	6,250	Costs Analysis Paper
Berm Construction	3,013,575	Costs Analysis Paper
Monitoring Wells	9,667	Costs Analysis Paper
Design & Permitting	353,279	Costs Analysis Paper
Mobilization/Engineering/Admin	1,413,117	Costs Analysis Paper
Habitat Mitigation	895,833	Costs Analysis Paper
Contingency	1,573,578	Costs Analysis Paper
Total Year 0 Costs	12,064,099	
Financing Costs	241,282	calculation
Total Borrowing	12,305,381	calculation
Level Debt Payments	1,207,062	calculation
Construction Reserve Account (for periodic construction costs, monthly contribution is invested at beginning of month, compounded monthly; withdrawal is made at end of withdrawal period):		
Investment rate	9.15%	one year CD
Withdrawal period thru year 16, year	3	Cost Analysis Paper
Triennial Costs:		
Site Preparation	6,250	Cost Analysis Paper
Berm Construction	3,013,575	Cost Analysis Paper
Monitoring Wells	9,667	Cost Analysis Paper
Habitat Mitigation	895,833	Cost Analysis Paper
Cell Capping	158,981	Cost Analysis Paper
Contingency 15%	612,646	calculation
Total Triennial Costs	4,696,952	calculation
Annual contribution	1,356,240	mtly X 12 (footnote 2)
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment Rate for Trust Fund	10.15%	one year CD + 1%
Trust Fund Term, years	20	assumption
Post Closure Term, years	10	PTI and DOE
Discount rate	7.50%	public cost of capital
Year 20 Reserve Requirement	\$3,544,569	calculation (footnote 1)
F.A. Account Annual Payment	\$55,240	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89



TABLE 7: NEARSHORE UNSATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:

Year 20 Reserve Requirement = 3,544,569

Post Closure Costs
Year 1989 Dollars Inflated

21	186,908	520,719
22	129,404	378,540
23	210,869	647,689
24	129,404	417,341
25	129,404	438,208
26	129,404	460,117
27	186,908	697,814
28	129,404	507,279
29	148,572	611,542
30	129,404	559,276

* Monitoring, Site Maintenance/Admin, Contingency

2. Calculation of Reserve Account Contributions

Construction Reserve
Mthly Pymt 113,020

F.A. Account:
Annual Pymt 55,240

Month	Cumulative	Month	Cumulative	Year	Cumulative
1	113,882	19	2,318,858	1	60,847
2	228,632	20	2,450,421	2	127,870
3	344,257	21	2,582,987	3	201,695
4	460,764	22	2,716,564	4	283,014
5	578,159	23	2,851,159	5	372,587
6	696,449	24	2,986,781	6	471,251
7	815,641	25	3,123,437	7	579,930
8	935,742	26	3,261,135	8	699,640
9	1,056,759	27	3,399,883	9	831,501
10	1,178,699	28	3,539,689	10	976,745
11	1,301,568	29	3,680,561	11	1,136,731
12	1,425,374	30	3,822,507	12	1,312,956
13	1,550,125	31	3,965,535	13	1,507,068
14	1,675,826	32	4,109,654	14	1,720,882
15	1,802,486	33	4,254,872	15	1,956,399
16	1,930,112	34	4,401,198	16	2,215,820
17	2,058,711	35	4,548,638	17	2,501,573
18	2,188,290	36	4,697,204	18	2,816,329
				19	3,163,033
				20	3,544,928

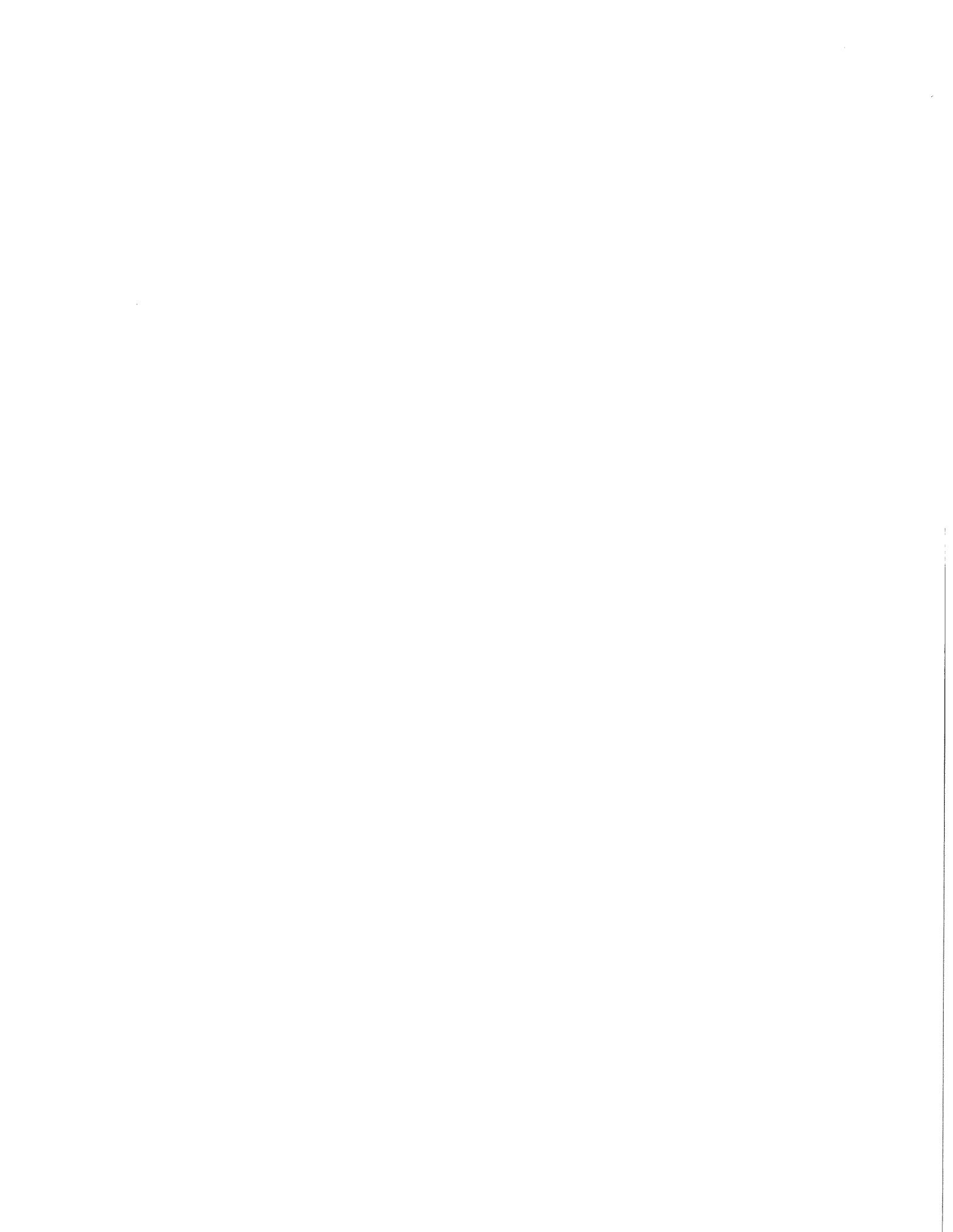


TABLE 7: NEARSHORE UNSATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062
F.A. ACCOUNT	55,240	55,240	55,240	55,240	55,240	55,240	55,240	55,240	55,240	55,240
CONSTRUCTION RESERVE	1,424,052	1,495,255	1,570,017	1,648,518	1,730,944	1,817,491	1,908,366	2,003,784	2,103,973	2,209,172
OPERATION										
Disposal/O&M	164,063	172,266	180,879	189,923	199,419	209,390	219,859	230,852	242,395	254,515
Administration	12,994	23,058	14,326	13,826	29,564	15,244	20,227	32,746	19,198	23,823
Monitoring	52,504	36,753	57,886	40,520	90,411	44,673	117,268	80,035	77,573	142,540
Contingency 15%	34,434	34,811	37,964	36,640	47,909	40,396	53,603	51,545	50,875	63,132
TOTAL COSTS	2,950,348	3,024,444	3,123,373	3,191,730	3,360,548	3,389,496	3,581,625	3,661,265	3,756,315	3,955,482
COST/CHARGE PER CUBIC YARD	47.21	48.39	49.97	51.07	53.77	54.23	57.31	58.58	60.10	63.29
USER FEE REVENUES	2,950,348	3,024,444	3,123,373	3,191,730	3,360,548	3,389,496	3,581,625	3,661,265	3,756,315	3,955,482

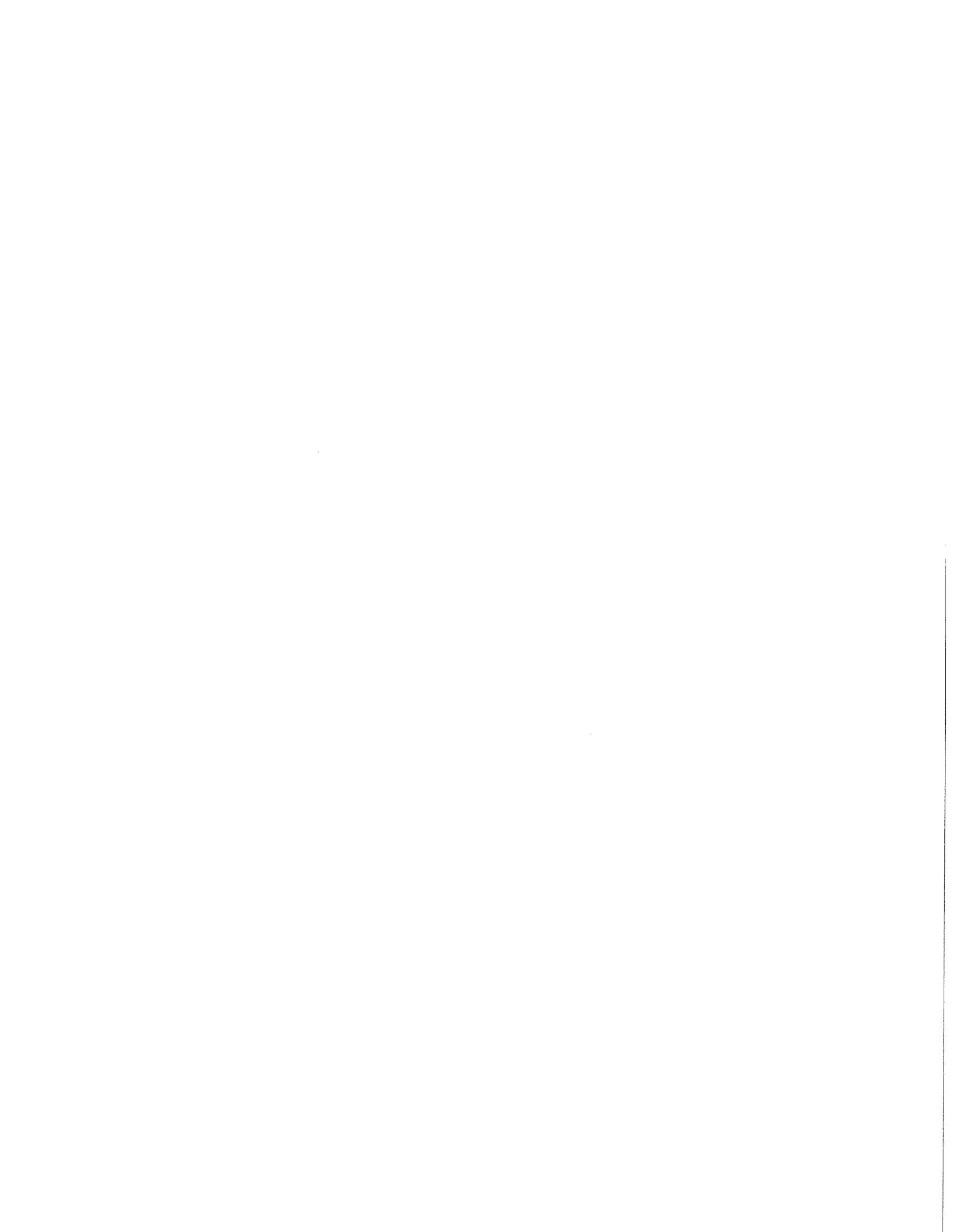


TABLE 7: NEARSHORE UNSATURATED DISPOSAL, TAX EXEMPT REVENUE BONDS

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062	1,207,062
F.A. ACCOUNT	55,240	55,240	55,240	55,240	55,240	55,240	55,240	55,240	55,240	55,240
CONSTRUCTION RESERVE	2,319,631	2,435,612	2,557,393	2,685,262	2,819,526	2,960,502	0	0	0	0
OPERATION										
Disposal/O&M	267,241	280,603	294,633	309,364	324,833	341,074	358,128	376,034	394,836	414,578
Administration	23,303	37,559	25,692	24,997	45,558	30,287	28,364	30,384	36,325	55,491
Monitoring	121,159	59,867	133,577	107,255	103,955	163,729	114,610	130,369	210,596	88,450
Contingency 15%	61,755	56,704	68,085	66,242	71,152	80,264	75,165	80,518	96,264	83,778
TOTAL COSTS	4,055,390	4,132,646	4,341,682	4,455,422	4,627,324	4,838,157	1,838,569	1,879,607	2,000,322	1,904,599
COST/CHARGE PER CUBIC YARD	64.89	66.12	69.47	71.29	74.04	77.41	29.42	30.07	32.01	30.47
USER FEE REVENUES	4,055,390	4,132,646	4,341,682	4,455,422	4,627,324	4,838,157	1,838,569	1,879,607	2,000,322	1,904,599

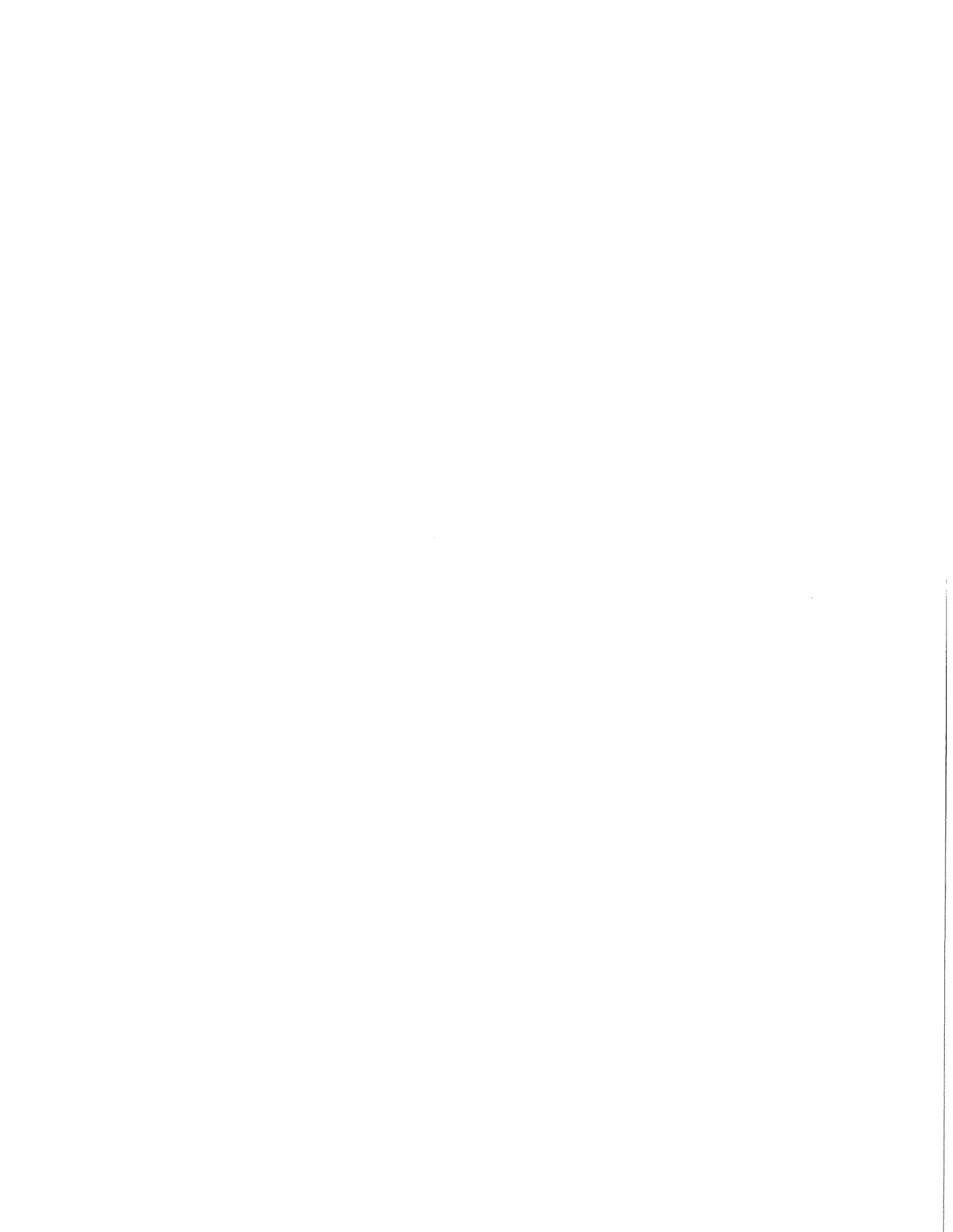


TABLE 8: NEARSHORE UNSATURATED DISPOSAL, PRIVATE FINANCING

PARAMETERS	ASSUMPTION	SOURCE
Loan Terms:		
Number of Borrowings	1	assumption
Borrowing Rate	13.00%	prime rate + 2%
Financing Costs--% of Principal	2.00%	usual terms
Debt Period, Years	15	usual terms
Borrowed Amount--% of Year 0 Costs	90.00%	usual terms
Equity Contribution--% of Year 0	10.00%	usual terms
Loan Amount:		
Year 0 Construction Costs:		
Site Survey/Sel./Test	225,000	Cost Analysis Paper
Site Acquisition	4,573,800	Cost Analysis Paper
Site Preparation	6,250	Cost Analysis Paper
Berm Construction	3,013,575	Cost Analysis Paper
Monitoring Wells	9,667	Cost Analysis Paper
Design & Permitting	353,279	Cost Analysis Paper
Mobilization/Engineering/Admin	1,413,117	Cost Analysis Paper
Habitat Mitigation	895,833	Cost Analysis Paper
Contingency	1,573,578	Cost Analysis Paper
Total Year 0 Costs	12,064,099	Cost Analysis Paper
Equity Contribution	1,206,410	calculation
Total Borrowing	10,857,689	calculation
Level Debt Payments	1,680,138	calculation
Profit Margin	10.00%	return on equity + profi
Construction Reserve Account (for periodic construction costs, monthly contribution is invested at beginning of month, compounded monthly; withdrawal is made at end of withdrawal period):		
Investment rate, Reserve Account	9.15%	one year CD rate
	3	based on cost projection
Triennial Costs:		
Site Preparation	6,250	
Berm Construction	3,013,575	
Monitoring Wells	9,667	Cost Analysis Paper
Habitat Mitigation	895,833	Cost Analysis Paper
Cell Capping	158,981	Cost Analysis Paper
Contingency 15%	612,646	calculation
Total Triennial Costs	4,696,952	calculation
Total Annual Contribution	1,356,240	mthly X 12 (footnote 2)
Financial Assurance (F.A.) Account (for post closure costs, an amount is deposited to trust account at beginning of each year, investment is compounded annually):		
Investment Rate for Trust Fund	11.15%	one year CD + 2%
Trust Fund Term, years	20	assumption
Post Closure Term, years	10	PTI and DOE
Discount Rate, Years 21-30	7.50%	public cost of capital
Year 20 Reserve Requirement	\$3,544,569	calculation (footnote 1)
F.A. Account Annual Payment	\$48,830	calculation (footnote 2)
Annual Rate of Inflation	5.00%	CPI U Mar 88 - Mar 89

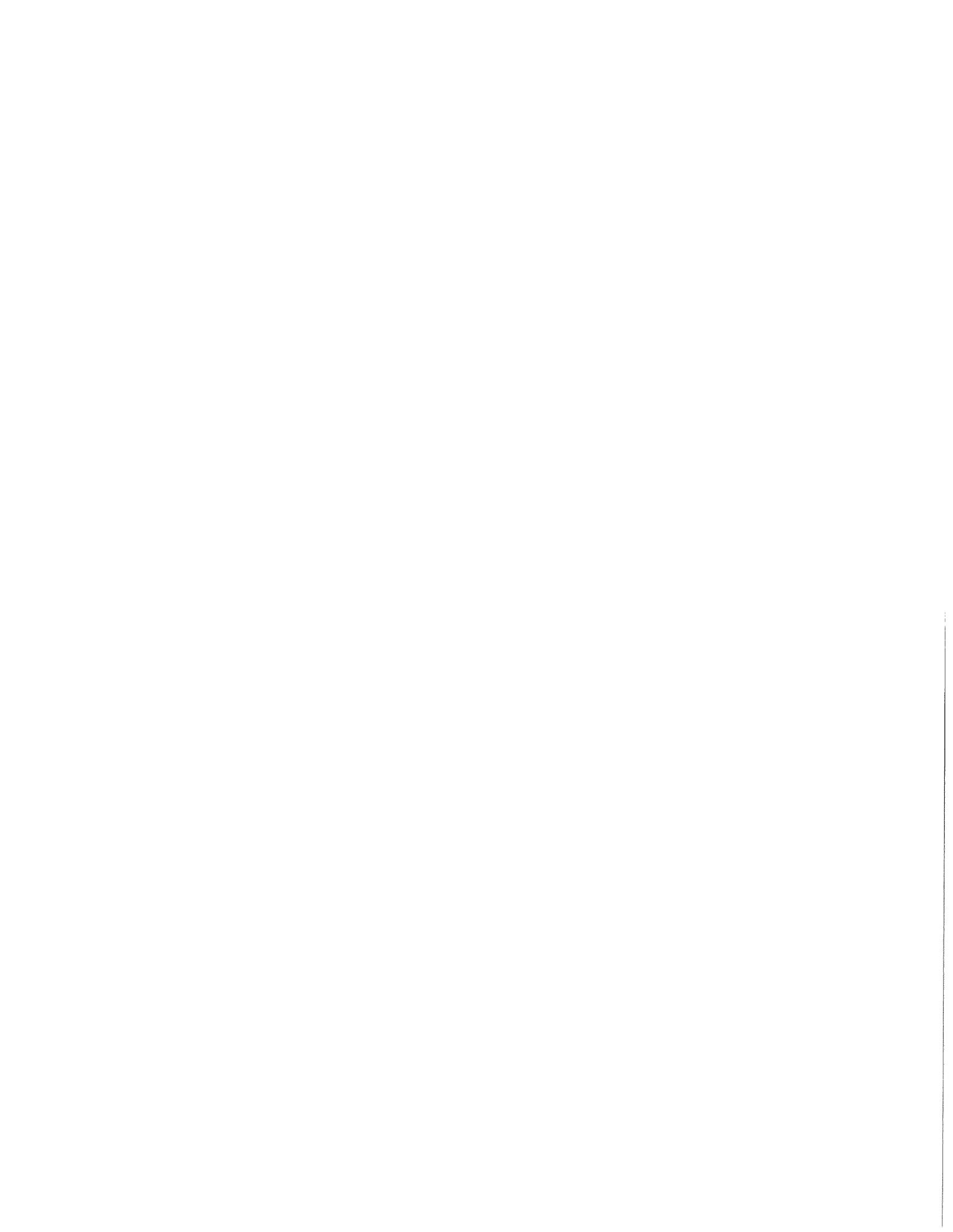


TABLE 8: NEARSHORE UNSATURATED DISPOSAL, PRIVATE FINANCING

FOOTNOTES

1. Calculation of Year 20 reserve requirement for post closure costs:
 Year 20 Reserve Requirement = \$3,544,569 (Year 20 NPV of inflated costs)

Year	Post Closure Costs*	
	1989 Dollars	Inflated
21	186,908	520,719
22	129,404	378,540
23	210,869	647,689
24	129,404	417,341
25	129,404	438,208
26	129,404	460,117
27	186,908	697,814
28	129,404	507,279
29	148,572	611,542
30	129,404	559,276

* Source: Cost Analysis Issue Paper

2. Calculation of Reserve Account Contributions: (1989 Dollars)

Construction Reserve:				F.A. Account:	
Mthly Pymt \$113,020				Annual Pymt \$48,830	
Month	Cumulative	Month	Cumulative	Year	Cumulative
1	113,882	19	2,318,858	1	54,275
2	228,632	20	2,450,421	2	114,601
3	344,257	21	2,582,987	3	181,653
4	460,764	22	2,716,564	4	256,182
5	578,159	23	2,851,159	5	339,021
6	696,449	24	2,986,781	6	431,096
7	815,641	25	3,123,437	7	533,438
8	935,742	26	3,261,135	8	647,191
9	1,056,759	27	3,399,883	9	773,627
10	1,178,699	28	3,539,689	10	914,161
11	1,301,568	29	3,680,561	11	1,070,365
12	1,425,374	30	3,822,507	12	1,243,985
13	1,550,125	31	3,965,535	13	1,436,964
14	1,675,826	32	4,109,654	14	1,651,460
15	1,802,486	33	4,254,872	15	1,889,872
16	1,930,112	34	4,401,198	16	2,154,868
17	2,058,711	35	4,548,638	17	2,449,410
18	2,188,290	36	4,697,204	18	2,776,794
				19	3,140,681
				20	3,545,141

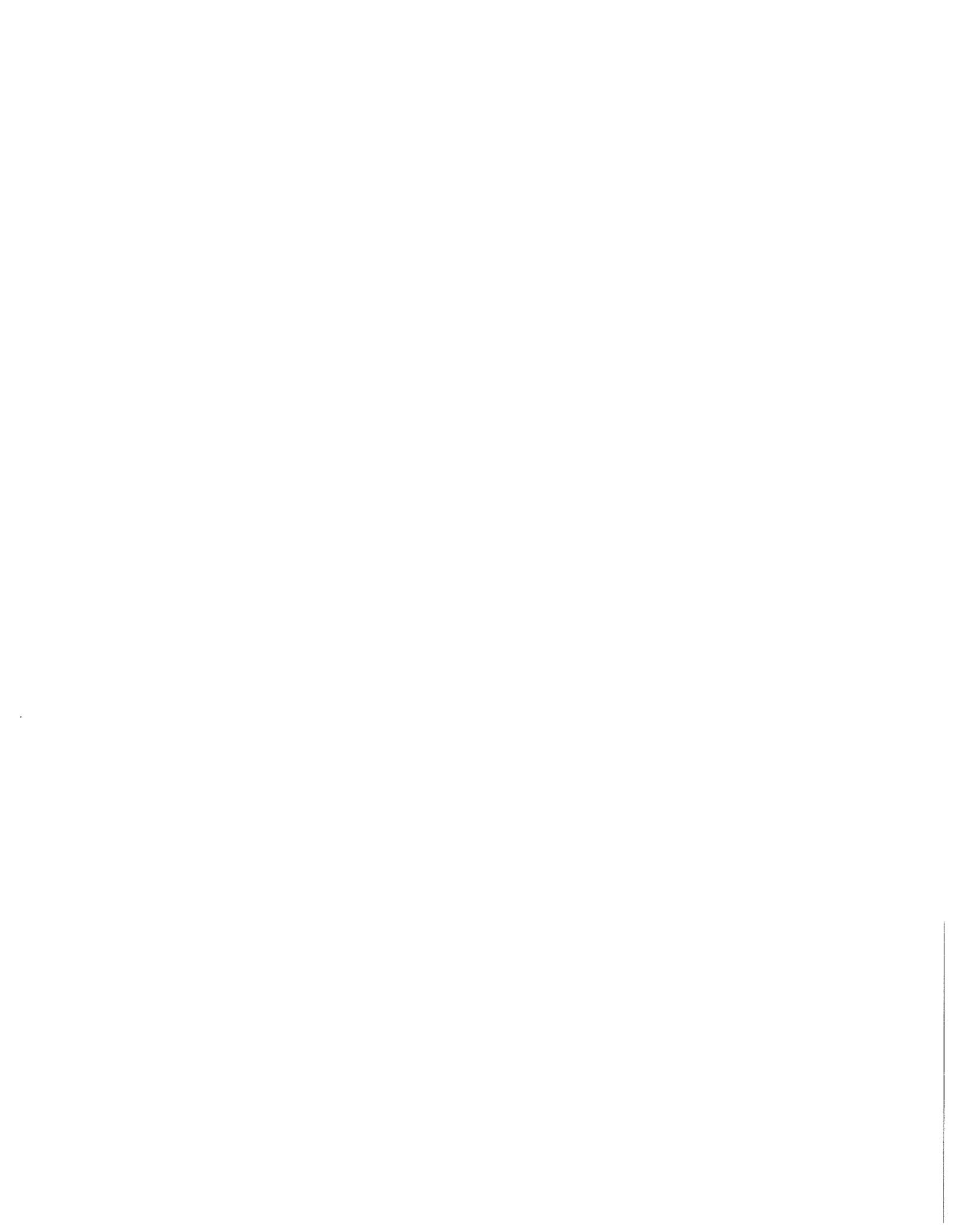


TABLE 8: NEARSHORE UNSATURATED DISPOSAL, PRIVATE FINANCING

	1	2	3	4	5	6	7	8	9	10
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138
F.A. ACCOUNT	48,830	48,830	48,830	48,830	48,830	48,830	48,830	48,830	48,830	48,830
CONSTRUCTION RESERVE	1,424,052	1,495,255	1,570,017	1,648,518	1,730,944	1,817,491	1,908,366	2,003,784	2,103,973	2,209,172
OPERATION										
Disposal/O&M	164,063	172,266	180,879	189,923	199,419	209,390	219,859	230,852	242,395	254,515
Administration	12,994	23,058	14,326	13,826	29,564	15,244	20,227	32,746	19,198	23,823
Monitoring	52,504	36,753	57,886	40,520	90,411	44,673	117,268	80,035	77,573	142,540
Contingency 15%	34,434	34,811	37,964	36,640	47,909	40,396	53,603	51,545	50,875	63,132
TOTAL COSTS	3,417,015	3,491,110	3,590,039	3,658,396	3,827,215	3,856,162	4,048,291	4,127,931	4,222,982	4,422,149
PROFIT	341,701	349,111	359,004	365,840	382,721	385,616	404,829	412,793	422,298	442,215
COST/CHARGE PER CUBIC YARD	60.14	61.44	63.18	64.39	67.36	67.87	71.25	72.65	74.32	77.83
USER FEE REVENUES	3,758,716	3,840,221	3,949,043	4,024,236	4,209,936	4,241,779	4,453,121	4,540,725	4,645,280	4,864,364

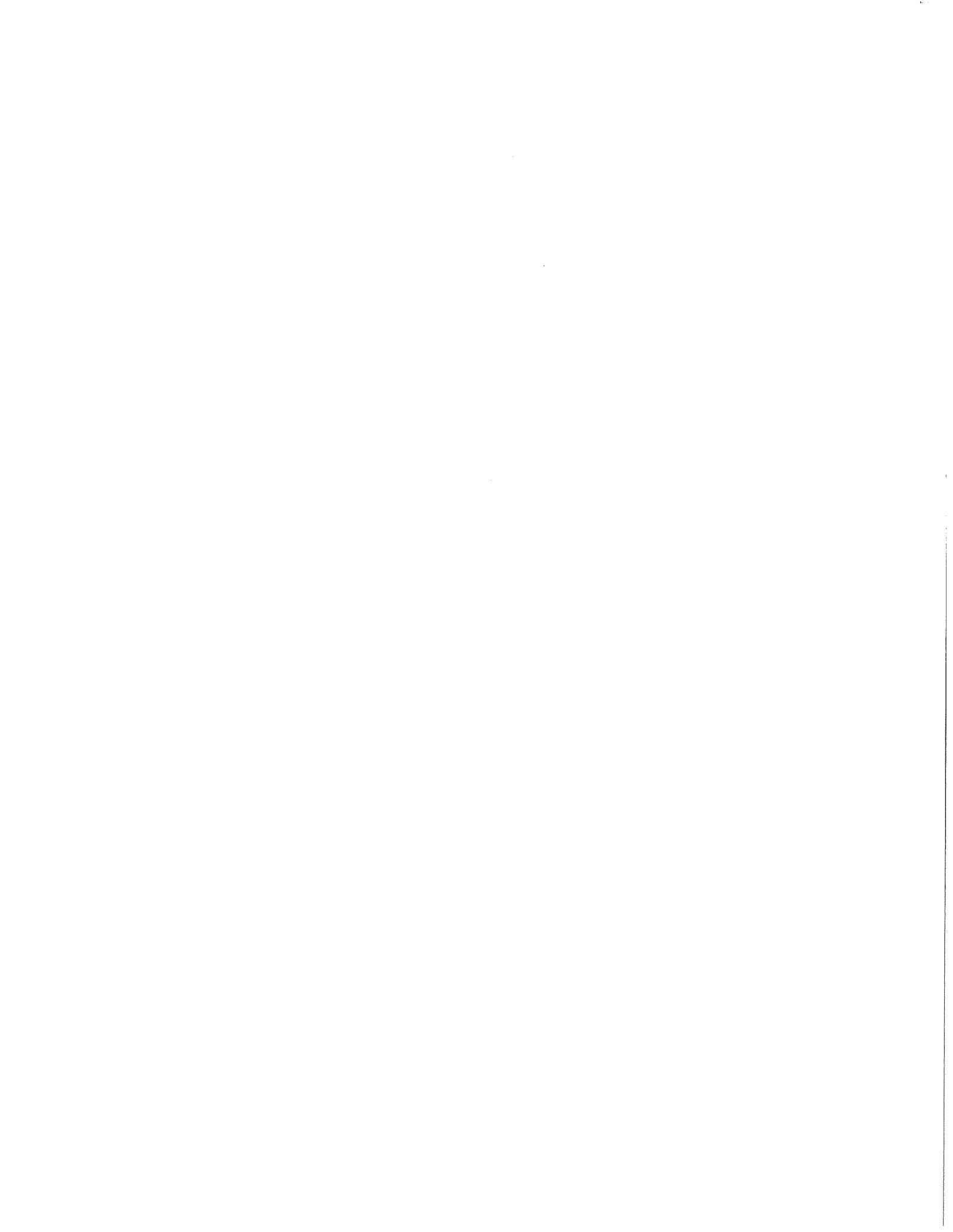


TABLE 8: NEARSHORE UNSATURATED DISPOSAL, PRIVATE FINANCING

	11	12	13	14	15	16	17	18	19	20
20 YEAR FUNDING W/ INFLATION	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
SEDIMENT VOLUMES (cubic yards)	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500
FACILITY COSTS:										
DEBT PAYMENT	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138	1,680,138
F.A. ACCOUNT	48,830	48,830	48,830	48,830	48,830	48,830	48,830	48,830	48,830	48,830
CONSTRUCTION RESERVE	2,319,631	2,435,612	2,557,393	2,685,262	2,819,526	2,960,502	0	0	0	0
OPERATION										
Disposal/O&M	267,241	280,603	294,633	309,364	324,833	341,074	358,128	376,034	394,836	414,578
Administration	23,303	37,559	25,692	24,997	45,558	30,287	28,364	30,384	36,325	55,491
Monitoring	121,159	59,867	133,577	107,255	103,955	163,729	114,610	130,369	210,596	88,450
Contingency 15%	61,755	56,704	68,085	66,242	71,152	80,264	75,165	80,518	96,264	83,778
TOTAL COSTS	4,522,057	4,599,312	4,808,348	4,922,089	5,093,990	5,304,824	2,305,235	2,346,273	2,466,989	2,371,265
PROFIT	452,206	459,931	480,835	492,209	509,399	530,482	230,524	234,627	246,699	237,127
COST/CHARGE PER CUBIC YARD	79.59	80.95	84.63	86.63	89.65	93.36	40.57	41.29	43.42	41.73
USER FEE REVENUES	4,974,262	5,059,243	5,289,183	5,414,298	5,603,389	5,835,306	2,535,759	2,580,900	2,713,687	2,608,392

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