# APPENDIX IX

# AN INDEPENDENT COST ASSESSMENT OF THE NATION'S HIGH-LEVEL NUCLEAR WASTE PROGRAM

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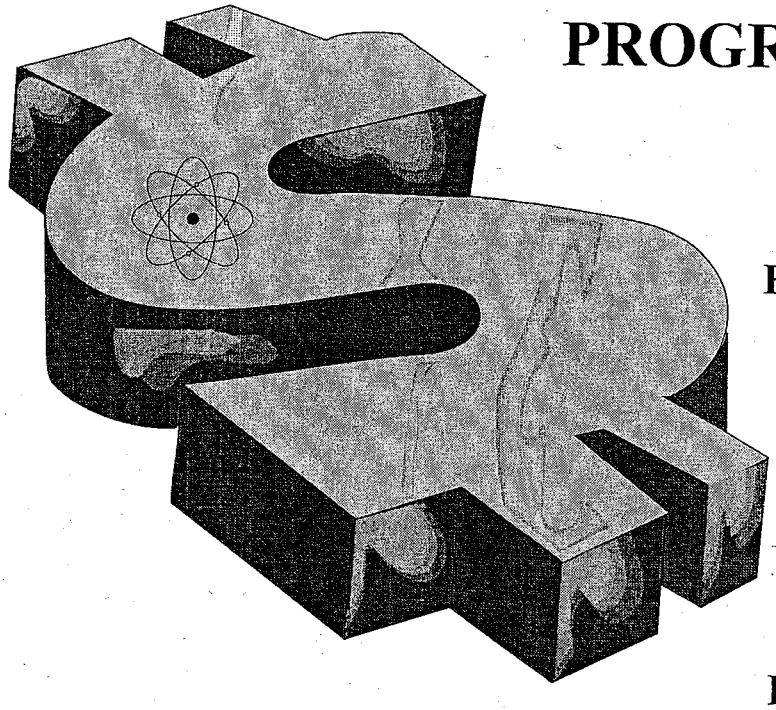

**February 1998**

**By**

*PLANNING INFORMATION CORPORATION*
*THOMPSON PROFESSIONAL GROUP*
*DECISION RESEARCH INSTITUTE*

**Review of Findings By**
**KPMG Peat Marwick**

## Preface

In 1996, the U.S. Department of Energy (DOE) announced plans to prepare, by late 1998, a "Viability Assessment" as a tool for managing and making decision about the federal high-level radioactive waste program, in particular the proposed Yucca Mountain nuclear waste repository. One component of the Viability Assessment was to be an assessment of the total cost of the federal program, something that has been and continues to be plagued by great uncertainty due to the changing and evolving nature of the program since 1983.

In order to effectively evaluate the accuracy and appropriateness of the Viability Assessment's findings, the State of Nevada commissioned an independent study of likely costs associated with accepting spent fuel and high-level radioactive wastes at generator sites, transporting the material to Nevada, and ultimately disposing of it in a repository. The report which follows grew out of this effort. However, as the project progressed, it became apparent that the data and findings have applicability and importance far beyond the narrow confines of DOE's Viability Assessment.

To undertake this project, it was necessary to make determinations about what the reference waste management system would consist of and how it will operate. Toward that end, the waste management system prescribed in pending congressional legislation was used as the report's guiding framework. Consequently, the assumptions in this independent cost assessment report reflect the legislation's provisions regarding schedules and time frames, DOE responsibility for at-reactor storage pending shipment, waste acceptance activities, transportation planning and emergency preparedness, shipping assumptions and intermodal transportation, centralized interim storage, repository disposal, and other related aspects of the system.

To assure that the report's contents and finds would be as accurate and objective as possible, a team of independent consultants was employed to gather information, analyze the data, and develop the ultimate cost conclusions. The accounting firm of KPMG Peat Marwick was commissioned to provide expert peer review for the effort.

The result of this extraordinary independent undertaking is a comprehensive and timely evaluation of the real costs to the nation of the federal high-level nuclear waste program - not just the Yucca Mountain repository component - and the potential taxpayer liability the country will incur as that program moves forward.

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April 23, 1998

Mr. Robert R. Loux
Executive Director
Nevada Agency for Nuclear Projects
1802 N. Carson Street, Suite 252
Carson City, Nevada 89701

Re: Peer Review of "An Independent Cost Assessment of the Nation's High-Level Nuclear Waste Program", February 1998

Dear Mr. Loux:

Pursuant to your request, KPMG Peat Marwick LLP ("KPMG") has completed its review of "An Independent Cost Assessment of the Nation's High Level Nuclear Waste Program", February 1998 ("Study"), prepared by Planning Information Corporation, Thompson Professional Group and Decision Research Institute, and hereby submits this summary letter describing work performed and conclusions reached.

KPMG was retained to provide the agreed upon procedures of "Peer Review" of the Study, pursuant to the engagement letter dated June 4, 1997. Of the limited tasks set forth below, the calculations tested were found to be accurate, the Study's assumptions appear to be supportable, and KPMG's peer review is complete.

The agreed upon procedures which constitute the peer review include the following:

a. Review the reasonableness of Study assumptions
b. Review the cost categories and cost components for completeness
c. Review the supporting documentation
d. Test selected mathematical calculations for accuracy
e. Review the Study for internal consistency
f. Review the Study for overall consistency

To complete the above described agreed upon procedures, KPMG performed certain tasks including the following:

1. Detailed review of Study
2. Site visits and interviews with authors of various Study components including: Planning Information Corporation, Thompson Professional Group and Decision Research Institute
3. Verify calculations/assumptions in narrative and charts to underlying data
4. Verify assumptions/citations in narrative to source documents (i.e. DOE Reports)
5. Review literature and supporting materials outside the body of the Study

The procedures performed do not constitute an audit, examination or review in accordance with standards established by the American Institute of Certified Public Accountants and therefore, we do not make any representations regarding the sufficiency of the procedures performed for your informational needs. The term "review" has a defined meaning in U.S. accounting and auditing literature; however, the term "review" as used in this letter is intended to refer to obtaining and analyzing information, and does not encompass the term or scope of engagement defined in the accounting and auditing literature.

Should you have any questions or comments regarding KPMG's completion of these services, please call me at (213) 955-8994.

Sincerely,

KPMG Peat Marwick LLP

Joseph S. D'Antoni
Principal

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# 1. EXECUTIVE SUMMARY

This report presents the findings of a new, comprehensive and independent assessment of the Total System Life Cycle Costs (TSLCC) for the nation's high-level nuclear waste (HLNW) program and the proposed repository at Yucca Mountain, Nevada. This study finds that the costs will be $53.9 billion in constant 1996 dollars.

The study bases its cost evaluation on current plans by the U.S. Department of Energy, recent federal court decisions, and pending federal legislation that has the support of a majority of members in Congress. The costs include expenditures to date and estimated costs for the study, licensing, development, and operations necessary to implement the federal program.

The HLNW is produced or stored at 80 locations including commercial nuclear power stations, nuclear weapons facilities and temporary storage sites. Moving these wastes to Yucca Mountain requires an unprecedented national waste transportation program. Since the majority of the HLNW is produced or stored east of the Mississippi River, rail and highway transportation will affect residents in 43 states and more than 500 communities. This report fully takes account of the national scope of the federal government's HLNW program.

The assessment for future activities, events, and behaviors depends upon the quality of the data and the assumptions made about future conditions. This 1998 Independent Report provides details of how this new study was conducted, including the important assumptions, data sources, calculations, and considerations that have significant effects on the total cost estimate. The total cost reported here is a conservative estimate that includes a contingency margin for ordinary complications but *does not include* estimates for uncertainties that could add significant additional costs to this first-of-a-kind, century-long, and historically-troubled effort. These uncertainties—which range from the cost of extended at-reactor storage, to accidents in cross-country transportation, to the technologies of emplacement, retrieval or closure—are summarized in Table 2 and described in the body of this report.

The goal of the HLNW program is to permanently dispose of these wastes in a facility that provides geological safety for humans and the environment as long as necessary, a period of 10,000 years or more. Faced with these requirements, no country in the world has developed a HLNW disposal facility. The stringent technical requirements, the lack of any precedent in scientific, engineering, and management experience, and the need to obtain public support make any program very costly. From the very beginning of the current program during the Carter administration, up to the present day, concerns about costs have been expressed in Congress, by the nuclear power industry, and by officials of the Reagan, Bush, and Clinton administrations. In authorizing the program, Congress reserved to itself the right to annually appropriate funds for the program and it imposed requirements on the program administrators to estimate costs and revenues.

## Background to a Total System Life Cycle Cost Estimate

The Nuclear Waste Policy Act (NWPA) requires the U.S. Department of Energy (DOE) to "estimate, on an annual basis, . . . the costs required to construct and operate the repositories to be needed . . . and to carry out any other activities under this Act" (Section 310 (a) (10)) and to "evaluate whether collection of the fee [authorized in the Act] will provide sufficient revenues to offset the costs . . ." (Section 302 (a) (4). The requirements are generally referred to as the analysis of "total system life cycle costs" (TSLCC) and the Fee Adequacy Assessment. During the 15 years that the Nuclear Waste Policy Act has been in effect, DOE has prepared three reports to meet these requirements. The 1986 report estimated TSLCC for a program using a single repository in tuff (at Yucca Mountain) at $30.0 billion; the 1990 estimate was $33.5 billion; and the 1995 estimate was $34.0 billion (in constant 1996 dollars).*

## Focus on Yucca Mountain

In the Nuclear Waste Policy Act of 1982, Congress outlined a program for studying three sites simultaneously as potential locations for the nation's first HLNW repository and then developing a second repository. This would have allowed the government to choose the best of the three sites for the first repository and to achieve geographical equity by eventually developing both a western and an eastern site. Both these goals were abandoned as program requirements when the Nuclear Waste Policy Act Amendments of 1987 directed the DOE to study only the potential repository site at Yucca Mountain, Nevada. The amendments also prohibited location of an interim storage facility in Nevada. This shift in policy responded to widespread public opposition to the original program and saved the costs of site characterization studies at Hanford, Washington and Deaf Smith County, Texas. DOE estimated the savings at $7.4 billion (in constant 1996 dollars).

Progress at Yucca Mountain has been slow and difficult. Meeting U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency licensing and permitting requirements even within time lines that were extended several times appeared impossible. Therefore, DOE suggested, and Congress authorized, a preliminary judgment about the suitability of this site in the form of a "viability assessment," which is due for release by the end of September, 1998. It now appears that this viability assessment will not include a TSLCC estimate. A presentation of the viability assessment cost estimate made to the 94th meeting of the Advisory Committee on Nuclear Waste on September 25, 1997 stated that this estimate will address only the "mined geologic disposal system" and will exclude "historical costs, licensing, waste acceptance, storage, national transportation, and other costs." The preliminary estimate for this portion of the repository work was $14.8 billion. This figure does not represent a comparable base for reference with past DOE estimates of a TSLCC or the 1998 independent assessment described in this report.

Also, it should be noted, the legislation now in Congress would remove the existing prohibition and establish an interim storage facility adjacent to Yucca Mountain on the assumption that prompt removal of wastes from civilian reactors is needed and that Yucca Mountain will eventually serve as a disposal site.

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* DOE estimates have been adjusted for changes in the inventory requiring permanent disposal, as well as changes in the value of the dollar.

## The Independent Cost Assessment by Major Category

The work done for this estimate of the TSLCC for the nation's high-level nuclear waste program can be summarized in seven categories, as shown in Table 1, below.

**Table 1. Overview of Total System Life Cycle Cost by Major Cost Categories**

| Major Cost Categories | Cost (bil FY'96$) | |
|---|---|---|
| Expenditures Through Fiscal Year 1996 | | 6.1 |
| Estimated Future Costs | | 47.8 |
| 1. Onsite Storage | 4.3 | |
| 2. Cross-Country Transportation | 6.0 | |
| 3. Nevada Transportation | 3.2 | |
| 4. Centralized Interim Storage Facility | 9.2 | |
| 5. Geological Repository | 23.0 | |
| 6. Other Development and Evaluation Costs | 0.4 | |
| 7. Other Program Costs | 1.7 | |
| **Total** | | $53.9 |

Each of these categories requires a brief summary description.

1. **Onsite Storage**: These are costs incurred at the nuclear power reactors for onsite storage due to an estimated delay in pickup of spent nuclear fuel of 5 years assuming that DOE pickup begins in 2003 instead of the contractual date of 1998.

2. **Cross-Country Transportation**: This includes costs of equipment and services for highway and rail transport of all HLNW from civilian, nuclear weapons, and temporary storage facilities to Yucca Mountain.

3. **Nevada Transportation**: This includes costs to receive and transport HLNW in heavy rail casks within the State of Nevada including the development and operation of an intermodal transfer facility at Caliente, heavy-haul operations to the centralized storage facility at Area 25 near Yucca Mountain, and the construction and operation of a government-owned railroad between Caliente and Yucca Mountain.

4. **Centralized Storage Facility**: This includes the costs of site development, facility construction, and operations. It also includes the cost of metal and concrete storage systems for spent fuel arriving by legal-weight truck and by rail, and for rail shipments using dual-purpose canisters or single-purpose canisters to transport spent fuel.

5. **The Geologic Repository**: This includes the costs of design, licensing, constructing, equipping, operating, and closing the repository.

6. **Other Development and Evaluation Costs**: This includes fees paid to the U.S. Nuclear Regulatory Commission and the costs of the Nuclear Waste Technical Review Board.

7. **Other Program Costs**: This includes payments equal to taxes and benefits as provided for under the Nuclear Waste Policy Act.

All estimates in Table 1, above, include contingency, project management, and program management costs, as well as the direct costs for personnel, equipment, materials, and sub-contractor expenses.

### Summary of Assumptions for the Independent TSLCC Assessment

Where possible, this TSLCC cost assessment is similar to the 1995 DOE TSLCC report. The most notable differences are in the waste management assumptions, which reflect recent court decisions and pending Congressional legislation. This cost assessment study takes into account the similar legislative proposals of Senate Bill 104 and House Bill 1270, both of which have been passed and now await actions by a conference committee in the current Congress, and the recent court decision on DOE's contractual obligations to nuclear power utilities (Northern States Power, et al., versus USDOE, November 14, 1997).

### Uncertainties

Cost estimates for complex projects and programs traditionally include a contingency factor to allow for a range of conditions and performance within the planning parameters. This was done in the case of the 1995 DOE TSLCC estimate and in the 1998 independent TSLCC study reported here. These contingency allowances assume that the waste disposal program proceeds as expected with no major surprises or complications, and are included in the Table 1 figures, above.

In fact, as the history of the selection and site characterization process shows, many things could go wrong and produce additional costs or reduced revenues. More importantly, there are many major components to the waste program that have no precedent, and adverse conditions or events could create large potential costs. Some areas of uncertainty that could add significant costs to the program, but which are not included as in this TSLCC assessment are listed in Table 2, below. The disqualification of Yucca Mountain as a suitable site, which could occur because of adverse site conditions, or for regulatory, political, or technological reasons, would be the most dramatic, unaccounted for outcome.

### Costs and Revenues

The estimates of revenues from civilian nuclear power plants are based upon projected electric generation of existing stations, which are expected to operate in gradually reduced numbers until the year 2033, when all currently operating reactors will have completed their license terms. There is some uncertainty about operating projections since several plants already have shut down early. Early shutdowns reduce revenues on a one-to-one basis for each kilowatt of power not produced, but the reduced amount of spent fuel reduces costs only at the margin of a program that must be developed in any case. The effects of early shutdowns in reducing nuclear waste fund revenues are likely to be substantially greater than their effects in reducing program costs.

Through fiscal year 1996, the program spent $6.1 billion, 11.4 percent of the total estimated program costs. This means that expenditures to date—the "sunk costs"—are just over one-tenth of the total estimated program costs.

**Table 2. Uncertainties in the Federal Government's HLNW Program**

| Uncertainty | Commentary |
|---|---|
| 1. Inventory of HLNW | Nuclear power stations may produce less spent fuel due to early shutdowns, thus producing less revenue. Weapons complex wastes may be greater than currently estimated. |
| 2. Pickup of Spent Fuel | Pickup start dates or schedules may be delayed adding costs to the program. Courts could allocate costs to the disadvantage of the Nuclear Waste Fund. Defense waste disposal could be delayed to accommodate commercial spent fuel. |
| 3. Onsite storage | Onsite storage of spent fuel could result in a different mix of dry-cask and pool storage with costs in operations, repackaging, and ability to operate reactors. |
| 4. Canisters and Casks | Problems with the construction, performance, and maintenance of canisters and casks could introduce additional direct costs and significant indirect costs through program delays. |
| 5. Cross-Country Transportation | Transportation capacity, performance, and public or community responses could adversely affect the cross-country transportation costs. Accidents (or sabotage incidents) involving waste shipments could add direct costs for response and cleanup, and cause delays in the shipment schedule. |
| 6. Regulatory and Oversight | Licensing and permitting may delay the program. The site characterization program itself may encounter technical, budgetary, management, or personnel performance delays. |
| 7. Construction | Delays for numerous reasons are possible at the intermodal transfer facility, and in heavy-haul and rail construction, or due to unexpected conditions at the repository, adjustment of the design to meet revised HLNW demand, management and contractor performance, and Congressional funding, |
| 8. Operations | Discovery of adverse conditions not predicted during site characterization, natural events such as earthquakes, complications with the performance of advanced technologies (e.g., robotics), personnel, contractor organizations, or program managers could introduce additional costs. |
| 9. Retrieval | A retrieval option for wastes already emplaced is required. If conditions at the site or with the wastes required retrieval the costs could be very significant. |
| 10. Closure | Estimate of the TSLCC is based upon closure of the repository and termination of the costs. If the planned techniques for closure do not prove to be adequate, ongoing costs could extend indefinitely. |

The costs of managing and disposing of the nation's high-level radioactive wastes have been a central concern since the late 1970s when the original terms of the Congressional program were first negotiated. The primary purpose of resulting legislation, The Nuclear Waste Policy Act of 1982, was to dispose of spent fuel from nuclear power plants and establish the Nuclear Waste Fund as the means to pay for the federal program (Section 111 (b)(4); Section 302 (a)(3)). The principle was to have the beneficiaries of nuclear power pay the costs of spent fuel disposal. The Secretary of Energy is required to annually evaluate and see whether the existing fee "will provide sufficient revenues to offset the costs" of the program (Section 302 (a)(4). If the fee is not adequate, the Secretary is directed to propose an adjusted fee and immediately inform Congress.

Costs for federal government use of the high-level nuclear waste repository to dispose of wastes from the nation's nuclear weapons complex, for example, are funded by taxpayers through Congressional appropriations. The expected use of the nation's proposed repository at Yucca mountain is about 80 percent for civilian spent nuclear fuel and about 20 percent for the nation's nuclear weapons wastes.

Congress, on its part, has the authority to modify the program, as it did in selecting Yucca Mountain, Nevada as the only site to be studied as a potential repository. This action prohibited further study of other sites (NWPA Amendments Act of 1987) and thereby cut costs for the program. Reductions in annual Congressional appropriations for the program, which are typically less than the administration's budget requests, can delay progress and impose increased costs in the long run.

The most recent estimate by the U.S. Department of Energy is that the Nuclear Waste Fund (current balance and future revenues) will produce $28.1 billion in constant 1996 dollars, about half (52 percent) of the $53.9 billion dollar projected cost for implementing the nation's HLNW program, leaving the general taxpayer with a liability of $25.8 billion.

### Implications

The cost-revenue condition of the nation's HLNW program and the potential for costly uncertainties are causes for concern. The key implications are that the probable costs of managing the nation's HLNW and the liability for the general taxpayer are substantially greater than have been estimated. The Nuclear Waste Fund under its current fee structure will not meet its share (approximately 80 percent) of the costs of permanent disposal of the nation's high-level nuclear wastes.

# 2. THE RESULTS, UNCERTAINTIES AND IMPLICATIONS OF THE INDEPENDENT COST ASSESSMENT

## Introduction

Escalating costs in the U.S. Department of Energy's (DOE) High-Level Radioactive Waste Management Program have been a matter of concern since the early days of the program. Initial estimates of the costs for characterizing three potential repository sites under the original Nuclear Waste Policy Act of 1982 were in the neighborhood of $80 million per site. The currently estimated cost of characterizing just one site - Nevada's Yucca Mountain - exceeds $5 billion.

Recognizing the importance of cost as a factor in determining the feasibility of continuing with the program, DOE initially included an assessment of program costs as one of the four components to its Yucca Mountain "Viability Assessment" (VA) that is being prepared for submission to the President and Congress in September, 1998. The VA was initially conceived by DOE in 1996 as part of a revised Program Plan for the Yucca Mountain project. The VA is intended to provide a basis for an assessment, by Congress and the Administration, of the overall feasibility of moving ahead with the federal high-level waste program. As proposed by DOE, the VA will have four components: (1) a preliminary Total System Performance Assessment (TSPA), (2) a conceptual design for the proposed repository and support facilities, (3) a plan for obtaining a license to construct and operate the repository from the Nuclear Regulatory Commission, (4) and an assessment of program costs. In 1997, DOE revised its concept of the VA to include only an assessment of the current and future costs associated with constructing and operating a repository - not the total costs for the program. DOE subsequently announced plans to issue a Total System Life Cycle Cost report in mid-September, 1998, but this will not be part of the VA.

Together with the ability of the site to isolate highly radioactive wastes from the environment for tens of thousands of years, the overall cost of the effort is a major determinant of the program's scope, direction, and impacts to states and communities. It is also a crucial ingredient for determining whether the program can, in fact, be implemented. The State of Nevada embarked on an independent system-wide cost assessment when it became known that the cost estimates in the VA would not be reflective of the total costs involved with implementing the federal high-level waste program. This independent cost assessment effort has two interrelated objectives: (1) to serve as the basis for critically and substantively evaluating DOE's conclusions about project costs as they are presented in the VA and in any associated TSLCC assessment and (2) to provide an objective and complete picture of the costs of the federal high-level waste program and the implications for impact assessment and for national high-level nuclear waste policy. Given the history of cost overruns and schedule delays not only for the Yucca Mountain program but also for a variety of other DOE programs nationwide,* a credible assessment of total system life cycle costs for the high-level waste program is indispensable for determining whether or not the federal program is, in fact, viable.

* See USGAO: "Department of Energy: Opportunity to Improve Management of Major System Acquisitions" (GAO/RCED-97-17), November 1996.

Since 1987, contractors for the State of Nevada's Yucca Mountain socioeconomic impact assessment studies have been collecting data on program costs as major factors that will drive project impacts in Nevada. At the same time, Nevada technical contractors have been closely monitoring DOE's site characterization activities and the design processes for the repository and related facilities. These efforts have generated significant amounts of information directly relevant to the issue of total system costs. In order to effectively and adequately evaluate the cost projection component of the DOE's VA, independent contractors have been engaged to compile available information on current and projected inventory requiring disposal, the costs of continued on-site (at reactor) storage, the costs of cross-country transportation, the costs of heavy haul and rail transportation in Nevada, the costs of centralized storage, and the costs of repository evaluation, licensing, construction, operations, and closure. Independent contractors also estimated contingency, and project and program management costs.

All of this information was then rolled up into a total system life cycle cost for the DOE program, as that program is defined by DOE's revised Program Plan, the requirements of currently-proposed legislation (e.g. S.104/H.R. 1270), the rulings of the U.S. Circuit Court of Appeals for the District of Columbia in litigation brought by utility companies (Northern States Power Company et al. v DOE), and recent DOE policy shifts. A prominent national accounting firm, KMPG Peat Marwick, was engaged to ensure that the independent cost analysis used reasonable and accurate assumptions, costing procedures, and cost factors.

This independent assessment draws on source data assembled by DOE and NRC, previous TSLCC and fee adequacy assessments by DOE, U.S. General Accounting Office (GAO) reports dealing with costs of DOE's high-level radioactive waste program (especially the 1990 report that reviewed DOE's findings with regard to Waste Fund adequacy),* and related assessments by special interest groups to support particular positions**.

## 2.1 TOTAL SYSTEM COST RESULTS

This section reviews the results of the independent cost analysis. Unless otherwise noted, cost estimates include contingency and project and program management as well as direct costs. Following sections address the uncertainties that suffuse the high-level nuclear waste program and their potential cost effects, and the key implications that flow from the findings of the assessment. Chapter 3 of this report discusses the basis for the cost analysis in greater detail—the assumptions regarding the inventory requiring permanent disposal, the strategy for waste management and the schedule for its implementation, the cost categories themselves and the cost analysis procedures.

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* "Nuclear Waste: Changes Needed in DOE User-Fee Assessments to Avoid Funding Shortfall," U.S. GAO, June 1990 (GAO/RCED-90-65).

** For example, the Nuclear Energy Institute's 1997 assessment of the costs of extended at-reactor dry storage and the 1997 Public Citizen analysis of on-site storage costs.

### Total and Projected System Costs

The independent cost assessment for the DOE/OCRWM program estimates total system costs at $53.9 billion (FY'96$), about 54.1 percent greater than DOE's estimate in September 1995 (see Figure 1). Projected expenditures after FY 1996 are estimated at $47.8 billion, about 66.8 percent greater than the DOE 9/95 estimate for this period. Of the total system cost, about 88.6 percent is projected expenditure and only 11.4 percent is "sunk costs" through FY 1996 (see Figure 2).

As mentioned, future expenditures are estimated at $47.8 billion, of which 9.0 percent is the cost of onsite storage due to delay in DOE pickup, about 12. 5 percent is cross-country transportation, about 6.8 percent is Nevada transportation, about 19.2 percent is centralized storage, about 48.0 percent is the cost of the repository, and about 4.5 percent is other program components (see Figures 3 and 4). About $38.5 billion (80.7 percent) is costs attributable to the disposal of commercial spent nuclear fuel, for which the Nuclear Waste Policy Act anticipates full recovery from the Nuclear Waste Fund.

**Figure 1. Total Cost is Estimated at $53.9 Billion (FY'96$)**

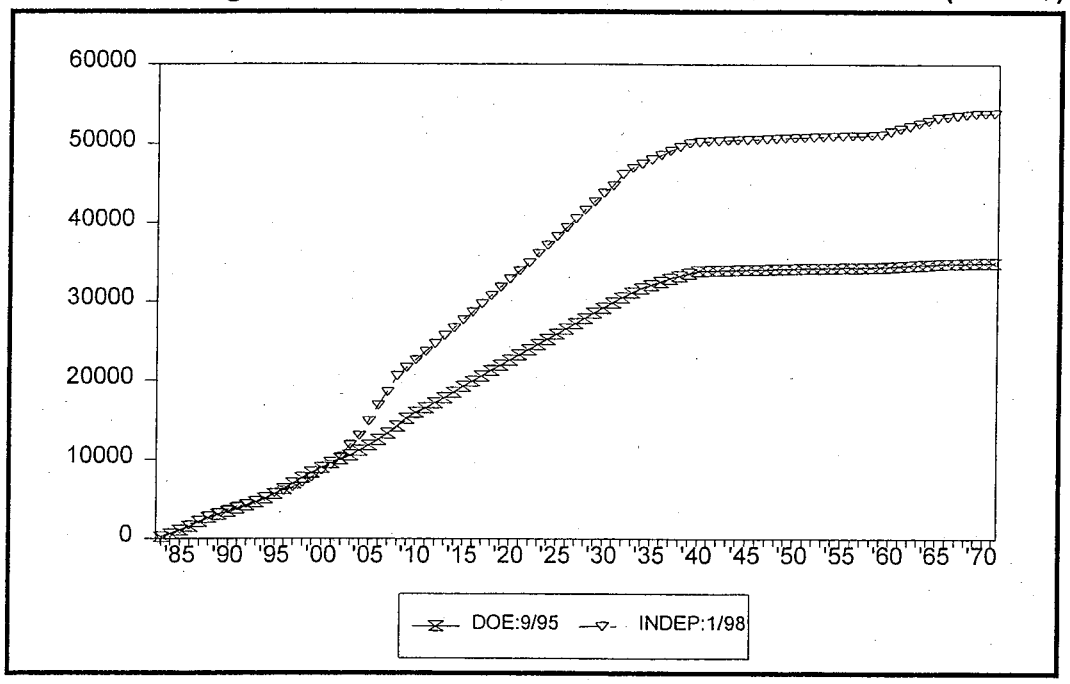


**Figure 2. About 11 Percent of the Total Has Been Spent**

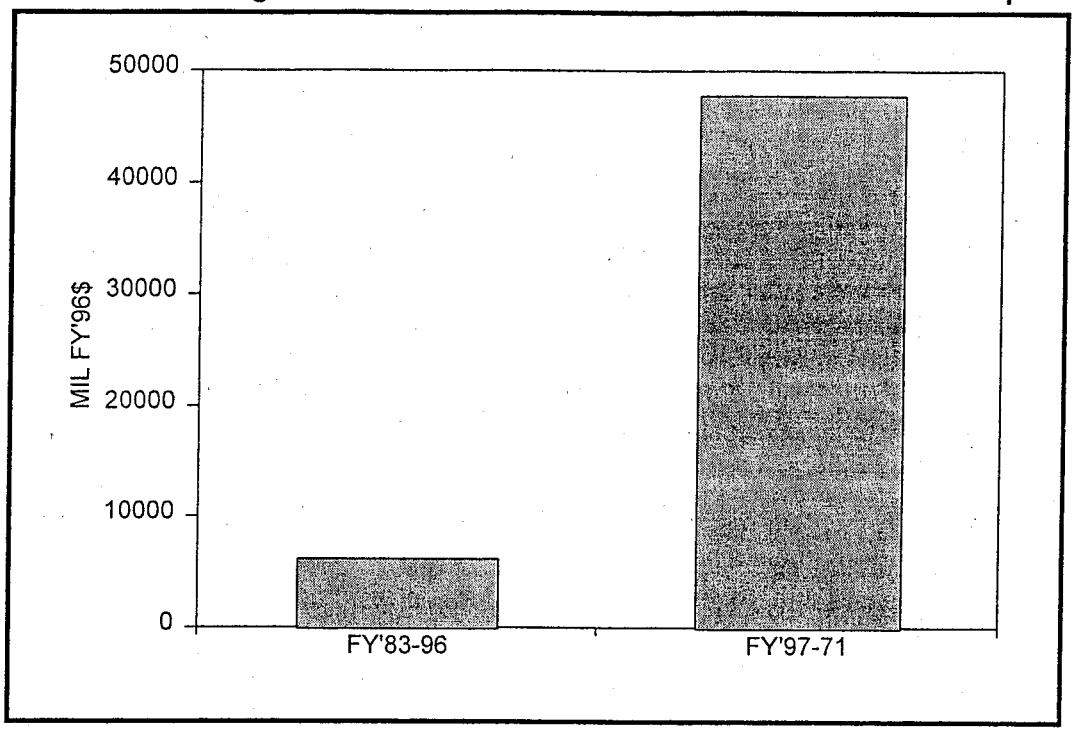
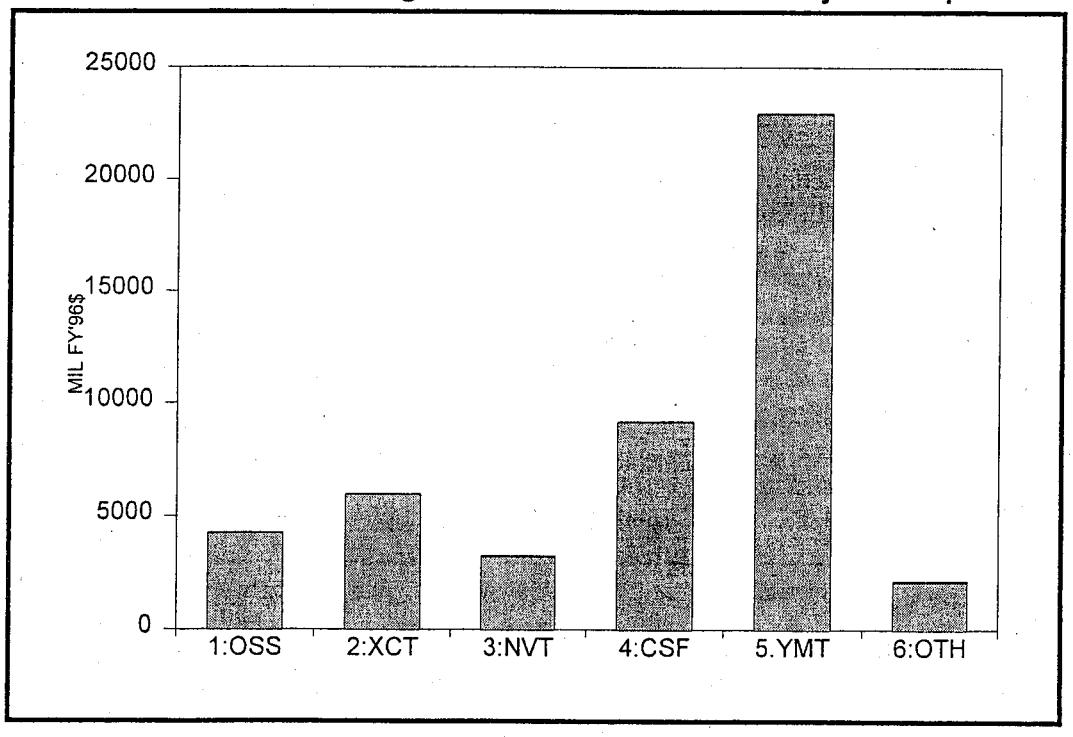



**Figure 3. Future Costs for Major Components**



## Figure 4. Sunk and Future Program Costs (FY'97 - FY'71; MIL '96$)

| | | Total | %FY'83+ | %FY'97+ | %categ |
|---|---|---|---|---|---|
| GRAND TOTAL: FY 1983FY 2071 | | 53905.4 | 100.0% | NA | NA |
| EXPENDITURE THROUGH FY 1996 | | 6128.0 | 11.4% | NA | NA |
| FUTURE COSTS: FY 1997 FY 2071 | | 47777.4 | 88.6% | 100.0% | NA |
| 1.0 | ONSITE STORAGE COSTS | 4278.9 | 7.9% | 9.0% | 100.0% |
| 1.1 | Commercial SNF in Que | 3886.1 | 7.2% | 8.1% | 90.8% |
| 1.2 | DOE SNF & SNF not in Que | 392.8 | 0.7% | 0.8% | 9.2% |
| 1.3 | DOE High-Level Waste | NA | 0.0% | 0.0% | 0.0% |
| 2.0 | X-COUNTRY TRANSPORTATION | 5968.2 | 11.1% | 12.5% | 100.0% |
| 2.1 | Commercial SNF in Que | 4269.3 | 7.9% | 8.9% | 71.5% |
| 2.2 | DOE & Other SNF not in Que | 590.1 | 1.1% | 1.2% | 9.9% |
| 2.3 | DOE High-Level Wastes | 505.1 | 0.9% | 1.1% | 8.5% |
| 2.4 | Technical Assist Trng: 180(c) | 603.7 | 1.1% | 1.3% | 10.1% |
| 3.0 | NEVADA TRANSPORTATION | 3244.7 | 6.0% | 6.8% | 100.0% |
| 3.1 | Intermodal Transfer Facility | 92.3 | 0.2% | 0.2% | 2.8% |
| 3.2 | Heavy-Haul to CSF | 437.2 | 0.8% | 0.9% | 13.5% |
| 3.3 | Rail Spur to CSF/YMP | 2715.1 | 5.0% | 5.7% | 83.7% |
| 4.0 | CENTRALIZED STORAGE FACILITY | 9179.3 | 17.0% | 19.2% | 100.0% |
| 4.1 | Misc Upfront Costs | 65.2 | 0.1% | 0.1% | 0.7% |
| 4.2 | Construction | 429.7 | 0.8% | 0.9% | 4.7% |
| 4.3 | Major Equipment | 8469.2 | 15.7% | 17.7% | 92.3% |
| 4.4 | Operations | 215.2 | 0.4% | 0.5% | 2.3% |
| 5.0 | REPOSITORY | 22955.1 | 42.6% | 48.0% | 100.0% |
| 5.1 | Site Characterization | 2553.8 | 4.7% | 5.3% | 11.1% |
| 5.2 | Design & License Application | 1079.2 | 2.0% | 2.3% | 4.7% |
| 5.3 | Surface Facilities | 6142.5 | 11.4% | 12.9% | 26.8% |
| 5.4 | Underground Facilities | 7158.2 | 13.3% | 15.0% | 31.2% |
| 5.5 | Waste Containers | 6021.4 | 11.2% | 12.6% | 26.2% |
| 6.0 | OTHER DEVEL & EVAL COSTS | 433.6 | 0.8% | 0.9% | 100.0% |
| 6.1 | NRC Fees | 400.0 | 0.7% | 0.8% | 92.3% |
| 6.2 | NWTRB | 33.6 | 0.1% | 0.1% | 7.7% |
| 6.3 | Nuclear Waste Negotiator | 0.0 | 0.0% | 0.0% | 0.0% |
| 7.0 | OTHER PROGRAM COSTS | 1717.8 | 3.2% | 3.6% | 100.0% |
| 7.1 | PETT Payments | 1233.0 | 2.3% | 2.6% | 71.8% |
| 7.2 | Benefits | 484.8 | 0.9% | 1.0% | 28.2% |

### Extended Onsite Storage

As implied in the November 14, 1997 decision of the District of Columbia Circuit Court in Northern States Power et al versus USDOE, this assessment assumes that the federal government and the Nuclear Waste Fund (not individual utility ratebases) have an obligation to pay for the costs of onsite storage of SNF which would have been removed from commercial reactor sites had DOE pickup begun in 1998 (as anticipated in the NWPA) and proceeded at rates specified in proposed legislation. These include costs for onsite dry storage, for operation of spent fuel pools as interim storage facilities after reactor shutdown, and for limited upgrades at spent fuel pools needed to load casks for cross-country transportation.

This assessment assumes that DOE pickup of commercial SNF will be delayed from 1998 to 2003, during which time centralized storage, intermodal transfer and other needed facilities might be designed, licensed and constructed. The projected cost (FY'97+) to the nuclear waste program for onsite storage associated with a five-year delay is $4.3 billion, of which $3.9 billion is for onsite storage of SNF at commercial reactor sites, and $0.4 billion is for onsite storage of SNF located elsewhere. Of the $3.9 billion, about $0.6 billion (14.8 percent) is for dry storage, and about $3.3 billion (84.2 percent) is for the operation of pools as interim storage facilities after reactor shutdown. Since this assessment bases transportation choices on the current loading capabilities of spent fuel pools, the estimated cost for upgrading pool dimensions or lifting apparatus is only $37 million (1.0 percent).

### Cross-Country Transportation

For legal-weight truck shipments, cross-country transportation includes the cost of shipment from origin sites to Yucca Mountain or Nevada Test Site (NTS) Area 25. These include the shipment costs, the shipment escort and inspection costs, the cost of the high-capacity cask and special truck trailer, and the operations, maintenance, replacement and decommissioning costs of this equipment.

For rail shipment, cross-country transportation is the cost of shipment in dedicated trains to Caliente (NV), where such shipments would be transferred to heavy-haul trucks or continue along a 365-mile government-owned and operated rail spur. Equipment purchases include cask and buffer cars; shipment costs are based on the loaded cask and the ballast in the buffer cars. Some rail shipment sites which lack or no longer have a rail spur require heavy-haul to a nearby railhead.

The total cost of cross-country transportation is estimated at $6.0 billion, of which $4.3 billion is for transport of SNF from commercial reactor sites, $0.6 billion is for SNF transport from other sites, $0.5 billion is for HLW transport from four sites in the DOE complex, and $0.6 billion is for emergency management training for affected states, counties and Tribes. Of the $4.3 billion, about $3.1 billion (71.9 percent) is for rail and truck carrier costs for 24,400 cask shipments over 56 million miles, about $1.0 billion (22.7 percent) is for purchasing, maintaining and decommissioning transportation casks and equipment, and $0.2 billion (5.4 percent) is for shipment escort and inspection.

### Nevada Transportation

In this assessment, Nevada transportation is included to enable transportation (cross-country and in Nevada) by rail as well as by legal-weight truck. Intermodal transfer and heavy-haul are included

(consistent with directives in proposed legislation) to enable *early* cross-country shipment by rail as well as by legal-weight truck. Nevada transportation costs are estimated at $3.2 billion, of which $0.5 billion (16.3 percent) is for the intermodal transfer facility at and heavy-haul from Caliente, while $2.7 billion (83.7 percent) is for the construction and operation of a 365-mile government-owned and operated rail spur from Caliente to Yucca Mountain.

Consistent with DOE's 1991 conceptual plan, the direct construction cost for the Caliente-Yucca Mountain rail route is estimated at $1.2 billion (FY'96$). Contingency and project and program management costs increase this figure to $1.9 billion. Upfront design and right-of-way costs, the construction of ancillary facilities, the purchase and maintenance/replacement of major equipment, and operations costs account for the remainder of the $2.7 billion estimate for the rail spur.

### The Central Storage Facility at NTS Area 25

Under the assumptions of this assessment, the centralized storage facility receives and stores SNF until it is emplaced in the nearby geologic repository at Yucca Mountain. About two-thirds of the SNF arrives at the centralized storage facility in dual-purpose rail canisters. Under normal circumstances, these canisters need not be opened at the central storage facility; they are removed from transportation casks and placed in concrete bunkers or vaults for onsite storage. This assessment assumes that, at 16 rail shipment sites, utilities choose to purchase dual-purpose canisters as an onsite storage cost in order to limit the operation of spent fuel pools as interim storage facilities after reactor shutdown. At 31 other rail shipment sites, utilities choose to use storage-only canisters for dry storage; the cost of dual-purpose canisters for transportation and central storage of SNF from these sites is included as a central storage cost.

About one-third of the SNF arrives at the centralized storage facility uncanistered in high-capacity casks for legal-weight truck transport. Under the assumptions of this assessment, this SNF is removed from the transportation cask and held in a reinforced concrete fuel transfer facility until a sufficient number of PWR or BWR assemblies have accumulated to fill a metal cask for onsite storage.

The total cost for centralized storage is estimated at $9.2 billion, of which $2.4 billion (26.3 percent) is the direct cost of purchasing, replacing and decommissioning metal casks for storage of SNF arriving by legal-weight truck, about $2.7 billion is the direct cost for dual-purpose canisters for rail shipment of SNF which has been stored onsite in pools or storage-only canisters, and about $0.4 billion (4.4. percent) is the direct cost of concrete storage for all SNF arriving by rail or heavy-haul. Other direct costs include upfront and construction costs (about $0.3 billion, 3.4 percent) and operations (about $0.14 billion, 1.5 percent). Contingency and project/program management costs account for the remaining non-direct portion of centralized storage costs.

### The Repository

Under the assumptions of this assessment, the geologic repository would dispose of the nation's entire current and projected inventory in 11,000 waste containers for SNF and 19,234 canisters* for HLW, emplaced in 94 miles of drifts bored in parallel rows at a single emplacement level through the fractured

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* Purchased by the DOE Office of Environmental Restoration and Waste Management as containers for onsite storage (and transportation, emplacement) of HLW; costs not included in estimates for the DOE/OCRWM program.

tuff beneath Yucca Mountain. Major challenges include the design of the emplacement drifts and the movement and emplacement of waste packages within and among them, the monitoring and possible retrieval of flawed or damaged packages, and the backfill and decommissioning of the facility* late in the 21st century.

The projected cost of the Yucca Mountain repository is estimated at $23.0 billion, of which the completion of site characterization is $2.6 billion (11.1 percent). Licensing and design (upfront and ongoing during construction and operations) is $1.1. billion (4.7 percent). The cost of surface facilities at the repository (their construction, equipping and operation throughout emplacement, care-taking and decommissioning) is estimated at $6.1 billion (26.8 percent of projected repository costs). Underground facilities are estimated to cost $7.2 billion (31.2 percent). The direct cost of waste emplacement containers for SNF is estimated at $6.0 billion (26.2 percent), of which $3.9 billion is the direct purchase cost at an estimated $350,000 per container.

## 2.2 UNCERTAINTIES IN THE DOE/OCRWM PROGRAM

The projected costs described above include estimated contingency costs to address the potential for ordinary complications in scheduling, regulatory compliance, design, construction, procurement or hiring. However, any large, long-term, first and only-of-its-kind project is subject to uncertainty over and above standard contingency factors. This section reviews some of the uncertainties in the DOE/OCRWM program, and suggests how they could affect program costs and/or the implementation of the waste management strategy implicit in current directions and proposed legislation.

### The Inventory Requiring Permanent Disposal

A Reagan administration decision in 1985 required collocated geologic disposal for high-level defense wastes as well as SNF from commercial and DOE reactors. However, the disposition of GTCC** and other wastes (e.g., decommissioned nuclear weapons) remains uncertain. Also, the estimates of high-level wastes are not finalized and are increasing; DOE's estimates in December 1996 are 45 percent greater in volume and 39 percent greater in canisters than its estimates 15 months earlier in September 1995. Additional waste streams could increase costs for cross-country and Nevada transportation, complicate the design and emplacement strategy for the repository, and increase repository construction and operations costs.

### The NWF Obligation Due to Delay in DOE Pickup of SNF

In its November 14, 1997 decision in Northern States Power et al versus USDOE, the US Court of Appeals for the District of Columbia Circuit concluded that the federal government has an obligation

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* Some studies suggest that the repository might be "ventilated" that is—not closed or decommissioned, but continued in caretaker operation into the 22nd century and beyond.

** Greater-than-class-c low-level wastes, much of which is expected to be generated in the decommissioning of nuclear reactors.

under its standard contract* with utilities to remediate costs attributable to delays in pickup and/or reductions in pickup rates. However, it declined to specify a remedy until delays actually begin, and it did not determine whether the costs of delay should be drawn from the Nuclear Waste Fund or from the general fund.

In the absence of a court-approved formula, this assessment allocated the costs of delay based on an estimate of the projected inventory at each site (assuming pickup beginning in 2003 and proceeding at rates specified in proposed legisilation) compared to the inventory had pickup begun in 1998. The uncertainties are a) the Court could specify a remedy more advantageous to utilities and less advantageous to DOE and the NWF or general taxpayer, and b) DOE could fail to begin pickup in 2003 and/or fail to proceed at S-104 rates. These contingencies could increase onsite storage costs and/or the portion of onsite storage costs allocated to the NWF or general taxpayer. If not anticipated and very effectively managed, delays in pickup (start date or rates) could result in unused capacity in cross-country and Nevada transportation, and in additional costs of systems developed but not fully used. Delays in the SNF pickup start date and rate could result in delay in pickup of high-level defense wastes, which the DOE Office of Environmental Restoration and Waste Management must vitrify and store while awaiting shipment to a geologic repository for permanent disposal.

### Dry Storage for Discharges in Excess of Pool Capacity

The assessment assumes that dry storage can be developed at any site at which it may be required. However, at some sites physical limitations or community concerns could complicate the licensing and development of dry storage facilities. The consequence could be a more costly solution to dry storage and/or a utility decision to shutdown before license term, thus depriving the NWF of currently anticipated revenues.

### Defective Canisters and/or Transportation Casks

This assessment assumes no defective storage canisters or transportation casks. If canisters are found to be defective, they would need to be repaired or replaced—increasing costs for onsite storage, transportation or centralized storage, depending on the point at which the defect is discovered. Defective transportation casks may or may not require repair or replacement, since transportation choices and schedules could result in an excess cask inventory in some shipment years. The major cost consequences, however, depend on the management of defects by utilities and/or DOE as they occur. Ineffective management could have major cost consequences.

### Canister and Cask Standardization

Our estimates assume all SNF will be shipped in a standard LWT cask and one of two rail casks, each matched with a standard canister for storage and/or transportation. If the container delivery "system" (DOE, NRC, vendors, fabricators) fails to deliver an adequate quantity of standard casks and canisters, as required by shipment schedules, system efficiency would go down and costs would go up. Under a privatized transportation system, such as DOE is now proposing, market-driven decisions could result in

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* Paragraph B of NWPA Section 302(a)(5) says that "in return for payment of fees," DOE will dispose of commercial spent nuclear fuel, beginning not later than January 31, 1998.

use of a variety of unstandardized casks, perhaps with reduced cask purchase costs, but with increased costs for handling, repackaging and storage at the centralized facility.

### Shipment Costs for Cross-Country Transportation

Transportation carrier costs for 30,400 cask shipments and 65 million cask shipment miles on the nation's Class A railroads and interstate highways are not yet negotiated. Rail carriers and USDOE disagree on the need for and cost of shipping SNF in dedicated trains. Given speed, route and operating restrictions for shipments of SNF and HLW—and the implications of these restrictions for other rail or highway freight traffic—shipment costs per ton-mile or per ton-originated may be higher than assumed in this assessment.

### Concerns in Transportation Corridor Communities

The willingness of corridor communities to accept a shipment campaign of this type and magnitude—the ability of our political system to produce and maintain acceptance when such a large portion of affected communities see themselves as corridors for dangerous materials originating elsewhere and benefitting others—has not been demonstrated. Resistance could come from state-local-tribal governments along corridors or from grassroots activism. Some believe that concerns with early shipments will rapidly diminish after the initial shipments along various routes; others anticipate the concerns could build as the campaign proceeds.

It is conceivable that concerns among corridor communities, as expressed through participatory state and local politics, could shutdown or greatly complicate parts of the nationwide campaign for cross-country shipment of high-level wastes. DOE could build a central storage facility and/or repository, and be able to ship only parts of the projected inventory to these Nevada facilities.

### Accidents in Cross-Country Transportation

Our assessment assumes no accidents in a cross-country shipment campaign involving 16,920 legal-weight truck shipments and 37.6 million cask shipment miles on often-congested public highways, plus 4,500 dedicated train shipments over 9.1 million miles of heavily-used rail corridors. Accidents in cross-country transportation are likely. Such accidents could require substantial emergency response, as well as evacuation, road closure or other measures resulting in losses for corridor businesses. The associated costs are not included in this assessment. Nor are the costs of potential radiation releases, should such occur, which would be paid under guidelines established by the Price-Anderson Act of 1957, as amended in 1988. The major costs of accidents in cross-country transportation, however, are likely to be subsequent to the accident itself, in the management and operation of the shipment campaign.

### NRC Review for Shipment Staging or Switching Locations

Our assessment assumes that NRC review and/or licensing is not required for staging or switching locations required in the cross-country shipment campaign—e.g., major rail yards in Chicago, St. Louis, Kansas City. Should such be required (e.g., if an accident or a security breakdown occurred in a rail switching yard), significant additional cross-country transportation costs could result.

### NRC Licensing for the Intermodal Transfer Facility

Our assessment assumes, based on Senate Bill 104, that NRC licensing is not required for the intermodal transfer facility at Caliente (NV). Should safety or security considerations (or litigation, or political action by affected parties) require NRC licensing, the result would be a delay in the pickup start date, with consequent implications for onsite storage costs at commercial reactor sites. Licensing could also require additional construction and operations costs at the intermodal transfer facility itself.

### Delays in Heavy-Haul Operations

Heavy-haul operations could be delayed due to complications in negotiating or funding the necessary improvements in the public highways along the 365-mile route, and/or due to concerns in local communities along such routes. The result could be increased costs for heavy-haul construction and operations, and (more significantly) increased upstream costs for onsite storage and cross-country transportation.

### Delays in Rail Spur Construction and Operation

Delays in procuring the required right-of-way and/or environmental permits along the 365-mile rail spur route could increase construction costs. Indirect effects could include an extension of heavy-haul operations (and the associated intermodal transfer and heavy-haul costs) and/or increased upstream costs for extended onsite storage or cross-country transportation.

### Seismic Activity at NTS and the Central Storage Facility

Seismic activity is expected to be a major concern in the licensing of a centralized storage facility for up to 24,000 MTU of SNF at NTS Area 25. These or other concerns could lead to increased costs to meet NRC licensing requirements regarding the spent fuel transfer building, storage procedures and equipment, or decontamination facilities. If such requirements delay the operations of the centralized storage facility or reduce its throughput capacity, there could be significant additional upstream costs in onsite storage and/or excess transportation capacity developed but not fully used.

### Delays in Site Characterization at Yucca Mountain

Several contingencies not addressed in this assessment could delay the completion of Yucca Mountain site characterization: e.g., a seismic event which damages surface or underground facilities and equipment at the exploratory studies facility; an unexpected geologic condition (e.g., a large body of perched water, a highly fractured unstable zone) encountered by the east-west tunnel currently under construction; discovery or confirmation of a health hazard for workers underground;* a major equipment failure which damages the heater test or causes an electrical fire or rock fall within the ESF. Any such contingency would increase site characterization costs and could indirectly increase costs in other components of the waste management program.

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* For example, cristobalite dust detected in 1996 in the original five-mile ESF was found to exceed OSHA limits and required respirators to worn by all personnel, thus reducing productivity.

### Repository Construction and Operation

The construction and 60-year operation of a permanent repository in the heavily fractured tuff of Yucca Mountain involves many contingencies not addressed in this assessment: e.g., defects in the repository block (faulting, fracturing, perched water) which were undetected during characterization and which reduce capacity or require reconfiguration; variations in rock quality in the repository block which complicate thermal loading and affect capacity, ventilation or emplacement layout; escalating surface facility construction costs due to seismic events or NRC license requirements; complications in the operation of robotic equipment within emplacement drifts; the cost of waste containers fabricated from exotic materials to meet stringent performance standards.

### Retrieval of Emplaced High-Level Waste

Performance standards require that SNF be retrievable for 50 years after initial emplacement. The feasibility of retrieval at any cost is uncertain at best. The costs, should retrieval be required, are not included in this assessment—very rough estimates are in the billions or tens of billions of dollars, depending on the complexity and extent of retrieval required. Also not included are the costs of dealing with the waste retrieved, should the retrieval be occasioned by hazards detected in the emplaced wastes.

### Permanent Closure of the Geologic Repository

In closing the repository, the federal government warrants that the materials it contains will be safely isolated from the human environment, without further government involvement, in perpetuity. Yet the backfilling techniques proposed for closure are unproven as to feasibility or effectiveness. Some argue that the repository should remain unclosed or ventilated, implying that the government responsibility (and costs) could extend indefinitely.

## 2.3 IMPLICATIONS OF THE COST ESTIMATES

The implications of the total system cost estimates, and of the uncertainties not reflected in the cost estimates, are wide ranging. The key implications are that the probable cost of managing the nation's SNF and HLW is substantially greater than has been estimated by DOE, that the general taxpayer stands to bear about half of the projected cost.

While there are and will continue to be substantial uncertainties inherent in projecting the costs and revenues of a complex program over many years, two things are apparent—the Nuclear Waste Fund as currently constituted is woefully inadequate to meet the long-term costs of implementing current DOE plans and proposed legislation, and this shortfall is likely to increase rather than decrease over time.

This section of the report briefly elaborates on these and related implications of the independent assessment of total system costs.

### Waste Management is More Costly than Estimated by DOE

The projected cost of managing SNF and HLW in accordance with the NWPA (as revised by the Amendments of 1987 and legislation proposed in Senate Bill 104 and House Bill 1270) and recent US

Appeals Court decisions is $53.9 billion—a figure about 18.9 billion (54.1 percent) greater than estimated by DOE in September 1995. The projected cost of managing SNF and HLW in fiscal years 1997-2071 is $47.8 billion—a figure $19.1 billion (66.8 percent) greater than DOE's estimates for the same period.

### Program Uncertainties Could Further Increase Costs

The above estimates do not include the cost implications of uncertainties in a program that involves many scientific and technical challenges, difficult equity and perceptual issues, and consequent demands on our regulatory and political systems. Should any or some combination of these uncertainties materialize, they could significantly increase the above estimates of costs required to see the nation's high-level nuclear waste program through to a satisfactory conclusion. Even more difficult, perhaps, they could require a rethinking of the nation's waste management program at a point when even more funds have been expended and wastes are partly emplaced, partly in central storage, and partly at commercial reactor and other DOE sites.

### NWF Revenues will Likely Further Contract

This assessment assumes that all commercial nuclear plants operating in 1997 will continue to operate (and generate revenues to the Nuclear Waste Fund) through their license term. DOE's fee adequacy assessment makes a similar assumption.* In recent months, however, several utilities have announced that they intend to or are considering early shutdown of several plants—e.g., Big Rock, Oyster Creek, Maine Yankee, Zion 1 and 2.

Early shutdowns would reduce the expense of waste management under the NWPA, by reducing the amount of spent fuel which must be stored on an interim basis, transported or emplaced. However, the reductions in NWF revenues as a consequence of early shutdowns will likely be much greater than the corresponding reductions in expenses. Early shutdowns reduce revenues on a one-to-one basis for each kilowatt of expected nuclear power not generated by a commercial reactor. Early shutdowns reduce waste management costs at the margins of an overall program which must be fully developed in any case. The effects of early shutdowns in reducing Nuclear Waste Fund revenues are likely to be substantially greater than their effects in reducing program costs. The assumptions of this assessment (all reactors operating in mid-1997 continue to operate through license term) represent the "best case" scenario of revenues and expenses for the NWF.

### Fund Management Could Diminish Investment Revenues

Nuclear utilities, frustrated by prospective delays in DOE pickup of spent nuclear fuel and by the inclusion of the Nuclear Waste Fund in the general federal budget, have proposed that annual fee collections be limited to the amounts actually appropriated by Congress for implementation of the

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* "The 1.0 mil per KWh fee revenue used in this analysis was derived from the no-new-orders end of reactor life projection of net electricity generation prepared in 1994 by the EIA. It is assumed in this projection that commercial units will operate for 40 years from the issuance of their operating licenses without extension, reactor performance will not be affected by aging, and the equilibrium-cycle capacity factor will increase slightly from 74 percent in 1995 through 2014 to between 75 and 76 percent until 2034." DOE/RW-0490, pg. 5.

DOE/OCRWM program. This would place the program on a current cost basis, and reduce the projected balance in the Nuclear Waste Fund, the investment of which was intended by the Nuclear Waste Policy Act to support the implementation of the program over the decades after nuclear reactors shut down.

### The General Taxpayer Stands to Pay $26 Billion

DOE's most recent assessment of the one-mil per kilowatt hour fee on sales of nuclear generated power, established by the NWPA to meet the costs of permanent disposal of commercial SNF, estimates that the fee provides a revenue base of $28.1 billion (FY'96$) from which to meet projected program expenditures.* The independent cost assessment estimates program costs at $53.9 billion (FY'96$), suggesting that the general taxpayer liability is about $25.8 billion, or about half (48 percent) of total program expenditure.**

### A Small Portion of Total Costs are "Sunk"

Though the DOE/OCRWM waste management program is now in its fifteenth year, only 11.3 percent of estimated TSLCC have been incurred through FY 1996; 88.7 percent will be incurred in future years. Thus, despite the huge investment at Yucca Mountain and the large investments in investigating sites at Hanford, Deaf Smith County and elsewhere, just over ten percent of the costs which the nation should expect to spend for permanent disposal of HLNW have been "sunk." In determining future directions for the program, sunk costs should be relegated to a lesser role than they seem to have been in many policy determinations to this point.

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* Nuclear Waste Fund Fee Adequacy: an Assessment (October 1996) DOE/RW-0490; Analysis of the Total System Life Cycle Cost (September 1995) DOE/RW-0479. The fee adequacy assessment (pg 11) estimates that the fund balance at the end of FY'94, plus projected income from fee payments and investments, will generate $22.8 billion ($24.1 billion in FY'96 dollars), sufficient to offset the civilian share of TSLCC as estimated by DOE in September 1995. DOE's September 1995 analysis of TSLCC (pg 39) estimates the civilian share at $26.6 billion ($28.1 billion in FY '96 dollars). Our discussion assumes that the fund will generate the higher figure—noting, however, that higher estimates of annual costs would draw down the fund balance more rapidly than assumed in DOE's fee adequacy assessment, thus reducing investment income to the NWF.

** As mentioned, the Nuclear Waste Fund (and the one-mil per kilowatt hour fee) created by the Nuclear Waste Policy Act (Section 302) was intended to pay for the disposal of only those wastes generated in the production of commercial nuclear power. The independent assessment estimated the costs attributable to commercial SNF, distinguishing these from the costs attributable to DOE SNF and HLW. Comparing the costs attributable to commercial SNF ($43.5 billion, FY'96$) against DOE's estimate of revenues generated in the Nuclear Waste Fund ($28.1 billion, FY'96$), we estimate a shortfall of $15.4 billion—that is, expenses attributable to commercial SNF that will not be met by the Nuclear Waste Fund as currently constituted. The $43.5 billion estimate of costs attributable to commercial SNF is 80.68 percent of projected costs (see Appendix D), plus a like percentage of actual expenditures through FY 1996 (see Appendix B).

## 2.4 SOURCES FOR TOTAL SYSTEM COST ASSESSMENT

Several sources were consulted in preparing the independent assessment of total system costs for the permanent disposal of the nation's SNF and high-level waste.

### USDOE Assessment of Total System Costs

The Nuclear Waste Policy Act requires DOE to prepare "an estimate, on an annual basis, of the costs required to construct and operate the repositories anticipated to be needed . . . and to carry out any other activities under this Act" (Section 301 (a) (10)). Based on the estimate of costs, the Act requires that DOE "shall annually review the amount of the fees (on sales of civilian nuclear power). . . to evaluate whether collection of the fee will provide sufficient revenues to offset the costs. . ." (Section 302 (a) (4)). The former requirement is generally referred to as the assessment of "total system life cycle costs" and is part of DOE's responsibility to develop and maintain a mission plan for management of the nation's high-level nuclear waste. The latter requirement is referred to as the "fee adequacy assessment," and is part of DOE's responsibility to manage the nuclear waste fund established by the NWPA.

This assessment included a thorough review of DOE's most recent analysis of total civilian costs (published in September 1995), and a comparative review of estimates prepared in 1986, 1989 and 1990. DOE's assessments describe waste management assumptions (e.g., projected inventory, number of repositories, repository media, etc.) but do not describe their cost analysis procedures or cost factors.

Our review compared DOE estimates of total system costs, selecting comparable waste management assumptions (e.g., single repository, in tuff) and adjusting for changes in the projected inventory and for constant dollars. The key observation is that, in a program that has had many changes of direction and adjustments in cost, the DOE estimates of TSLCC have been very consistent. The 1995 estimate is only about ten percent above the initial estimate prepared in 1986, only seven to eight percent higher than the estimate from 1989, and virtually identical to the 1990 estimate prepared to reflect the effects of the 1987 amendments to the NWPA.

### USGAO Reports to Congress

In response to requests from Congress and its committees, the General Accounting Office (GAO) has made numerous inquiries into various aspects of DOE's program for management of the nation's high-level nuclear wastes and/or the site characterization project at Yucca Mountain. Some GAO inquiries have focused directly on program costs or revenues; other have focused on management issues which have a significant but indirect bearing on costs. The GAO has found numerous persistent causes for concern:

- A September 1994 report concluded that comprehensive review of the disposal program is needed.
- A December 1994 report expressed concerns about DOE's management and organization of the Nevada repository project.
- A September 1993 report inquired about funds spent to identify a monitored retrievable storage facility site.

- A May 1993 report observed that Yucca Mountain project was behind schedule and facing major scientific uncertainties.

- A May 1992 report concluded that DOE's repository site investigations would be a long and difficult task.

- A March 1992 report concluded that the development of casks for transporting spent fuel needs modification.

- A June 1992 report evaluated the status of actions to improve DOE user-fee assessments.

GAO's major review of total system costs in the DOE/OCRWM program was published in June 1990* and concluded that changes were needed in DOE user-fee assessments to avoid shortfalls in the Nuclear Waste Fund. The review evaluated DOE's estimates of total system cost, but did not investigate costs analysis procedures in detail, nor did it validate cost factors. Much of GAO's review focused on the one mil per kilowatt hour fee and the uncertainties regarding its adequacy to support projected expenses.

GAO has reviewed 80 projects designated by DOE as major systems acquisitions and identified many which suffered significant cost overruns or schedule slippages:** e.g.,

- The final cost of the Fuels and Materials Examination Facility at Hanford (WA) was 39 percent above the original estimate, and the completion schedule slipped 14 months. The $234 million facility is now used for storage and office space.

- The costs of the West Valley Demonstration Project in New York increased 226 percent from an original estimate of $446 million to a final cost of $1,008.5 million, and the originally estimated completion date slipped seven years and five months.

- The cost of the Super Conducting Supercollider in Texas increased from an original estimate of $5.9 billion to over $11 billion before the project was terminated in October 1993.

- The vitrification plant at the Savannah River Site in South Carolina was completed in November 1996—62 percent over original budget and 6½ years behind schedule.

GAO notes the many causes for cost overruns and schedule slippages in large and technically demanding projects, but finds several underlying causes (unclear or changing missions, incremental project funding, a flawed system of incentives, insufficient DOE personnel to effectively oversee contractor operations) common to many DOE major systems acquisitions.

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* USGAO: "Nuclear Waste: Changes Needed in DOE User-Fee Assessments to Avoid Funding Shortfall" (GAO/RCED-90-95, June 7, 1990).

** USGAO: "Department of Energy: Opportunity to Improve Management of Major System Acquisitions" (GAO/RCED-97-17, November 1996).

### DOE/NRC Management Information

This assessment included significant efforts to collect, organize and analyze information collected by DOE or NRC. Examples include:

- DOE expenditures, as reported in detail in "status of obligation authority" reports.
- DOE records of spent fuel discharges (by reactor, current location, number and type of assemblies, MTU) through 1995.
- NRC data on operating and shutdown commercial nuclear power reactors (Information Digest: Appendix A).
- DOE projections of spent fuels discharges under no-new-orders, end-of-license term assumptions (DOE/RW-0431, June 1995)
- DOE's Integrated Data Base Report (DOE/RW-006, December 1996) including estimates of high-level defense waste and DOE spent nuclear fuel.

### Other Sources for the Independent Assessment

Other information sources used in this assessment include data received from the American Railroad and American Trucking Associations, inputs from sources in the nuclear industry (e.g., the Nuclear Energy Institute and its consultant Energy Resources International), and construction industry standards.

The State of Nevada began the independent assessment in late 1996. Independent contractors were engaged to collect available information on the current and projected inventory requiring permanent disposal, the costs of continued onsite storage due to delay in DOE pickup, the costs of cross-country transportation, the costs of heavy-haul and rail transportation in Nevada, the costs of centralized storage, and the costs of repository characterization, licensing, construction, operations, and closure. Independent contractors were asked to estimate contingency, project management and program management costs—arriving at a total cost for the life-cycle of the DOE program. Waste management assumptions were specified so as to reflect a program which responds as practicable to initiatives currently underway as part of DOE's May 1996 revised program plan, the requirements of currently proposed legislation (e.g., S.104/HR.1270), the remedies resulting from the November 14, 1997 decision in Northern States Power Company et al versus USDOE, and recent DOE/OCRWM policy shifts. An outside contractor was engaged to ensure that the independent cost analysis used reasonable assumptions, costing procedures and cost factors.

Chapter 3 of this report describes the inventory requiring permanent disposal; the strategy for managing the waste inventory; the types of costs required by the waste management strategy; the schedules for storage, pickup and emplacement which determine cost streams over time; and the key cost analysis procedures used in this assessment.

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# 3. THE INDEPENDENT COST ANALYSIS: WASTE INVENTORY, WASTE MANAGEMENT ASSUMPTIONS, COST ANALYSIS PROCEDURES

In its September 1995 analysis of the total system life-cycle cost (TSLCC) of the civilian radioactive waste program, the US Department of Energy (DOE) describes its assumptions regarding waste management strategy—the inventory, the transportation requirements, the schedule for disposal. However, DOE's report does not describe its costing procedures or cost factors, or the rationale for the costing procedures and factors.

This section describes at a general level the waste management assumptions and cost analysis procedures and cost factors used in an independent assessment of total system cost. We discuss the inventory requiring permanent disposal; the strategy for managing the waste inventory; the types of costs required by the waste management strategy; the schedules for storage, pickup and emplacement which determine cost streams over time; and the key cost analysis procedures used in this assessment.

Throughout the independent assessment we have used the "best available" input data and cost assumptions. Much of the input data comes from DOE, and we have made particular efforts to locate and obtain the most recent DOE data available. Many of the cost assumptions come from nuclear industry sources or construction industry standards. Supplementary inquiries have been conducted to provide a basis for estimates of project and program management costs, additional PETT payments, and numerous other factors.

## 3.1 THE INVENTORY REQUIRING PERMANENT DISPOSAL: THREE GROUPS

This assessment divides the inventory requiring permanent disposal in a geologic repository into three broad categories:

a) Current and projected inventories of spent nuclear fuel stored at commercial reactor sites. This category includes all discharges of spent fuel assemblies from commercial reactors, less those which for various reasons have been shipped to other sites such as Morris (IL), West Valley (NY), and the Idaho National Engineering and Environmental Laboratory (INEEL)—i.e., the broad category of SNF for which utilities expected the federal government to begin taking responsibility on January 31, 1998.

b) Current and projected inventories of spent nuclear fuel at other sites—chiefly federal government sites, but also private sites such as the Morris facility and various universities with research reactors. The inventories include SNF from commercial reactors (e.g., Three Mile Island, Cooper Station, Dresden) which has been shipped offsite (e.g., to INEEL, Morris, West Valley), SNF from Navy and foreign research reactors which will be shipped to INEEL and the Savannah River Site (SRS) for storage while awaiting shipment to Yucca Mountain for disposal, and SNF

generated at defense reactors—chiefly Hanford. In the que for DOE pickup, this category has second priority (in this assessment) to spent fuel stored at commercial reactor sites.

c) Projected HLW, which will be vitrified and canistered at four defense sites (Hanford, Savannah River, INEEL and West Valley) before being shipped* to Nevada for permanent disposal at Yucca Mountain.

### Current (1995) Discharges of SNF

This study included an assessment of spent fuel discharges through 1995, identifying the date, origin, current location, metric tons uranium (MTU) and assemblies of each discharge, and distinguishing discharges currently located at reactor sites (inventory group "a" above) from those at other sites (group "b"). At the end of 1995, 1,275 discharges totaling 31,747 MTU in 111,015 assemblies were stored at commercial reactor sites (inventory group "a"). Another 850 MTU originated at commercial reactors but had been shipped for storage at other sites (e.g., Morris, INEEL, West Valley); these form part of inventory group "b" in the current assessment.

### Projected Discharges (1996+) from Commercial Reactors

This study also included an assessment of projected spent fuel discharges from currently operating commercial nuclear reactors, through the end of their license term. Projected discharges are consistent with those presented in DOE's most recent projection of spent fuel storage requirements.** However, adjustments were made in the early projection years to account for actual discharges in 1994 and 1995, which are projection years in the DOE study. Also a random number method was used to prioritize projected discharges within a given year. Finally, projected discharges from four reactors included in the DOE projections (TVA's Bellefonte 1&2 and Watts Bar 1&2) were removed from this assessment—reflecting a judgement that, though NRC construction permits had been issued, these plants would not have commercial operation. Thus, inventory group "a" in this assessment reflects a no-new-orders, *modified* end-of-license-term projection of spent fuel discharges from commercial nuclear reactors.

The projected spent fuel discharges after 1995 total 50,598 MTU. Combined with the 31,747 MTU currently stored at commercial reactor sites, the total inventory in group "a" is estimated at 82,345 MTU. This is SNF which is or will be stored at commercial reactor sites, and which*** is the focus of the federal government's obligations for interim storage and pickup under the Northern States Power et al versus USDOE court decision of November 14, 1997.

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* Beginning in 2015, according to assumptions used in DOE's September 1995 TSLCC (pg. 8) and in this assessment.

** Spent Fuel Storage Requirements 1994-2042 DOE/RW-0431, June 1995.

*** Along with SNF stored at the General Electric Facility at Morris (IL).

### Spent Nuclear Fuel Not Located at Commercial Reactor Sites

Regarding inventory group "b", this study included an assessment of current and projected spent fuel *not* located at commercial reactor sites. One component in this group is SNF which originated at commercial reactors but which has since been shipped for storage at other sites such as Morris, West Valley, and INEEL. As mentioned, this component totals 850 MTU.* Another component is spent fuel discharges from DOE weapons reactors, Navy reactors, foreign research reactors and other fuel in the DOE/DOD complex. This fuel, which totals 2,666.5 MTU, has been grouped according to the probable locations from which it would be shipped to Yucca Mountain.

Combining both components, inventory group "b" includes 3,516.5 MTU (roughly similar to the spent fuel expected to be discharged from six BWR reactors.)** which would be shipped to Yucca Mountain from Hanford (2,132 MTU), INEEL (325 MTU), SRS (214 MTU), Morris (674 MTU), West Valley (147 MTU), or other sites (24 MTU).

### High-Level Waste at Four Defense Sites

Highly-radioactive wastes have accumulated at DOE defense sites (particularly Hanford, INEEL and Savannah River) in liquid, sludge, salt cake, slurry, calcine, capsule and other forms. DOE intends to stabilize these wastes in glass columns about 2 feet in diameter and 10 to 15 feet in length. The glass will then be canistered for storage onsite until it can be transported (beginning in 2015***) to Nevada for permanent disposal. This assessment assumes that 19,234 canisters of HLW will be produced.****

## 3.2 WASTE MANAGEMENT ASSUMPTIONS

Any estimate of total systems cost must reflect assumptions regarding how the current and projected inventory will be managed. The assumptions used in this assessment reflect current legislative proposals (primarily Senate Bill 104 and House Bill 1270), recent court decisions (e.g., Northern States Power et al versus USDOE, November 14, 1997), and DOE policies. The question posed is, what is the likely cost of a program which attempts to implement the directives in proposed legislation and the conclusions of recent court decisions? Some of the key waste management assumptions (which are summarized and compared with those of DOE's 9/95 TSLCC in Figure 5) include:

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* It also includes very small amounts of spent fuel discharged from DOE research reactors which is included in DOE's acceptance priority rankings.

** E.g., Clinton, Cooper Station, Duane Arnold, Fitzpatrick, Monticello, Vermont Yankee.

*** DOE TSLCC 9/95, pg. 8.

**** DOE IDB December 1996 pp. 50-51. The estimate increased from 13,789 in IDB September 1995, pp 64-65.

## Figure 5. Waste Management Assumptions: Comparison

| | DOE TSLCC: 9/95 | INDEP ASSESS: 1/98 |
|---|---|---|
| # PERMANENT REPOSITORIES | Single repository for all SNF & HLW.<br>Exceed 70,000 MTU limit for repos #1. | Same<br>Same |
| INTERIM STORAGE | No monitored retrievable or centralized storage facility.<br>SNF stored at reactor sites (at utility expense) until shipped to YM, beginning 2010. | Central storage facility at NTS Area 25.<br>SNF stored at reactor sites (at shared NWF/utility expense) until shipped to YM, beginning 2003. |
| DOE PICKUP: SNF | Begins in 2010 & extends through 2040:<br>Year 1: 300 MTU<br>Year 2: 600 MTU<br>Year 3: 1,200 MTU<br>Year 4: 2,000 MTU<br>Year 5: 3,000 MTU<br>Year 6-30: 3,000 MTU<br>Year 31: 1,854 MTU | Begins in 2003 & extends through 2033:<br>Year 1: 1,211 MTU<br>Year 2: 1,215 MTU<br>Year 3: 2,025 MTU<br>Year 4: 2,011 MTU<br>Year 5 2,704 MTU<br>Year 6-30: 3,021 MTU (Avg)<br>Year 31: 1,179 MTU |
| DOE PICKUP: HLW | Begins in 2015 & extends through 2040:<br>Year 1-23 750 canisters<br>Year 24: 175 canisters<br>Year 25: 345 canisters<br>Year 26: 576 canisters | Begins in 2015 & extends through 2040:<br>Year 1-23 750 canisters<br>Year 24: 750 canisters<br>Year 25: 750 canisters<br>Year 26: 484 canisters |
| INVENTORY | SNF: 83,954 MTU<br>HLW: 18,346 Canisters | SNF: 85,861 MTU<br>82,345 Comm reactor sites<br>3,517 DOE & other<br>HLW: 19,234 Canisters |
| INTERIM STORAGE/ PERMANENT DISPOSAL | SNF is packaged & emplaced as received at the YM repository. | Same |
| NWF OBLIGATIONS:<br>Inventory<br>Waste Mgt Activ<br>Interim strg<br>X-ctry transp<br>Nevada transp<br>Central strg<br>Repository<br>Program mgt | <br>Commercial<br><br>Not Applic<br>Yes, re SNF %<br>Yes, re SNF %<br>Not Applic<br>Yes, re SNF %<br>Yes, re SNF % | <br>SNF at commercial sites<br><br>Shared re pickup start and rate<br>Yes, re SNF %<br>Yes, re SNF %<br>Yes, re SNF %<br>Yes, re SNF %<br>Yes, re SNF % |
| NEVADA TRANSP:<br>Intermodal Transf<br>Heavy-Haul<br>Rail Spur | <br>Not Applic<br>Not Applic<br>Yes, 2010+, _____ miles | <br>Yes, by 2003<br>Yes, 2003-2008<br>Yes, 2008+, 365 miles |
| TRANSP CASKS:<br>Rail<br>Hwy | <br>MPC @ 125/75 tons, as req.<br>High-capacity LWT cask, as req. | <br>Same<br>Same |

| TRANSP CHOICES: | Reactor Facilities | Cask Shipments | Sites | Cask Shipments |
|---|---|---|---|---|
| LWT: Comm SNF in Que | 4 | 1,441 | 26 | 14,769 |
| Other SNF | | | 4* | 2,151 |
| Small rail | 23 | 4,216 | 19 | 5,382 |
| Large rail | 92 | 9,189 | 28 | 4,256 |
| HLW rail | | | 4 | 3,847 |
| Sub-total | 119 | 14,846 | 81 | 30,405 |

* Multiple sites, grouped to 4 for analysis
Note: Some numbers may not add due to rounding.

### A Single Repository for All SNF and HLW

Our assessment assumes that all current and projected SNF and HLW is emplaced in a single repository at Yucca Mountain in Nevada. Implicitly, we assume that Section 114(d) of the NWPA would be changed to authorize DOE to exceed the 70,000 MTU limit for the first repository.* DOE's 9/95 TSLCC makes similar assumptions.

Previous DOE TSLCC assessments have assumed that the first repository would accommodate 62,907 MTU of SNF and 7,093 MTU of HLW.** Under our assumptions, about 22,954 MTU of SNF and about 40,984 MTU of vitrified HLW that would (under provisions of NWPA Section 114d) be stored in a second repository would instead be disposed at Yucca Mountain.***

### A Centralized Storage Facility at NTS Area 25

Our assessment assumes that a centralized storage facility, with capacity to store all SNF accepted and not yet emplaced, would be developed at Area 25 of the NTS. Implicitly, we assume that legislation would override the provisions of the NWPA that interim and permanent facilities should not be in the same state (Section 141(g)) and that the permanent facility must be authorized for construction before an interim facility can be authorized at all (Section 148(d)(1)).

DOE's 9/95 TSLCC, adhering to the provisions of the 1987 Amendments to the NWPA, assumes no Monitored Retrievable Storage or centralized storage facility. Implicitly, it assumes that SNF will be stored at reactor sites (at utility expense) until shipped to Yucca Mountain for permanent disposal.

### Early and Rapid DOE Pickup from Commercial Sites

Proposed legislation would require DOE pickup from commercial sites to begin in 2002 or 2003 (at 1,200 MTU) and rapidly increase (1,200 MTU in year two, 2,000 MTU in year three, 2,700 MTU in year four) to a plateau level of 3,000 MTU per year. Our assessment assumes that operation of a central storage facility begins in 2003, and that thereafter DOE pickup from commercial sites proceeds as specified in proposed legislation.

DOE's 9/95 TSLCC assumes that DOE pickup from commercial sites begins in 2010 (at 300 MTU) and increases gradually (600 MTU in year two, 1,200 MTU in year three, 2,000 MTU in year four) to a plateau level of 3,000 MTU, which extends to 2040. Our analysis accepts DOE's 9/95 assumption

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* An important uncertainty is whether Yucca Mountain can be shown to have the capacity to safely emplace SNF and HLW in such volume.

** E.g., DOE TSLCC May 1989 Tables A-3&4 (two-repository system).

*** SNF: 85,861 MTU projected inventory - 62,907 MTU in first repository = 22,954 MTU
HLW: 48,077 MTU projected inventory - 7,093 MTU in first repository = 40,984 MTU
19,234 canisters times estimated MTU per canister at Hanford, Savannah River, INEEL and West Valley = 48,077 MTU vitrified HLW.

that pickup of HLW from four defense sites begins in 2015 and extends (at a plateau rate of 750 canister shipments per year) until all canisters have been removed to Nevada.

### Intermodal Transfer and Heavy-Haul

There is currently no rail link to Yucca Mountain. Our assessment assumes that the development of a long rail spur would begin in FY 2002 and would require at least five years. Furthermore, shipment of the volumes anticipated entirely on public highways is assumed to be unacceptable. Therefore, our assessment, consistent with proposed legislation, assumes that early shipment requires an intermodal transfer facility at Caliente and heavy-haul operation on Nevada's public highways. We further assume that heavy-haul through Las Vegas or across the NTS is infeasible; therefore, heavy-haul shipments are routed north of the Nellis Air Force Range to Tonopah, then south along US 95 to Yucca Mountain.

DOE's 9/95 TSLCC assumes that shipments begin in 2010, by which time a rail spur to Yucca Mountain would be available. Under these waste management assumptions, rail shipments would not require heavy-haul in Nevada to reach Yucca Mountain.

### Central Storage at NTS Area 25

Consistent with provisions of proposed legislation (HR-1270), our assessment assumes that, as SNF is received in Nevada (beginning in 2003), it would be stored above-ground at a centralized facility at NTS Area 25 until the repository is ready for operation in 2010. We further assume that SNF which arrives uncanistered (by legal-weight truck) will be stored in metal casks, while SNF which arrives in dual-purpose canisters (by rail/heavy-haul) will be placed in concrete storage facilities.

DOE's 9/95 TSLCC assumes that SNF and HLW is packaged and emplaced (for permanent disposal) as it is received at the Yucca Mountain repository, which is assumed to begin operation in 2010.

### Federal Government Obligation for Onsite Storage at Commercial Reactor Sites

As a result of the November 14, 1997 court decision in Northern States Power et al versus USDOE (and follow-on litigation to specify the implications of that decision), our assessment assumes that the federal government will have a financial obligation for continued onsite storage of SNF after it would have been picked up under an oldest-fuel-first priority ranking beginning in 1998. A calculation of the annual inventory at each site under the two cases (pickup beginning in 1998 and proceeding at S-104 rates versus pickup beginning in 2003) provides the basis for calculation of the federal government and NWF obligation for extended onsite storage at commercial reactor sites.

DOE's 9/95 TSLCC implicitly assumes that the federal government has no obligation for onsite storage of SNF at commercial reactor sites—even though pickup would not begin until 2010.

### Canisters and Casks for Storage and Transportation

Our assessment assumes that a dual-purpose canister system for rail shipments (and storage onsite and/or at a centralized facility) would be made available. But utilities are under no obligation to use it in onsite dry storage, and, as long as early shipment is a prospect, may not, given the circumstances at

particular reactor sites, have a financial incentive to do so. We have analyzed the circumstances at 77 sending sites and identified 16 which appear to have a financial incentive to use dual-purpose canisters for onsite storage in a program in which pickup begins in 2003. While a high-capacity LWT cask is currently not certified, we assume that such a cask would be made available in order to reduce (by a factor of four) the number of cask shipments on public highways.

DOE's 9/95 TSLCC assumes that a multiple-purpose canister system is developed by DOE and certified by NRC, as is the high-capacity cask for legal-weight truck shipment of uncanistered SNF. It further assumes that these federally-developed systems are used in preference to other storage/transportation systems.

### Transportation Mode and Cask Choices

Based on a review of pool loading capabilities (e.g., operating crane capacity, cask set-down area, pool depth) at commercial reactor sites, our assessment assumes that as many as 26 sites (36 percent) will choose to ship by legal-weight truck. Utilities have no financial incentive to upgrade pool loading capabilities merely to facilitate rail shipment rather than shipment by LWT, which is legal under USDOT regulation.

Though DOE has made no commitment to transport rail casks by dedicated train, and has a long-standing challenge to rail carrier estimates of the cost of dedicated train shipment, we assume that SNF mixed with general rail freight would be unacceptable, and that dedicated trains would be used for all rail shipment.

DOE's 9/95 TSLCC assumes that, of 119 reactor facilities, only 4 (3.4 percent will ship by legal-weight truck. Further "all SNF rail shipments are assumed to be made by dedicated train."*

## 3.3 THE TOTAL SYSTEM COST CATEGORIES

The waste management assumptions described above require an analysis of total system cost in seven major categories, several of which have not been addressed in previous DOE TSLCC assessments.

### Extended Onsite Storage (Master Code 1.0)

This assessment estimated the costs of extended onsite storage for 73 commercial reactor sites (master code 1.1), assuming DOE pickup beginning in 2003 rather than in 1998. Onsite storage costs include: the costs of dry storage for SNF discharges in excess of current pool capacity, the cost of operating spent fuel pools as interim storage facilities after shutdown of their associated reactors, and the cost of limited upgrades of pool loading capabilities to accommodate casks of a specified type, size and weight.**

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* DOE 9/95 TSLCC, pg. 8.

** The NWF obligation for these costs is based on the projected inventory at each site compared to the projected inventory had DOE pickup begun in 1998 and proceeded at S-104 rates.

This category also includes the costs of extended onsite storage of SNF not stored at commercial reactor sites (master code 1.2). For this analysis, multiple sites (Morris, Ft. St. Vrain, West Valley, DOE defense sites, university research reactors) are combined into four, and inventory estimates in MTU are translated into BTU assembly equivalents. The analysis assumes all such costs are supported by defense appropriations, except for those at Morris.

HLW at four defense sites will require vitrification, canistering and onsite storage while awaiting shipment to Yucca Mountain (master code 1.3). However, such costs are assumed to be the responsibility of the DOE Office of Environmental Restoration and Waste Management, not DOE/OCRWM.

### Cross-Country Transportation (Master Code 2.0)

Cross-country transportation includes the cost of high-capacity casks for LWT shipment of uncanistered SNF and the cost of rail casks for shipment of canistered SNF or HLW; the cost of trailers for LWT shipment and cask and buffer cars for rail shipment; the cost of operating, maintaining, replacing and decommissioning this equipment; the carrier, escort and inspection costs for LWT and rail shipments; and the cost of heavy-haul to a nearby railhead for rail shipment from sites which do not or no longer have a rail spur. These costs are estimated for transportation of commercial SNF stored at commercial reactor sites (master code 2.1), other SNF (master code 2.2), and HLW (master code 2.3).

Also included in cross-country transportation is an estimate of the costs of technical assistance training required of DOE/OCRWM under NWPA Section 180(c) (master code 2.4)

### Nevada Transportation (Master Code 3.0)

Cross-country transportation includes the cost of LWT shipment to Yucca Mountain, and of rail shipment to Caliente (NV). Nevada transportation includes the costs of moving rail casks from Caliente to the central storage facility at NTS Area 25 or the geologic repository at Yucca Mountain. These include the cost of an intermodal transfer facility at Caliente (master code 3.1), a heavy-haul operation between Caliente and the central storage facility (master code 3.2), and the construction and operation of a government-owned rail spur between Caliente and Yucca Mountain (master code 3.3).

### The Centralized Storage Facility (Master Code 4.0)

The costs of a centralized storage facility at NTS Area 25 include: the costs of designing and licensing such a facility (master code 4.1), the costs of site development and facility construction (master code 4.2), the costs of storage equipment (master code 4.3) and of facility operations (master code 4.4). The costs of storage equipment include the costs of metal casks for SNF arriving uncanistered by LWT and concrete storage for SNF arriving by rail in dual-purpose canisters. Storage equipment also includes the cost of dual-purpose canisters for rail shipments from 31 reactor sites at which onsite storage has used pools or dry-storage in storage-only canisters. The estimates reflect the projected inventory at the CSF, considering both the flows of SNF shipped to Nevada and those emplaced for permanent geologic disposal.

### The Geologic Repository (Master Code 5.0)

Repository costs include the actual expenditure for "first repository" development and evaluation through FY 1996, and the costs of completing site characterization at Yucca Mountain (master code 5.1), the design and license application costs at Yucca Mountain (master code 5.2); the cost of constructing, equipping and operating surface facilities (master code 5.3) and underground facilities (master code 5.4); and the cost of about 11,000 waste containers for emplacement of 85,861 MTU of SNF (master code 5.5).

### Other Development and Evaluation Costs (Master Code 6.1)

Other development and evaluation costs include fees paid to the Nuclear Regulatory Commission (master code 6.1), and support for the Nuclear Waste Technical Review Board (master code 6.2). These costs are not independently estimated. Estimates from the DOE 9/95 TSLCC (converted to FY'96$) are applied in this assessment.

### Other Program Costs (Master Code 7.0)

Other program costs include payments equal to taxes (master code 7.1) and benefits (master code 7.2) as provided for under NWPA Sections 116(c)(3) and 170-171. Estimates from the DOE 9/95 TSLCC (converted to FY'96 $) are applied in this assessment. However, an estimate of additional PETT related to components not included in the current DOE program (Nevada transportation and centralized storage) is included, based on the construction and major equipment costs of these facilities.

### Contingency Costs

Continency costs are estimated as a percentage of direct costs in the categories above. A review of projected costs in the DOE 9/95 TSLCC was conducted, relating contingency to base costs for various cost elements. The results were used as points of reference for estimating contingency costs in this assessment. A 15 percent contingency factor was used for onsite storage, cross-country transportation and the intermodal transfer portion of Nevada transportation. A 20 percent contingency factor was used for the heavy-haul and rail spur portions of Nevada transportation and for repository costs other than site characterization. Lower contingency factors were used for the completion of Yucca Mountain site characterization and for other development and evaluation and program costs. Overall in this assessment, contingency comprises 11.0 percent of total projected costs, and 16.3 percent of direct costs.*

Contingency addresses the potential for complications in the implementation of the program components as described—complications in scheduling, meeting state-local and federal regulations, construction, procurement or hiring. As applied in this assessment, contingency does not address the major uncertainties in the program—e.g., the potential for major accidents,** special construction

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* By comparison, in DOE's September 1995 estimate of TSLCC, contingency comprises 14.1 percent of total projected costs and 18.6 percent of "base" costs.

** Contracted emergency response is included for two incidents (not involving releases or fatalities) in heavy-haul operations (master code 3.2) and nine incidents in rail spur operations (master code 3.3).

problems, unanticipated licensing requirements, etc. Such uncertainties are discussed in section 2.2 of this report.

### Project Management Costs

This study included an assessment of project and program management costs in the DOE/OCRWM program in fiscal years 1988-1996. Using annual reports of DOE/OCRWM expenditures, selected budget and reporting codes were identified as "project" or "program" management, and tabulated for the relevant fiscal years, thus dividing total costs into three broad categories—direct costs, project management costs, and program management costs. Distinct from program management, which involves overall direction of the DOE/OCRWM program, "project management" is the management of specific activities for which direct costs have been estimated. This tabulation suggests that project management comprised 24.1 percent of direct costs over the nine-year period FY 1988-96, and 23.9 percent over the most recent five-year period FY 1992-96. Project management costs in the Yucca Mountain project (B&R category 1.2) have been higher than in the DOE/OCRWM program overall—31.2 percent in the FY 1988-96 period, and 28.3 percent in the FY 1992-96 period.

The above analysis was used as a point of reference in estimating project management costs associated with projected direct expenditure. In most categories, project management is estimated at 15 percent of direct costs plus one-third of contingency costs. In some categories (e.g, technical assistance training (master code 2.4), site characterization (master code 5.1.1), other development and evaluation (master code 6.0), and other program (master code 7.0) costs, project management is assumed to have been included in direct costs. Overall in this assessment, project management comprises 9.2 percent of total projected costs, and 13.6 percent of direct costs.

### Program Management

The assessment described above also estimated program management costs in the DOE/OCRWM program, representing these as a percentage of all other (direct and project management) costs. Generally but not exclusively or necessarily conducted at DOE's headquarters in Washington, program management involves the overall direction, advocacy, coordination and financial management of the DOE/OCRWM program. The assessment suggests that program management costs comprised 8.3 percent of all other costs over the nine-year period FY 1988-96, and 15.1 percent over the more recent five-year period FY 1992-96.

The analysis of recent DOE/OCRWM expenditure was used as a point of reference in estimating program management costs associated with other projected expenditure. In most cost categories, program management was estimated at 15 percent of the subtotal of direct, contingency and project management. Overall, program management comprises 12.5 percent of total projected costs, and 14.2 percent of the direct, contingency and project management cost sub-total.

## 3.4 WASTE MANAGEMENT SCHEDULE: PICKUP, INTERIM STORAGE, EMPLACEMENT

Several schedules must mesh in a national waste management program—the schedules by which spent fuel is discharged from nuclear reactors (or HLW vitrified and canistered at DOE defense sites) and stored onsite while awaiting pickup, the start date and rate of DOE pickup of SNF and HLW for transport to the central storage facility or repository, and the rate at which SNF and HLW is emplaced in the

geologic repository. These rates determine the inventory in onsite storage, the inventory in transit, the inventory in centralized above-ground storage, and the inventory emplaced in each year of the waste management program. These inventories, or their year-to-year changes, drive the cost streams in this assessment. The inventory assumptions are discussed in section 3.1, above. This section discusses the schedules for DOE pickup and emplacement.

### Priority for Pickup of SNF

DOE pickup from commercial reactor sites is estimated on an oldest-fuel-first basis,* using the overall acceptance rates specified in currently proposed legislation, and summing for all storage locations at a particular site. This results in different pickup schedules at each commercial reactor site—depending on the start of commercial operations and the rate of discharges at each reactor relative to others across the nation. Thus, for example, pickup at Big Rock Point, which began commercial operation in March 1963, would start in year 1, while pickup at Callaway (commercial operations: December 1984) would begin in year 7, and pickup at Braidwood (commercial operations: July 1988) would begin in year 9.

### Pickup Start Date and Schedule

If pickup begins in 2003 as assumed in this assessment, and proceeds at rates specified in current legislation (at least 1,200 MTU in years one and two, at least 2,000 MTU in year three, etc.), 81,683 MTU will have been picked up through 2031 (year 29 of the acceptance and transportation program). This assessment assumes that the remaining SNF at commercial reactor sites (662 MTU) would be picked up in 2032,** along with 2,338 MTU of SNF stored elsewhere. The remaining SNF not stored at reactor sites would be picked up in 2033.

Consistent with DOE assumptions in its 9/95 TSLCC, this assessment assumes that pickup of HLW begins in 2015 and proceeds at 750 canisters annually until all are removed from their current storage sites. At this rate, shipment of currently projected HLW canisters would extend through 2040.

This assessment prioritizes pickup of HLW based on the cumulative production and storage of canisters at each site (Hanford, INEEL, Savannah River, West Valley). This prioritization may not meet the terms of agreements between DOE and the host states for its facilities. For example, canister production at INEEL is projected (IDB December 1996) to extend through 2035 and pickup would extend through 2040.

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* As described in the "standard contract" (10 CFR 961).

** Some SNF may not have been discharged from reactors. Shutdown at Comanche Peak 2, for example, is scheduled for February 2033. The study assumes that the final discharges from Comanche Peak, Limerick 2 and Vogtle 2 are available for pickup in year 30, and do not require a hiatus in a shipment campaign which proceeds at S-104 rates.

### Implications for Reactor Sites

This assessment assumes that a central storage facility at the NTS (and the associated intermodal transfer facility at Caliente and heavy-haul around Nellis Air Force Range) begin operation in FY 2003, not in 1998 when the federal government obligations for commercial waste management begin. For example, given the priority of its discharges, the Beaver Valley site can expect pickup of 16.1 MTU in year four, 48.7 MTU in year five, and 35.2 MTU in year six—that is, 2006, 2007, and 2008 assuming DOE's first pickup year is 2003.

### Implications for the Nuclear Waste Fund

In a November 14, 1997 decision, the US Court of Appeals for the District of Columbia Circuit concluded in Northern States Power et al versus USDOE that the federal government has an obligation under the standard contract (NWPA Section 302) to remediate utility costs attributable to delays in pickup start date or shortfalls in pickup rates. However, it declined to specify the remedy until delays actually begin, and it did not determine whether the costs of delay would be drawn from the Nuclear Waste Fund or from some other source such as the general fund.

In the absence of a court-approved formula, this assessment allocated the costs of delay based on an estimate of the projected inventory at each site (assuming pickup beginning in 2003 and proceeding at S-104 rates) compared to the inventory had pickup begun in 1998. The percentage of the projected inventory which would have been picked up had pickup begun in 1998 is applied to subtotal of costs for dry storage, pool operations after reactor shutdown and pool loading upgrades. The resulting estimated costs of delay are assumed to be an obligation of the Nuclear Waste Fund.

The estimated NWF obligation for onsite storage costs varies by site and by year. Overall, the NWF obligation is about 52.2 percent of the direct costs of dry storage, pool operations after reactor shutdown and pool loading upgrades at commercial reactor sties. The percentage is higher for sites that ship by legal-weight truck and sites that ship by rail after dry storage in storage-only canisters than for sites that ship by rail after storage in dual-purpose canisters.

## 3.5 COST ANALYSIS PROCEDURES: SITE-BY-SITE ANALYSIS

This assessment conducted a site-specific analysis for 73 commercial reactor sites, 4 sites* where DOE and other SNF is stored, and 4 HLW sites. The site-specific analysis estimates the annual inventory in pools and in dry storage; the DOE pickup from each site and the number of cask shipments by transportation mode and cask type; onsite storage costs (dry storage, pool operations after reactor shutdown, pool loading upgrades, additional dual-purpose canisters required for rail transport, and necessary heavy-haul to nearby rail heads); and the NWF obligation for onsite storage costs due to pickup delay. Site-by-site estimates of annual cask shipments (by transportation mode and cask type) provide the basis for estimates of transportation costs (cask shipment, escort and inspection; transportation cask and equipment purchases, operations and maintenance, and decommissioning), and (combined with assumptions regarding emplacement) the type, number and cost of storage equipment required at the central storage facility.

* Multiple sites, grouped as four for this assessment.

**Site-by-Site Information**

The following information was collected or developed for the reactors, pools and dry storage facilities at each site:

- The current (1995) inventory in each pool (joined or shared pools were treated as a single wet storage location) and existing dry storage facility.

- The projected additional discharges from each reactor to each pool. An analysis of the origin and storage location of SNF discharges through 1995 was used to allocate projected discharges from reactors to pools.

- The license shutdown date of each reactor and its associated pool. Information from the NRC Information Digest (1996 Edition) was used; joined or shared pools received the latter shutdown date among the reactors served.

- The maximum capacity (in assemblies ) of each pool, and the full core reserve to be added to that capacity upon shutdown of the associated reactor. This information was assembled from DOE's June 1995 projection of spent fuel storage requirements (DOE/RW-0431).

- The operating cost of each pool during reactor operations and after reactor shutdown. In absence of reliable data which distinguishes the cost of reactor and pool operations, we applied an average annual cost for pool operations, adjusted for the size of PWR and BWR pools at individual sites.

- The mode and cask for shipments from each storage location at each site. This study used the results of an assessment of "current capabilities" transportation choices published in July 1996.* (The second strategy option for onsite storage was associated with the "MPC Base Case" transportation choices developed in the same assessment.) As mentioned, under current capabilities transportation choices about 44 percent of storage locations ship by LWT, versus about 21 percent in the MPC base case assessment and 3.4 percent in DOE's September 1995 TSLCC.

- Requirements to upgrade pool loading capabilities in order to ship casks of the specified type. These requirements were based on a review of data collected in DOE's 1990 Facility Infrastructure Capacity Assessment, and an assessment to relate loading capabilities to the dimensions and loaded weight of the high-capacity LWT cask and the small and large rail casks assumed for this assessment.

- Requirements for heavy-haul to a nearby rail spur. The requirements were based on review of data collected in DOE's 1990 Near Site Transportation Infrastructure study, and an assessment to relate near-site infrastructure capabilities to transportation choices (i.e., rail or LWT) at each site.

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* The Transportation of Spent Nuclear Fuel and High-Level Waste, NV NWPO, July 1996, pg 39.

- The pickup schedule for spent fuel and HLW at each site, given a start date and pickup rate for all projected spent nuclear fuel stored at commercial reactor and other sites, as discussed in section 3.4, above.

### The Inventory Flow at Storage Sites

The information described above was applied in a model of inventory flow for each of 73 commercial reactor sites.* In the model:

- Additional discharges (after 1995) from a reactor are stored in a designated pool until the pool capacity is reached. Discharges in excess of pool capacity require dry storage. It is assumed that dry storage could be provided at any site where it may be required, and would be provided to meet additional storage requirements in excess of pool capacity.

- Two strategies for onsite storage are available for each site: The first option assumes that at least one pool is retained in operation for interim storage and that necessary dry storage uses storage-only canisters. Pickup is prioritized among spent fuel locations in such a way that a pool (rather than dry storage is the last storage facility at a site to shutdown). An operating pool is used to load all legal-weight truck or rail transportation casks.

  In the second onsite storage strategy option, pool inventories are moved to dry storage in the years after reactor shutdown, and dry storage uses dual-purpose canisters. Pickup is prioritized in such a way that pools shut down prior to dry storage facilities; dual-purpose canisters are loaded dry to rail transport casks.

- In a preliminary run, the onsite storage costs for each option were compared for each site—given the assumptions for pickup start date, rate and priority in this scenario. The second option for onsite storage was assumed for 16 rail shipment sites for which onsite storage costs under option two are at least ten percent below those for option one. This assessment assumes that utilities select a strategy for onsite storage based on cost, given reasonably credible expectations for DOE pickup—not in order to facilitate a desirable overall plan for cross-country transportation or centralized storage, the costs for which are the obligation of the Nuclear Waste Fund, not individual utility ratebases.

### Dry Storage Costs (Master Code 1.1.1, 1.2.1)

A May 1995 study by Energy Resources International, "Utility At-Reactor Spent Fuel Storage Requirements and Costs" estimated the costs of a 500 MTU dry storage facility operated over 20 years, considering the upfront, incremental, operating and decommissioning costs of such a facility. Total costs were estimated at 34 to 50 million, of which the incremental costs of metal storage canisters, concrete bunkers, loading and consumables comprise 60-65 percent.

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* Hope Creek and Salem reactors (owned by Public Service Electric and Gas Company) were combined as a single storage/shipment site. Fitzpatrick (owned by the Port Authority of New York) and Nine Mile Point (owned by Niagara Mohawk Power) were combined as a single storage/shipment site.

Using the framework of the ERI study, an analysis was conducted to apply the results in a model of inventory flow which estimates the annual inventory requiring dry storage at a particular site.

- Upfront costs (licensing, construction, equipment, engineering and startup testing) are incurred two years ahead of a projected need for additional dry storage. However, with the exception of equipment, all upfront costs are reduced by 25 to 33 percent for subsequent 500 MTU facilities that may be required at a particular site.

- Incremental costs (storage-only canisters, concrete overpack, pad extensions, loading) are incurred with increases in the dry storage inventory at a particular site. The ERI estimate of incremental costs for a 500 MTU dry storage facility are apportioned among the total PWR or BWR assemblies that could be stored at such a facility, and applied in this assessment as the needs occur.

- Annual operations costs (NRC fees, security, monitoring) are incurred in each year that a 500 MTU facility has inventory. For subsequent dry storage facilities that may be required at a particular site, operations costs are reduced 25 to 33 percent.

- Decommissioning costs are estimated at 12.5 percent of the initial (incremental) cost of storage-only canisters, concrete overpack and pads—i.e., the elements likely to be radioactively contaminated. These costs are incurred in the year after the facility's shutdown.

- Under the second option for dry storage at a rector site, the cost of canisters is increased by 50 percent to reflect the robust dual-purpose canister used, but the decommissioning costs attributable to storage-only canisters (about 12.5 percent of purchase costs under option 1) are eliminated as an on-site storage cost, since the dual-purpose canister would be used for transportation as well as on-site storage.

### Pool Operations After Reactor Shutdown (Master Code 1.1.2, 1.2.2)

In this assessment, pool operations are an onsite storage cost only in years after reactor shutdown. Otherwise, pool operations are considered a cost of operating the associated reactor. Data which reliably distinguishes the cost of reactor operations from those of associated pools were not available to this study. Industry sources have estimated pool operations costs at $8.0 million annually after shutdown. This assessment assumes that the average annual cost of pool operations is $6.3 million, a cost which is adjusted for the size of PWR and BWR pools at various reactor sites.

### Pool Loading Upgrades (Master Code 1.1.3)

Though the transportation choices assumed in this assessment conform to current pool loading capabilities at reactor sites, some improvements to operating crane capacity, cask set-down area or pool depth are nevertheless required at a few sites—based on the assessment of current conditions conducted in a recent transportation study.* Greater emphasis on rail over legal-weight truck transport, or on the

* The Transportation of SNF and HLW: A Systematic Basis for Planning and Management at National, Regional and Community Levels (July 1996), Nevada NWPO.

use of large rail over small rail casks, would require greater investment to upgrade pool loading capabilities at more reactor sites.

### Cask Shipment (Master Code 2.1.1, 2.2.1, 2.3.1)

Annual cask shipments by site and transportation mode/cask provide the basis for estimates of cask shipment miles and for truck or rail carrier costs, using revenues per ton-mile factors. Rail shipment miles are estimated based on default (least-time, using Class A railroads) routes from the origin site or the nearest railhead to Caliente. Highway shipment miles are based on the default (least-time, using interstate highways) routes from the origin site to Yucca Mountain. Each shipment includes a backhaul to the next pickup; backhaul milage is based on the average milage of one-way shipments for each cask type.

The tonnage includes the estimated weight of the loaded cask and its trailer or cask car, plus (in the case of rail shipments) the weight of buffer cars and ballast used in dedicated trains. The backhaul tonnage is adjusted for the weight of SNF or HLW removed at the central storage facility or repository. The revenues per ton-mile factors are based on an evaluation of information regarding the tonnage, revenue and average haul of general and hazmat rail and truck freight shipments received from the American Railroad Association and American Trucking Association. The rates for rail shipment used in this assessment are about five times general freight rates, and the rates for highway shipment are about three times general freight rates. These estimates may be conservatively low, given the special attention required in shipment of high-level radioactive waste, and the effects of dedicated train shipment on other freight traffic on Class A railroads.

### Shipment Escort (Master Code 2.1.2, 2.2.2, 2.3.2)

This assessment assumes that each legal-weight truck cask shipment and each dedicated train is escorted. The costs are estimated on a per hour basis, considering the number of casks in the shipment and the average speed of the cross-country shipment.

### Shipment Inspection (Master Code 2.1.3, 2.2.3, 2.3.3.)

This assessment assumes that each shipment is inspected twice—once en route at a designated crew change location or safe haven, and once on arrival at the central storage facility or repository in Nevada. Inspections include not only the casks but the shipment tackle, the truck trailers or rail cask cars, and the truck or locomotive. Inspection costs are estimated on a per inspection basis.

### Transportation Cask and Equipment Purchases (Master Code 2.1.4, 2.2.4, 2.3.4)

This assessment assumes that casks and transportation equipment will be purchased for use exclusively in the shipment campaign. Purchases include transportation casks of the type and number required in a particular shipment year, the purchases of truck trailers and rail cask (or buffer) cars used in cross-country shipment, and the replacement of casks and equipment after 20 years—regardless of the level of use, but only if shipments continue to be made.

The requirement for casks-on-hand is the annual number of cask shipments of a particular type, divided by the annual number of round trips (turnover). We assume 15 round trips per year for all cask types, even though the particulars vary. (For example, the average one-way travel time is 49 hours for

LWT shipments versus 83 hours for small rail and 93 hours for large rail shipments. The shipment preparation and/or inspection for a dedicated train might be greater than for a LWT shipment). The estimated costs for casks and equipment are drawn from sources in the nuclear industry.

### Transportation Cask and Equipment Operations and Maintenance (Master Code 2.1.5, 2.2.5, 2.3.5)

Annual operations and maintenance costs are estimated as a percentage of the initial purchase costs, but are applied only to the extent that the cask and equipment is in use in a particular year. The annual use of the cask and equipment inventory is estimated by comparing cask shipments with fleet capacity. The cask shipment capacity of the fleet is estimated by multiplying the number of casks in the inventory by annual turnover. Cask shipments divided by fleet capacity gives the fleet capacity in use. Except for HLW shipments, which are assumed to proceed (from four defense sites), at a steady 750 canisters per year, annual variation in cask shipments reduces the fleet capacity in use to under 50 percent.

### Transportation Cask and Equipment Decommissioning (Master Code 2.1.6, 2.2.6, 2.3.6)

Decommissioning costs are incurred as the casks and equipment go out of service and are estimated as a percentage of original purchase costs. Rail cask cars and truck trailers are assumed to have some salvage value which offsets the decommissioning costs of the casks themselves.

### Heavy-Haul to Rail Head (Master Code 2.1.7)

Several sites which, under the assumptions used in this assessment, would choose onsite storage option two do not or no longer have an onsite rail spur. The cost of heavy-haul to a nearby railhead is estimated based on a cost per shipment plus a cost per ton-mile, and is assumed to be the obligation of the Nuclear Waste Fund.

### Centralized Storage of SNF Arriving Uncanistered (Master Code 4.3.1)

This assessment assumes that SNF arriving uncanistered at the centralized storage facility is placed in metal casks for above-ground storage. The metal casks are assumed to be similar to the NAC ST cask, with capacity for 57 BWR or 27 PWR assemblies. The number of such casks required is based on the cumulative inventory arriving at the central storage facility by legal-weight truck, less the cumulative inventory emplaced (assuming the same emplacement rates for SNF which arrives at the CSF canistered or uncanistered). The cost for metal casks is estimated on a per cask basis, assuming no operation and maintenance cost, and a need to replace only five percent after 20 years.

### Centralized Storage of SNF Arriving Canistered (Master Code 4.3.2)

This assessment assumes that SNF arriving in dual-purpose rail canisters is placed in concrete bunkers or vaults for centralized above-ground storage. The cost for construction and decommissioning of concrete storage facilities is estimated on a per assembly basis, using factors consistent with those used in estimates of the incremental costs of onsite dry storage.

### Additional Canisters Required for Rail Shipment (Master Code 4.3.3)

Rail shipment sites which have (under onsite storage option one) used storage-only canisters or spent fuel pools for onsite dry storage require dual-purpose canisters for rail shipment. The cost of such canisters (consistent with the cost of those purchased for onsite dry storage) is incurred at pickup and is the obligation of the Nuclear Waste Fund.

## 3.6 COST ANALYSIS PROCEDURES: NEVADA COMPONENTS

Standard engineering analysis procedures were used to estimate the design, construction, equipment and operations costs of Nevada components of the DOE/OCRWM waste management program—intermodal transfer at Caliente, heavy-haul between Caliente and NTS Area 25, rail spur construction and operations between Caliente and Yucca Mountain, centralized storage at NTS Area 25, and geologic disposal. A design concept for each of these components was developed through review of DOE and other sources, then detailed in over 200 cost items, sub-items and elements. Each cost item or element was described or dimensioned, then costed in terms of units purchased at a specified unit cost. Unit costs were developed from standard construction and other industry sources. The allocation of item costs to years in which costs are incurred was based on the overall schedule for transport and emplacement assumed for this assessment and discussed in section 3.4, above.

### Intermodal Transfer Facility (Master Code 3.1)

Thirty-five cost items and elements are considered in estimating the cost of constructing and operating an intermodal transfer facility at Caliente. Major items include the construction of a rail spur to the site and the construction of rail sidings (20 car capacity); the purchase of two switch engines; the installation of a 150-ton crane, the construction of a wastewater treatment plant (1,500 person capacity) for the town of Caliente;* and the construction of a truck service center. Over 40 percent of total systems cost for this component is the cost of staff, utilities and equipment maintenance over a 62-month operations period.

### Heavy-Haul to NTS Area 25 (Master Code 3.2)

Twenty-four cost items and elements are considered in estimating the cost of heavy-haul from Caliente around the north and west sides of the Nellis Air Force Range to a central storage facility at NTS Area 25. Major costs include the construction of slow lanes (up and downgrade); the upgrading of existing road surface and selected road base and bridges; the purchase of major equipment for the heavy-haul operations (transporters, tractors, pusher trucks, escort vehicles, communications); and the consumables (tires, fuel, etc.) for the heavy-haul operation.

### Rail Spur Construction and Operation (Master Code 3.3)

The 365-mile rail spur from Caliente to Yucca Mountain is costed as a government owned and operated "short-line" railroad. Twenty-two cost items are considered, of which by far the largest is the construction of the 365-mile single track rail line. Other significant items include the cost of staff and other operations over a 33-year period; the design costs for the rail line and its ancillary facilities, the

* As specified in Senate Bill 104.

purchase of locomotives, signal systems and other major equipment; and cost of periodic overhaul of major equipment.

### The Central Storage Facility (Master Code 4.0)

Thirty-eight cost items and elements are considered in estimating the cost of the facility for centralized above-ground storage at NTS Area 25. By far, the largest is the cost of metal and concrete storage for SNF arriving canistered and uncanistered but not yet emplaced (see section 3.5, above). Other major items include the construction of storage pads and access alleys; the construction of a large reinforced concrete transfer facility (used in part as a staging location for the accumulation of uncanistered SNF to be loaded into metal storage casks); and the cost of staff, utilities and equipment maintenance during operation.

### The Repository (Master Code 5.0)

Ninety cost items and elements are considered in projecting the cost for completing site characterization at Yucca Mountain and for construction and operation of the geologic repository. The major surface facility items are the construction of a waste handling building and a disposal container receiving facility. Major underground construction includes the cost of driving service and emplacement drifts and turnouts. The cost of staff, utilities and equipment maintenance (above-ground and underground) during emplacement, care-taking and closure/decommissioning is a major cost, as is the cost of designing surface and underground facilities (upfront and ongoing during operations). The purchase of about 11,000 containers for emplacement of SNF is also a major cost.

## 3.7 COST PROCEDURES: OTHER PROGRAM COMPONENTS

Several other program components considered in previous DOE estimates of TSLCC do not lend themselves to cost assessment via the site-by-site analysis used for onsite storage and transportation or the engineering cost analysis used for Nevada components.

### Technical Assistance Training: NWPA Section 180 (c) (Master Code 2.4)

This analysis estimated the cost of technical assistance training required by NWPA Section 180(c) to prepare affected states, counties and Indian tribes to effectively prepare for and respond to emergencies (accidents or incidents) in a shipment campaign involving (under assumptions used in this assessment) 30,400 cask shipments and 65 million cask shipment miles by rail and truck. The state, local and Tribal responsibilities are for "awareness" and "first response", and do not include the full cost of responding to, or cleaning-up after, accidents or incidents.

Costs are estimated in terms of estimated annual payments to 40 states,* 10 particularly affected counties, 4 regional organizations of states, and an unspecified number of Indian Tribes and organizations. The costs also include contracts and agreements (with federal agencies and labs) to prepare and deliver the training.

Costs are assumed to begin two years ahead of the first shipment (2003 in this assessment) and to extend at a relatively high "gear-up"level over ten years, then to continue at a lower "maintenance"

* Two groups of five states are assumed to be affected to a greater degree than the remaining 30.

level throughout the SNF shipment campaign, and at an even lower level during the remaining years of the HLW shipment campaign.

### Repository Site Characterization (Master Code 5.1)

Through FY 1996, DOE expended $4,376 million (FY'96$) on characterization of the nation's first geologic repository for high-level radioactive wastes. Of this, $2,768 million (63.3 percent) was spent at Yucca Mountain, $691 million (15.8 percent) at the Hanford site in Washington, and $741 million (16.9 percent) at the Deaf Smith County site in Texas. An additional $158 million was spent in the mid-1980's in preliminary characterization for the nation's second repository.

In 1991, DOE estimated that characterization at Yucca Mountain would require expenditure of $6,531 million, of which $1,869 million is included in DOE's funding request for FY 1997 or its projected funding requirements for FY 1998-2002. The difference between the 1991 estimate ($6,531 million) and the expenditure through FY 1996 ($4,376 million) is included as the remaining expenditure for site characterization in this assessment. This estimate is assumed to include contingency and project management. The cost of the recently-authorized east-west tunnel in the exploratory studies facility (estimated via engineering costing procedures) is included in addition to the site characterization estimates from 1991. Note that DOE's estimate of funding requirements for site characterization "reflect activities specified in the revised Program Plan through submission of a license application to the Nuclear Regulatory Commission"*—implying that site characterization does not include activities subsequent to submission of the license application, or not reflected in the current Program Plan.

### Other Development and Evaluation Costs (Master Code 6.0)

All DOE expenditure to-date has been "development and evaluation"—a broad category which includes the exploratory studies facility at Yucca Mountain, site characterization at Yucca Mountain and other sites, and various planning activities related to waste acceptance, transportation, and interim or monitored retrievable storage.

In this assessment, projected expenditure for development and evaluation are specified for Yucca Mountain site characterization (master code 5.1) or included in estimates for program management. However, DOE's 9/95 TSLCC included estimates for NRC fees, support of the Nuclear Waste Technical Review Board and the Nuclear Waste Negotiator (whose activities began in 1990 and were terminated in 1995). This assessment uses DOE's estimates (adjusted to FY'96$) for these "other development and evaluation costs"—even though the waste management assumptions for this assessment could require activity by NRC, the NWTRB and other review or regulatory agencies which was not anticipated in 1995.

### Other Program Costs (Master Code 7.0)

This assessment uses DOE's 9/95 estimates (adjusted to FY'96$) for Payments Equal to Taxes and Benefits. However, several program components required by the waste management assumptions of this assessment (intermodal transfer, heavy-haul, rail spur and centralized storage) were not anticipated in previous estimates of TSLCC. For these components, PETT was estimated based on the direct construction and major equipment costs of the facilities that would form an assessment base were the

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* Civilian Radioactive Waste Management Program: Funding Requirements (FY 1997-FY 2002), Table 3.

facilities privately-owned and operated. Other factors are the years in which PETT is applicable, the assessment rate (35 percent in Nevada), tax rates (selected FY'96 unit tax rates in Lincoln and Nye Counties), and the portion of the rail spur likely to be located in the two counties.

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# APPENDIX A: ACRONYMS

We have attempted to explain acronyms in the body of the text. The following is a summary list and explanation of the more commonly used acronyms:

CSF: Central Storage Facility
A facility for above-ground dry storage of large volumes of spent fuel previously located in spent fuel pools or dry storage at multiple reactor sites. The facility would include equipment for opening and reloading casks and canisters, but not for consolidation of spent fuel or other operations envisioned for the Monitored Retrievable Storage (MRS) facility specified in the NWPA.

DOE: The US Department of Energy
In this report "DOE" generally refers to the Department's Office of Civilian Radioactive Waste Management (DOE/OCRWM) established by the Nuclear Waste Policy Act to dispose of spent nuclear fuel and other highly radioactive wastes.

ESF: The Exploratory Studies Facility
A five-mile tunnel into and across the emplacement block within Yucca Mountain, in which DOE will conduct tests and experiments critical to determining the suitability of the mountain for permanent geologic disposal.

HLW: High-Level Waste
Highly radioactive material, containing fission products, traces of uranium and plutonium and other transuranic elements, that results from chemical reprocessing of spent fuel.

LWT: Legal-Weight Truck
Legal weight on the nation's highways is generally 80,000 lbs, or 40 tons, including the payload, shipping tackle, truck and trailer.

MTU: Metric Tons Uranium

NRC: The Nuclear Regulatory Commission
Previously part of the Atomic Energy Commission, the NRC is the regulatory body responsible for licensing the repository, nuclear reactors and their pools and dry storage facilities, a centralized dry storage facility, and transportation casks and canisters.

NWF: The Nuclear Waste Fund
Established by the Nuclear Waste Policy Act (Section 302) with revenues from the one mil per kilowatt hour fee on sales of nuclear-generated power to ensure full recovery of the costs of long-term storage and permanent disposal of commercial SNF.

NWPA: The Nuclear Waste Policy Act of 1982
The act is Public Law 97-425, January 7, 1983. It established DOE/OCRWM and its responsibilities to dispose of commercial spent fuel, in return for the payment of fees on sales of nuclear generated power. The act was amended by Title V of Public Law 100-203 in December 1997. Proposed legislation in the Senate (S-104) and House (HR-1270) would replace the NWPA.

PETT: Payments Equal to Taxes
Section 116(c)(3) of the NWPA, requires DOE to grant to the State of Nevada or any affected unit of government amounts equal to the taxes on comparable non-Federal real property and industrial activity.

SNF: Spent Nuclear Fuel
Fuel that has been irradiated in a nuclear reactor to the point that it no longer contributes efficiently to the nuclear chain reaction. Spent fuel is thermally hot and highly radioactive.

TSLCC: Total System Life Cycle Cost
Life cycle costing was created during the 1970's to consider the ownership (operations) as well as the acquisition (design and construction) costs of military systems, and to compare systems over their "life cycle", taking into account the value of money spent at various points in time. See "Life Cycle Costing: Techniques, Models and Applications" by B.S. Dhillon, 1989.

# APPENDIX B: TOTAL SYSTEM COSTS: FY 1983-FY 2071

The table presents annual and cumulative estimates of total systems costs—distinguishing repository and site characterization from other program activity, and comparing estimates of the independent cost assessment with those of DOE published in September 1995. The DOE estimates are those presented in the September 1995 report, adjusted to FY'96$. The independent cost analysis combines two sources:

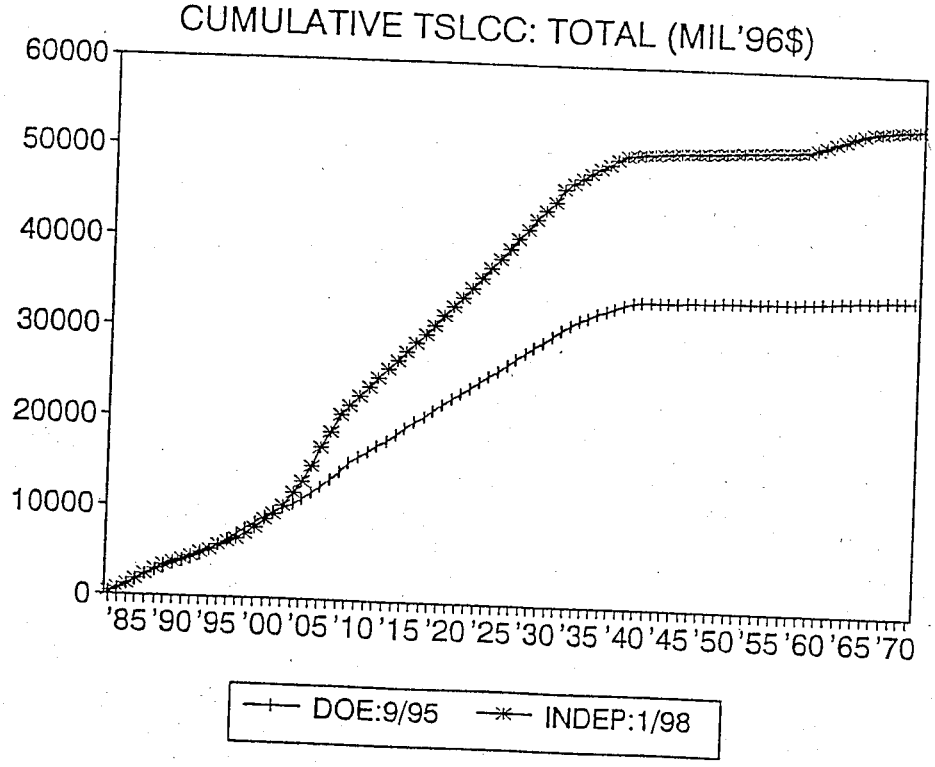
- A tabulation of actual program expenditures (compiled from SOAR #9 reports) from FY 1983 through FY 1996, adjusted to FY'96$.
- Projected expenditures from FY 1997 forward, as discussed in Chapter 3, in FY'96$. The charts compare cumulative total systems costs, distinguishing repository from other program activity.

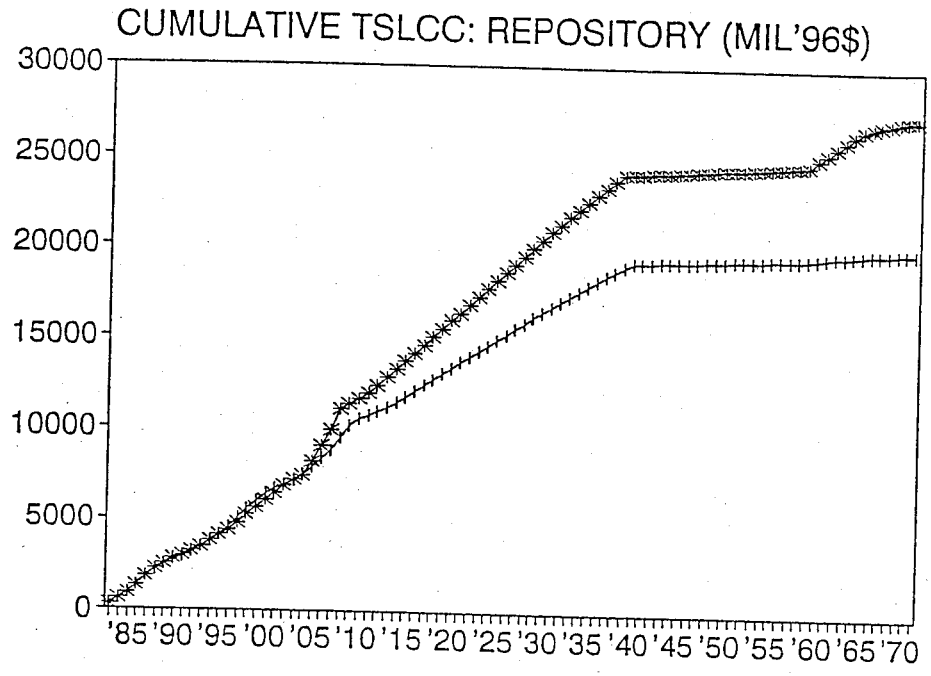
**INDEPENDET COST ASSESSMENT: ACTUAL DOE/OCRWM EXPENSES (FY'83-'96); PROJECTED EXPENSES (FY'97-'71)**
**DOE/OCRWM TSLCC (9/95): MIL CONSTANT (FY'96) $**

| | Annual Expenses.... INDEP COST ASSESS | | | DOE TSLCC: 9/95 | | | Cumulative Expenses.... INDEP COST ASSESS | | | DOE TSLCC: 9/95 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | Repos SiteC | Other | TOTAL | Repos | Other | TOTAL | Repos SiteC | Other | TOTAL | Repos | Other |
| 1983 | 280.9 | 248.0 | 32.9 | 250.7 | 233.0 | 17.6 | 281 | 248 | 33 | 251 | 233 | 18 |
| 1984 | 417.6 | 332.6 | 85.0 | 378.5 | 310.7 | 67.8 | 698 | 581 | 118 | 629 | 544 | 85 |
| 1985 | 461.5 | 322.8 | 138.7 | 425.1 | 327.4 | 97.7 | 1160 | 903 | 257 | 1054 | 871 | 183 |
| 1986 | 567.9 | 416.6 | 151.3 | 528.8 | 422.4 | 106.4 | 1728 | 1320 | 408 | 1583 | 1294 | 290 |
| 1987 | 649.7 | 503.8 | 145.9 | 610.9 | 508.8 | 102.0 | 2378 | 1824 | 554 | 2194 | 1802 | 392 |
| 1988 | 508.1 | 394.5 | 113.6 | 478.4 | 381.7 | 96.7 | 2886 | 2218 | 667 | 2672 | 2184 | 488 |
| 1989 | 469.0 | 299.3 | 169.7 | 413.8 | 284.1 | 129.7 | 3355 | 2518 | 837 | 3086 | 2468 | 618 |
| 1990 | 371.9 | 249.6 | 122.4 | 394.9 | 239.0 | 155.9 | 3727 | 2767 | 960 | 3481 | 2707 | 774 |
| 1991 | 348.1 | 211.0 | 137.1 | 366.6 | 214.7 | 151.8 | 4075 | 2978 | 1097 | 3848 | 2922 | 926 |
| 1992 | 364.6 | 225.2 | 139.4 | 392.0 | 225.3 | 166.7 | 4439 | 3203 | 1236 | 4240 | 3147 | 1092 |
| 1993 | 402.6 | 250.0 | 152.6 | 431.0 | 251.2 | 179.8 | 4842 | 3453 | 1389 | 4671 | 3399 | 1272 |
| 1994 | 428.7 | 295.7 | 133.1 | 460.3 | 295.6 | 164.8 | 5271 | 3749 | 1522 | 5131 | 3694 | 1437 |
| 1995 | 523.1 | 388.9 | 134.1 | 558.3 | 382.1 | 176.2 | 5794 | 4138 | 1656 | 5689 | 4076 | 1613 |
| 1996 | 334.3 | 237.7 | 96.5 | 646.0 | 464.8 | 181.2 | 6128 | 4376 | 1752 | 6335 | 4541 | 1794 |
| 1997 | 420.9 | 389.9 | 31.0 | 693.9 | 503.5 | 190.4 | 6549 | 4766 | 1783 | 7029 | 5045 | 1985 |
| 1998 | 573.4 | 417.1 | 156.3 | 684.5 | 481.8 | 202.7 | 7122 | 5183 | 1940 | 7714 | 5526 | 2187 |
| 1999 | 645.6 | 417.8 | 227.8 | 668.4 | 459.7 | 208.7 | 7768 | 5600 | 2167 | 8382 | 5986 | 2396 |
| 2000 | 892.7 | 415.4 | 477.3 | 609.4 | 394.3 | 215.1 | 8661 | 6016 | 2645 | 8991 | 6380 | 2611 |
| 2001 | 669.8 | 415.4 | 254.5 | 606.6 | 291.4 | 315.2 | 9330 | 6431 | 2899 | 9598 | 6672 | 2926 |
| 2002 | 1028.2 | 380.2 | 648.0 | 485.7 | 215.4 | 270.2 | 10359 | 6811 | 3547 | 10084 | 6887 | 3197 |
| 2003 | 1488.4 | 365.6 | 1122.8 | 472.9 | 215.1 | 257.8 | 11847 | 7177 | 4670 | 10557 | 7102 | 3454 |
| 2004 | 1180.5 | 240.8 | 939.7 | 588.4 | 330.0 | 258.4 | 13028 | 7418 | 5610 | 11145 | 7432 | 3713 |
| 2005 | 1792.9 | 755.6 | 1037.3 | 675.0 | 423.2 | 251.8 | 14820 | 8173 | 6647 | 11820 | 7856 | 3965 |
| 2006 | 2031.3 | 853.7 | 1177.6 | 698.8 | 458.3 | 240.5 | 16852 | 9027 | 7825 | 12519 | 8314 | 4205 |
| 2007 | 1721.3 | 876.8 | 844.5 | 770.4 | 481.2 | 289.2 | 18573 | 9904 | 8669 | 13289 | 8795 | 4494 |
| 2008 | 1998.7 | 1120.8 | 877.8 | 931.0 | 667.4 | 263.6 | 20572 | 11025 | 9547 | 14220 | 9462 | 4758 |
| 2009 | 1052.7 | 269.9 | 782.8 | 982.1 | 663.1 | 319.0 | 21624 | 11295 | 10330 | 15202 | 10126 | 5077 |
| 2010 | 996.5 | 301.5 | 695.0 | 733.2 | 373.5 | 359.7 | 22621 | 11596 | 11025 | 15936 | 10499 | 5436 |
| 2011 | 1044.6 | 350.4 | 694.1 | 598.1 | 185.9 | 412.1 | 23666 | 11947 | 11719 | 16534 | 10685 | 5849 |
| 2012 | 1007.1 | 413.6 | 593.4 | 638.4 | 210.2 | 428.2 | 24673 | 12360 | 12312 | 17172 | 10895 | 6277 |
| 2013 | 1012.9 | 451.4 | 561.4 | 641.7 | 235.7 | 406.0 | 25685 | 12812 | 12874 | 17814 | 11131 | 6683 |
| 2014 | 953.4 | 448.7 | 504.7 | 699.0 | 277.7 | 421.2 | 26639 | 13260 | 13378 | 18513 | 11409 | 7104 |
| 2015 | 1030.0 | 448.7 | 581.4 | 734.2 | 326.7 | 407.5 | 27669 | 13709 | 13960 | 19247 | 11735 | 7511 |
| 2016 | 1008.3 | 448.7 | 559.6 | 677.7 | 324.3 | 353.5 | 28677 | 14158 | 14519 | 19925 | 12060 | 7865 |
| 2017 | 1031.7 | 448.7 | 583.0 | 671.8 | 323.6 | 348.1 | 29709 | 14606 | 15102 | 20596 | 12383 | 8213 |
| 2018 | 1032.7 | 450.6 | 582.1 | 669.4 | 318.7 | 350.8 | 30742 | 15057 | 15685 | 21266 | 12702 | 8564 |
| 2019 | 1061.5 | 448.7 | 612.8 | 660.6 | 317.1 | 343.5 | 31803 | 15506 | 16297 | 21926 | 13019 | 8907 |
| 2020 | 1047.0 | 448.7 | 598.3 | 662.5 | 316.0 | 346.5 | 32850 | 15954 | 16896 | 22589 | 13335 | 9254 |
| 2021 | 1034.5 | 448.7 | 585.8 | 663.7 | 316.6 | 347.2 | 33884 | 16403 | 17482 | 23253 | 13652 | 9601 |
| 2022 | 1047.9 | 448.7 | 599.2 | 660.3 | 318.4 | 341.9 | 34932 | 16852 | 18081 | 23913 | 13970 | 9943 |
| 2023 | 1200.9 | 465.7 | 735.2 | 665.9 | 316.1 | 349.8 | 36133 | 17317 | 18816 | 24579 | 14286 | 10293 |
| 2024 | 1066.8 | 448.7 | 618.2 | 663.9 | 317.4 | 346.5 | 37200 | 17766 | 19434 | 25243 | 14604 | 10639 |
| 2025 | 1118.0 | 448.7 | 669.4 | 663.8 | 315.5 | 348.3 | 38318 | 18215 | 20103 | 25906 | 14919 | 10987 |
| 2026 | 1083.4 | 448.7 | 634.7 | 667.5 | 315.5 | 352.0 | 39402 | 18663 | 20738 | 26574 | 15235 | 11339 |
| 2027 | 1139.1 | 448.7 | 690.4 | 667.1 | 318.3 | 348.8 | 40541 | 19112 | 21429 | 27241 | 15553 | 11688 |
| 2028 | 1097.6 | 450.6 | 647.1 | 659.2 | 316.7 | 342.5 | 41638 | 19563 | 22076 | 27900 | 15870 | 12031 |
| 2029 | 1102.2 | 448.7 | 653.5 | 674.7 | 319.4 | 355.3 | 42740 | 20011 | 22729 | 28575 | 16189 | 12386 |
| 2030 | 1080.3 | 448.7 | 631.6 | 656.8 | 302.3 | 354.4 | 43821 | 20460 | 23361 | 29232 | 16491 | 12740 |
| 2031 | 918.9 | 448.7 | 470.2 | 636.6 | 290.1 | 346.5 | 44740 | 20909 | 23831 | 29868 | 16781 | 13087 |
| 2032 | 1464.8 | 448.7 | 1016.2 | 652.9 | 292.5 | 360.5 | 46204 | 21357 | 24847 | 30521 | 17074 | 13447 |
| 2033 | 767.4 | 451.4 | 316.1 | 655.3 | 290.5 | 364.8 | 46972 | 21809 | 25163 | 31177 | 17364 | 13812 |
| 2034 | 554.2 | 401.8 | 152.5 | 502.9 | 293.4 | 209.6 | 47526 | 22210 | 25316 | 31680 | 17658 | 14022 |
| 2035 | 588.3 | 401.8 | 186.6 | 430.2 | 290.8 | 139.3 | 48114 | 22612 | 25502 | 32110 | 17949 | 14161 |
| 2036 | 519.8 | 401.8 | 118.0 | 407.7 | 290.5 | 117.2 | 48634 | 23014 | 25620 | 32517 | 18239 | 14278 |
| 2037 | 520.3 | 401.8 | 118.5 | 411.2 | 284.7 | 126.5 | 49155 | 23416 | 25739 | 32929 | 18524 | 14405 |
| 2038 | 522.1 | 403.6 | 118.5 | 341.4 | 236.5 | 104.9 | 49677 | 23819 | 25857 | 33270 | 18760 | 14510 |
| 2039 | 442.2 | 323.2 | 119.0 | 343.6 | 247.6 | 96.0 | 50119 | 24143 | 25976 | 33614 | 19008 | 14606 |
| 2040 | 163.3 | 51.9 | 111.4 | 305.9 | 241.7 | 64.1 | 50282 | 24194 | 26088 | 33919 | 19250 | 14670 |
| 2041 | 80.6 | 31.7 | 48.9 | 56.3 | 17.4 | 38.9 | 50363 | 24226 | 26137 | 33976 | 19267 | 14709 |
| 2042 | 57.8 | 24.2 | 33.6 | 24.7 | 12.8 | 11.8 | 50420 | 24250 | 26170 | 34000 | 19280 | 14721 |
| 2043 | 75.7 | 24.2 | 51.5 | 24.5 | 12.8 | 11.7 | 50496 | 24274 | 26222 | 34025 | 19293 | 14732 |
| 2044 | 58.1 | 24.2 | 34.0 | 24.4 | 12.8 | 11.6 | 50554 | 24299 | 26256 | 34049 | 19305 | 14744 |
| 2045 | 39.6 | 24.2 | 15.4 | 24.3 | 12.8 | 11.4 | 50594 | 24323 | 26271 | 34074 | 19318 | 14755 |

**INDEPENDET COST ASSESSMENT: ACTUAL DOE/OCRWM EXPENSES (FY'83-'96); PROJECTED EXPENSES (FY'97-'71)**
**DOE/OCRWM TSLCC (9/95): MIL CONSTANT (FY'96) $**

| | Annual Expenses.... INDEP COST ASSESS | | | DOE TSLCC: 9/95 | | | Cumulative Expenses.... INDEP COST ASSESS | | | DOE TSLCC: 9/95 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | Repos SiteC | Other | TOTAL | Repos | Other | TOTAL | Repos SiteC | Other | TOTAL | Repos | Other |
| 2046 | 38.1 | 24.2 | 13.9 | 24.1 | 12.8 | 11.3 | 50632 | 24347 | 26285 | 34098 | 19331 | 14767 |
| 2047 | 39.3 | 24.2 | 15.1 | 24.0 | 12.8 | 11.2 | 50671 | 24371 | 26300 | 34122 | 19344 | 14778 |
| 2048 | 49.8 | 36.4 | 13.4 | 31.3 | 20.2 | 11.1 | 50721 | 24407 | 26313 | 34153 | 19364 | 14789 |
| 2049 | 46.3 | 36.4 | 9.9 | 31.2 | 20.2 | 10.9 | 50767 | 24444 | 26323 | 34184 | 19384 | 14800 |
| 2050 | 45.0 | 33.3 | 11.6 | 29.2 | 18.4 | 10.8 | 50812 | 24477 | 26335 | 34213 | 19403 | 14811 |
| 2051 | 34.9 | 24.2 | 10.7 | 23.5 | 12.8 | 10.7 | 50847 | 24501 | 26346 | 34237 | 19415 | 14821 |
| 2052 | 76.9 | 24.2 | 52.8 | 23.4 | 12.8 | 10.6 | 50924 | 24526 | 26399 | 34260 | 19428 | 14832 |
| 2053 | 33.6 | 24.2 | 9.4 | 23.3 | 12.8 | 10.5 | 50958 | 24550 | 26408 | 34284 | 19441 | 14842 |
| 2054 | 33.5 | 24.2 | 9.3 | 23.2 | 12.8 | 10.4 | 50991 | 24574 | 26417 | 34307 | 19454 | 14853 |
| 2055 | 38.3 | 24.2 | 14.1 | 23.1 | 12.8 | 10.3 | 51029 | 24598 | 26431 | 34330 | 19467 | 14863 |
| 2056 | 32.8 | 23.7 | 9.1 | 23.0 | 12.8 | 10.2 | 51062 | 24622 | 26440 | 34353 | 19480 | 14873 |
| 2057 | 32.7 | 23.7 | 9.0 | 22.9 | 12.8 | 10.1 | 51095 | 24645 | 26449 | 34376 | 19492 | 14883 |
| 2058 | 44.8 | 36.0 | 8.9 | 30.3 | 20.2 | 10.0 | 51140 | 24681 | 26458 | 34406 | 19513 | 14893 |
| 2059 | 46.4 | 37.6 | 8.8 | 31.2 | 21.2 | 9.9 | 51186 | 24719 | 26467 | 34437 | 19534 | 14903 |
| 2060 | 403.0 | 393.6 | 9.4 | 73.1 | 61.5 | 11.6 | 51589 | 25113 | 26477 | 34510 | 19595 | 14915 |
| 2061 | 339.7 | 330.4 | 9.3 | 63.1 | 51.6 | 11.5 | 51929 | 25443 | 26486 | 34573 | 19647 | 14926 |
| 2062 | 339.6 | 330.4 | 9.2 | 63.0 | 51.6 | 11.4 | 52268 | 25773 | 26495 | 34636 | 19699 | 14938 |
| 2063 | 339.5 | 330.4 | 9.1 | 62.9 | 51.6 | 11.3 | 52608 | 26104 | 26504 | 34699 | 19750 | 14949 |
| 2064 | 339.5 | 330.4 | 9.1 | 62.8 | 51.6 | 11.3 | 52947 | 26434 | 26513 | 34762 | 19802 | 14960 |
| 2065 | 339.4 | 330.4 | 9.0 | 62.7 | 51.6 | 11.2 | 53287 | 26765 | 26522 | 34825 | 19853 | 14972 |
| 2066 | 151.8 | 142.9 | 8.9 | 33.2 | 22.1 | 11.1 | 53439 | 26907 | 26531 | 34858 | 19875 | 14983 |
| 2067 | 136.6 | 127.7 | 8.8 | 30.7 | 19.7 | 11.0 | 53575 | 27035 | 26540 | 34889 | 19895 | 14994 |
| 2068 | 136.5 | 127.7 | 8.8 | 30.7 | 19.7 | 11.0 | 53712 | 27163 | 26549 | 34919 | 19915 | 15005 |
| 2069 | 136.4 | 127.7 | 8.7 | 30.6 | 19.7 | 10.9 | 53848 | 27291 | 26557 | 34950 | 19934 | 15016 |
| 2070 | 32.3 | 23.7 | 8.6 | 14.2 | 3.3 | 10.8 | 53881 | 27314 | 26566 | 34964 | 19938 | 15026 |
| 2071 | 24.9 | 16.4 | 8.5 | 13.0 | 2.2 | 10.8 | 53905 | 27331 | 26575 | 34977 | 19940 | 15037 |
| TOT | 53905 | 27331 | 26575 | 34977 | 19940 | 15037 | | | | | | |
| '97+ | 47777 | 22955 | 24822 | 28642 | 15399 | 13243 | | | | | | |
| %97+ | 88.6% | 84.0% | 93.4% | 81.9% | 77.2% | 88.1% | | | | | | |




CUMULATIVE TSLCC: REPOSITORY (MIL'96$)
30000
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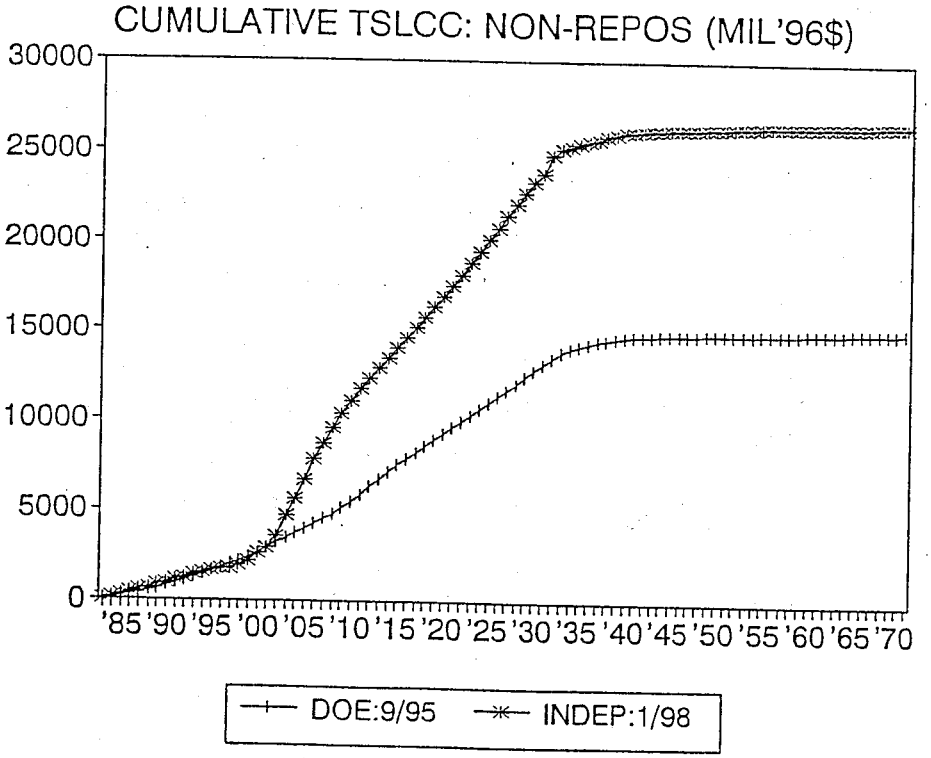
20000
15000
10000
5000
0
'85 '90 '95 '00 '05 '10 '15 '20 '25 '30 '35 '40 '45 '50 '55 '60 '65 '70


CUMULATIVE TSLCC: NON-REPOS (MIL'96$)
30000
25000
20000
15000
10000
5000
0
'85 '90 '95 '00 '05 '10 '15 '20 '25 '30 '35 '40 '45 '50 '55 '60 '65 '70
DOE:9/95
INDEP:1/98

# APPENDIX C: PROJECTED TOTAL SYSTEMS COSTS: FY 1997 - FY 2071 (MIL'96$)

The Table presents projected systems costs by "master code" categories. Master code categories were used in the assembly of estimates developed by various costing procedures (discussed in Section 3.4-6). The total in this instance is the total *projected* costs for FY 1997 through FY 2071. These estimates exclude costs which are the responsibility of other offices within DOE (e.g., the vitrification, canistering and interim storage of HLW), or of nuclear utilities (e.g., the cost for onsite storage of SNF that utilities are and will be required to store even if pickup had begun in 1998 and proceeded at S-104 rates). The table also presents the distribution of projected expenses, a calculation of the net present value of the projected costs streams (assuming three percent real interest rate), and the NPV percentage of total projected costs in constant dollar terms.

## THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM: PROJECTED PROGRAM COSTS (FY 1997-FY 2071: MIL'96$)

| MASTER | Description | Total | %total | %categ | NPV | NPV%TOT |
|---|---|---|---|---|---|---|
| 1.0 | ONSITE STORAGE COSTS | 4278.9 | 9.0% | 100.0% | 2215.5 | 51.8% |
| 1.1 | Commercial SNF in Que | 3886.1 | 8.1% | 90.8% | 1970.5 | 50.7% |
| 1.1.1 | Dry Storage | 575.9 | 1.2% | 13.5% | 360.1 | 62.5% |
| 1.1.1.1 | Opt 1/LWT: 26 sites | 133.0 | 0.3% | 3.1% | 85.1 | 64.0% |
| 1.1.1.2 | Opt 1/R125: 17 sites | 100.6 | 0.2% | 2.4% | 64.6 | 64.3% |
| 1.1.1.3 | Opt 2/R125: 11 sites | 202.3 | 0.4% | 4.7% | 125.2 | 61.9% |
| 1.1.1.4 | Opt 1/R75: 14 sites | 32.1 | 0.1% | 0.8% | 21.9 | 68.3% |
| 1.1.1.5 | Opt 2/R75: 5 sites | 108.0 | 0.2% | 2.5% | 63.2 | 58.5% |
| 1.1.2 | Pool Op after Reactor Shutdn | 3273.2 | 6.9% | 76.5% | 1582.5 | 48.3% |
| 1.1.2.1 | Opt 1/LWT: 26 sites | 1350.9 | 2.8% | 31.6% | 674.9 | 50.0% |
| 1.1.2.2 | Opt 1/R125: 17 sites | 799.3 | 1.7% | 18.7% | 349.7 | 43.7% |
| 1.1.2.3 | Opt 2/R125: 11 sites | 236.8 | 0.5% | 5.5% | 130.6 | 55.1% |
| 1.1.2.4 | Opt 1/R75: 14 sites | 757.3 | 1.6% | 17.7% | 353.9 | 46.7% |
| 1.1.2.5 | Opt 2/R75: 5 sites | 129.0 | 0.3% | 3.0% | 73.5 | 57.0% |
| 1.1.3 | Pool Loading Upgrades | 37.0 | 0.1% | 0.9% | 27.9 | 75.4% |
| 1.1.3.1 | Opt 1/LWT: 26 sites | 1.0 | 0.0% | 0.0% | 0.8 | 79.3% |
| 1.1.3.2 | Opt 1/R125: 17 sites | 8.7 | 0.0% | 0.2% | 5.9 | 68.0% |
| 1.1.3.3 | Opt 2/R125: 11 sites | 17.6 | 0.0% | 0.4% | 13.6 | 77.0% |
| 1.1.3.4 | Opt 1/R75: 14 sites | 0.9 | 0.0% | 0.0% | 0.7 | 83.7% |
| 1.1.3.5 | Opt 2/R75: 5 sites | 8.7 | 0.0% | 0.2% | 6.8 | 78.5% |
| 1.2 | DOE SNF & SNF not in Que | 392.8 | 0.8% | 9.2% | 245.1 | 62.4% |
| 1.2.1 | Dry Storage | 5.4 | 0.0% | 0.1% | 4.3 | 80.3% |
| 1.2.2 | Pool Op after Reactor Shutdn | 387.4 | 0.8% | 9.1% | 240.7 | 62.1% |
| 1.2.3 | Pool Loading Upgrades | 0.0 | 0.0% | 0.0% | 0.0 | NA |
| 1.3 | DOE High-Level Waste | NA | 0.0% | 0.0% | 0.0 | NA |
| 2.0 | X-COUNTRY TRANSPORTATION | 5968.2 | 12.5% | 100.0% | 3103.7 | 52.0% |
| 2.1 | Commercial SNF in Que | 4269.3 | 8.9% | 71.5% | 2355.1 | 55.2% |
| 2.1.1 | Cask Shipment Costs | 3060.3 | 6.4% | 51.3% | 1683.1 | 55.0% |
| 2.1.1.1 | Legal-Wt Truck | 1870.6 | 3.9% | 31.3% | 1056.4 | 56.5% |
| 2.1.1.2 | Large Rail | 571.5 | 1.2% | 9.6% | 301.6 | 52.8% |
| 2.1.1.3 | Small Rail | 618.1 | 1.3% | 10.4% | 325.1 | 52.6% |
| 2.1.2 | Shipment Escort Costs | 158.4 | 0.3% | 2.7% | 88.0 | 55.5% |
| 2.1.2.1 | Legal-Wt Truck | 115.7 | 0.2% | 1.9% | 65.5 | 56.6% |
| 2.1.2.2 | Large Rail | 17.6 | 0.0% | 0.3% | 9.3 | 52.9% |
| 2.1.2.3 | Small Rail | 25.1 | 0.1% | 0.4% | 13.2 | 52.5% |
| 2.1.3 | Cask Inspection Costs | 73.4 | 0.2% | 1.2% | 40.2 | 54.8% |
| 2.1.3.1 | Legal-Wt Truck | 44.4 | 0.1% | 0.7% | 25.0 | 56.3% |
| 2.1.3.2 | Large Rail | 12.8 | 0.0% | 0.2% | 6.7 | 52.7% |
| 2.1.3.3 | Small Rail | 16.2 | 0.0% | 0.3% | 8.5 | 52.7% |
| 2.1.4 | Cask & Equip Purchases | 560.8 | 1.2% | 9.4% | 333.3 | 59.4% |
| 2.1.4.1 | Legal-Wt Truck | 290.5 | 0.6% | 4.9% | 177.0 | 60.9% |
| 2.1.4.2 | Large Rail | 125.9 | 0.3% | 2.1% | 72.8 | 57.8% |
| 2.1.4.3 | Small Rail | 144.3 | 0.3% | 2.4% | 83.6 | 57.9% |
| 2.1.5 | Cask & Equip O&M | 327.0 | 0.7% | 5.5% | 178.1 | 54.5% |
| 2.1.5.1 | Legal-Wt Truck | 162.9 | 0.3% | 2.7% | 91.6 | 56.3% |
| 2.1.5.2 | Large Rail | 77.9 | 0.2% | 1.3% | 41.0 | 52.7% |
| 2.1.5.3 | Small Rail | 86.3 | 0.2% | 1.4% | 45.5 | 52.7% |
| 2.1.6 | Cask & Equip Decomm | 78.1 | 0.2% | 1.3% | 25.7 | 32.9% |
| 2.1.6.1 | Legal-Wt Truck | 41.4 | 0.1% | 0.7% | 14.0 | 33.7% |
| 2.1.6.2 | Large Rail | 16.8 | 0.0% | 0.3% | 5.4 | 32.0% |
| 2.1.6.3 | Small Rail | 19.8 | 0.0% | 0.3% | 6.3 | 32.1% |
| 2.1.7 | Hvy Haul to Railhead | 11.4 | 0.0% | 0.2% | 6.6 | 58.5% |
| 2.2 | DOE Spent Nuclear Fuel | 590.1 | 1.2% | 9.9% | 197.4 | 33.5% |
| 2.2.1 | Cask Shipment Costs | 196.3 | 0.4% | 3.3% | 67.4 | 34.3% |
| 2.2.2 | Shipment Escort Costs | 10.0 | 0.0% | 0.2% | 3.4 | 34.3% |
| 2.2.3 | Cask Inspection Costs | 6.5 | 0.0% | 0.1% | 2.2 | 34.3% |
| 2.2.4 | Cask & Equip Purchases | 309.4 | 0.6% | 5.2% | 107.7 | 34.8% |
| 2.2.5 | Cask & Equip O&M | 23.7 | 0.0% | 0.4% | 8.1 | 34.3% |
| 2.2.6 | Cask & Equip Decomm | 44.1 | 0.1% | 0.7% | 8.5 | 19.3% |
| 2.3 | DOE High-Level Wastes | 505.1 | 1.1% | 8.5% | 207.6 | 41.1% |
| 2.3.1 | Cask Shipment Costs | 349.6 | 0.7% | 5.9% | 143.3 | 41.0% |
| 2.3.2 | Shipment Escort Costs | 12.3 | 0.0% | 0.2% | 5.0 | 41.0% |
| 2.3.3 | Cask Inspection Costs | 11.6 | 0.0% | 0.2% | 4.7 | 40.6% |
| 2.3.4 | Cask & Equip Purchases | 74.4 | 0.2% | 1.2% | 33.0 | 44.3% |
| 2.3.5 | Cask & Equip O&M | 47.2 | 0.1% | 0.8% | 19.2 | 40.6% |
| 2.3.6 | Cask & Equip Decomm | 9.9 | 0.0% | 0.2% | 2.4 | 24.5% |
| 2.4 | Technical Assist Trng: 180(c) | 603.7 | 1.3% | 10.1% | 343.6 | 56.9% |

## PROJECTED PROGRAM COSTS (FY 1997-FY 2071: MIL'96$)

| MASTER | Description | Total | %total | %categ | NPV | %NPV |
|---|---|---|---|---|---|---|
| 3.0 | NEVADA TRANSPORTATION | 3244.7 | 6.8% | 100.0% | 2433.5 | 75.0% |
| 3.1 | Intermodal Transfer Facility | 92.3 | 0.2% | 2.8% | 75.9 | 82.2% |
| 3.1.1 | Land and ROW | 0.5 | 0.0% | 0.0% | 0.4 | 94.3% |
| 3.1.2 | Construction | 25.1 | 0.1% | 0.8% | 22.5 | 89.6% |
| 3.1.2.1 | Security Construction | 5.6 | 0.0% | 0.2% | 5.1 | 91.5% |
| 3.1.2.2 | Site Work | 2.7 | 0.0% | 0.1% | 2.4 | 91.5% |
| 3.1.2.3 | Facility Construction | 16.8 | 0.0% | 0.5% | 14.9 | 88.7% |
| 3.1.3 | Major Equipment | 3.2 | 0.0% | 0.1% | 2.8 | 86.3% |
| 3.1.4 | Operations | 63.5 | 0.1% | 2.0% | 50.2 | 79.0% |
| 3.1.4.1 | Staff | 55.9 | 0.1% | 1.7% | 44.2 | 79.0% |
| 3.1.4.2 | Other | 7.6 | 0.0% | 0.2% | 6.0 | 79.0% |
| 3.2 | Heavy Haul to CSF | 437.2 | 0.9% | 13.5% | 381.2 | 87.2% |
| 3.2.1 | Engineering | 15.4 | 0.0% | 0.5% | 14.3 | 92.9% |
| 3.2.2 | Infrastructure Upgrade | 248.0 | 0.5% | 7.6% | 227.0 | 91.5% |
| 3.2.3 | Midway Service Facility | 9.3 | 0.0% | 0.3% | 8.4 | 90.9% |
| 3.2.4 | Equipment | 36.9 | 0.1% | 1.1% | 30.5 | 82.7% |
| 3.2.5 | Operations | 127.6 | 0.3% | 3.9% | 100.8 | 79.0% |
| 3.2.5.1 | Staff | 49.9 | 0.1% | 1.5% | 39.5 | 79.0% |
| 3.2.5.2 | Road Maintenance | 62.8 | 0.1% | 1.9% | 49.6 | 79.0% |
| 3.2.5.3 | Other | 14.9 | 0.0% | 0.5% | 11.8 | 79.0% |
| 3.3 | Rail Spur to CSF/YMP | 2715.1 | 5.7% | 83.7% | 1976.5 | 72.8% |
| 3.3.1 | Misc Upfront Costs | 119.3 | 0.2% | 3.7% | 106.0 | 88.8% |
| 3.3.2 | Construction | 1896.1 | 4.0% | 58.4% | 1497.2 | 79.0% |
| 3.3.2.1 | Rail Spur Const | 1867.3 | 3.9% | 57.5% | 1475.3 | 79.0% |
| 3.3.2.2 | Ancillary Facil Const | 28.8 | 0.1% | 0.9% | 21.9 | 75.9% |
| 3.3.3 | Major Equipment | 20.9 | 0.0% | 0.6% | 15.5 | 74.4% |
| 3.3.4 | Operations | 678.8 | 1.4% | 20.9% | 357.7 | 52.7% |
| 3.3.4.1 | Staff | 556.7 | 1.2% | 17.2% | 293.4 | 52.7% |
| 3.3.4.2 | Other | 122.1 | 0.3% | 3.8% | 64.3 | 52.7% |
| 4.0 | CENTRALIZED STORAGE FACILITY | 9179.3 | 19.2% | 100.0% | 5327.1 | 58.0% |
| 4.1 | Misc Upfront Costs | 65.2 | 0.1% | 0.7% | 60.5 | 92.9% |
| 4.2 | Construction | 429.7 | 0.9% | 4.7% | 372.7 | 86.7% |
| 4.2.1 | Security Construction | 8.4 | 0.0% | 0.1% | 7.4 | 88.0% |
| 4.2.2 | Site Work & Access | 6.6 | 0.0% | 0.1% | 5.8 | 87.9% |
| 4.2.3 | Pads & Alleys | 233.3 | 0.5% | 2.5% | 198.4 | 85.0% |
| 4.2.4 | Facility Construction | 181.3 | 0.4% | 2.0% | 161.1 | 88.8% |
| 4.3 | Major Equipment | 8469.2 | 17.7% | 92.3% | 4728.6 | 55.8% |
| 4.3.1 | Storage Casks, Metal | 3782.1 | 7.9% | 41.2% | 2269.5 | 60.0% |
| 4.3.2 | Storage Casks, Concrete | 628.4 | 1.3% | 6.8% | 395.4 | 62.9% |
| 4.3.3 | Addl Canisters for Rail Ship | 4020.0 | 8.4% | 43.8% | 2029.9 | 50.5% |
| 4.3.4 | Other | 38.6 | 0.1% | 0.4% | 33.8 | 87.5% |
| 4.4 | Operations | 215.2 | 0.5% | 2.3% | 165.2 | 76.8% |
| 4.4.1 | Staff | 204.1 | 0.4% | 2.2% | 156.7 | 76.8% |
| 4.4.2 | Other | 11.1 | 0.0% | 0.1% | 8.5 | 76.8% |
| 5.0 | REPOSITORY | 22955.1 | 48.0% | 100.0% | 11693.3 | 50.9% |
| 5.1 | Site Characterization | 2553.8 | 5.3% | 11.1% | 2282.5 | 89.4% |
| 5.1.1 | As Proposed in 1991 | 2478.6 | 5.2% | 10.8% | 2212.7 | 89.3% |
| 5.1.2 | East-West Tunnel | 75.2 | 0.2% | 0.3% | 69.8 | 92.9% |
| 5.2 | Design & License Application | 1079.2 | 2.3% | 4.7% | 623.2 | 57.7% |
| 5.2.1 | Design: Upfront & Ongoing | 973.6 | 2.0% | 4.2% | 529.3 | 54.4% |
| 5.2.2 | Prepare License | 105.6 | 0.2% | 0.5% | 93.8 | 88.9% |
| 5.3 | Surface Facilities | 6142.5 | 12.9% | 26.8% | 3143.1 | 51.2% |
| 5.3.1 | Construction | 2397.7 | 5.0% | 10.4% | 1737.0 | 72.4% |
| 5.3.1.1 | North | 2265.0 | 4.7% | 9.9% | 1658.9 | 73.2% |
| 5.3.1.2 | South | 132.7 | 0.3% | 0.6% | 78.1 | 58.9% |
| 5.3.2 | Equipment | 78.7 | 0.2% | 0.3% | 48.0 | 61.0% |
| 5.3.3 | Operations | 3666.2 | 7.7% | 16.0% | 1358.1 | 37.0% |
| 5.3.3.1 | Staff | 3530.7 | 7.4% | 15.4% | 1309.9 | 37.1% |
| 5.3.3.2 | Other | 135.5 | 0.3% | 0.6% | 48.2 | 35.6% |
| 5.4 | Underground Facilities | 7158.2 | 15.0% | 31.2% | 3004.6 | 42.0% |
| 5.4.1 | Construction | 5052.4 | 10.6% | 22.0% | 1988.1 | 39.3% |
| 5.4.2 | Equipment | 284.3 | 0.6% | 1.2% | 199.4 | 70.1% |
| 5.4.3 | Operations | 1821.4 | 3.8% | 7.9% | 817.1 | 44.9% |
| 5.4.3.1 | Staff | 703.8 | 1.5% | 3.1% | 234.9 | 33.4% |
| 5.4.3.2 | Other | 1117.6 | 2.3% | 4.9% | 582.2 | 52.1% |
| 5.5 | Waste Containers | 6021.4 | 12.6% | 26.2% | 2639.9 | 43.8% |
| 6.0.0 | OTHER DEVEL & EVAL COSTS | 433.6 | 0.9% | 100.0% | 304.8 | 70.3% |
| 6.1.0 | NRC Fees | 400.0 | 0.8% | 92.3% | 277.7 | 69.4% |
| 6.2.0 | NWTRB | 33.6 | 0.1% | 7.7% | 27.1 | 80.7% |
| 6.3.0 | Nuclear Waste Negotiator | 0.0 | 0.0% | 0.0% | 0.0 | NA |
| 7.0.0 | OTHER PROGRAM COSTS | 1717.8 | 3.6% | 100.0% | 755.5 | 44.0% |
| 7.1.0 | PETT Payments | 1233.0 | 2.6% | 71.8% | 539.4 | 43.7% |
| 7.1.1 | DOE TSLCC 9/95 | 348.0 | 0.7% | 20.3% | 129.2 | 37.1% |
| 7.1.2 | Re Addl NV Components | 885.0 | 1.9% | 51.5% | 410.1 | 46.3% |
| 7.2.0 | Benefits | 484.8 | 1.0% | 28.2% | 216.2 | 44.6% |
| | GRAND TOTAL | 47777.4 | 100.0% | 100.0% | 25833.5 | 54.1% |

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# APPENDIX D: PROJECTED DIRECT AND NON-DIRECT SYSTEMS COSTS: FY 1997 THROUGH FY 2071 (MIL'96$)

Direct costs are estimated via procedures discussed in sections 3.5 through 3.7, above. Other "non-direct" costs (contingency, project and program management) are discussed in section 3.3. The following table presents total projected direct, contingency, project management and program management costs by master code category. (Also included are estimates of the projected obligations of the Nuclear Waste Fund for costs attributable to commercial SNF.) A subsequent table presents these as percentages of total projected costs. A final table presents the factors used to estimate contingency and other non-direct costs in the independent assessment.

The factors are applied at the most detailed master code level, with results summed for higher levels. Contingency factors are applied to direct costs. Project management factors are applied to the sum of direct plus one-third of contingency costs. Program management factors are applied to the sum of direct, contingency and project management costs. Total projected costs are the sum of direct, contingency and project and program management costs. Factors used to estimate the obligation of the Nuclear Waste Fund are applied to total projected costs.

## THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM: DIRECT & NON-DIRECT COSTS (FY 1997-FY 2071: MIL'96$)

| MASTER | Description | DIRECT | CONTNG | PROJCT | PROGRM | TOTAL | NWFOBL |
|---|---|---|---|---|---|---|---|
| 1.0 | ONSITE STORAGE COSTS | 2845.7 | 426.9 | 448.2 | 558.1 | 4278.9 | 3963.7 |
| 1.1 | Commercial SNF in Que | 2584.5 | 387.7 | 407.1 | 506.9 | 3886.1 | 3886.1 |
| 1.1.1 | Dry Storage | 383.0 | 57.5 | 60.3 | 75.1 | 575.9 | 575.9 |
| 1.1.1.1 | Opt 1/LWT: 26 sites | 88.4 | 13.3 | 13.9 | 17.3 | 133.0 | 133.0 |
| 1.1.1.2 | Opt 1/R125: 17 sites | 66.9 | 10.0 | 10.5 | 13.1 | 100.6 | 100.6 |
| 1.1.1.3 | Opt 2/R125: 11 sites | 134.5 | 20.2 | 21.2 | 26.4 | 202.3 | 202.3 |
| 1.1.1.4 | Opt 1/R75: 14 sites | 21.3 | 3.2 | 3.4 | 4.2 | 32.1 | 32.1 |
| 1.1.1.5 | Opt 2/R75: 5 sites | 71.8 | 10.8 | 11.3 | 14.1 | 108.0 | 108.0 |
| 1.1.2 | Pool Op after Reactor Shutdn | 2176.9 | 326.5 | 342.9 | 426.9 | 3273.2 | 3273.2 |
| 1.1.2.1 | Opt 1/LWT: 26 sites | 898.4 | 134.8 | 141.5 | 176.2 | 1350.9 | 1350.9 |
| 1.1.2.2 | Opt 1/R125: 17 sites | 531.6 | 79.7 | 83.7 | 104.3 | 799.3 | 799.3 |
| 1.1.2.3 | Opt 2/R125: 11 sites | 157.5 | 23.6 | 24.8 | 30.9 | 236.8 | 236.8 |
| 1.1.2.4 | Opt 1/R75: 14 sites | 503.6 | 75.5 | 79.3 | 98.8 | 757.3 | 757.3 |
| 1.1.2.5 | Opt 2/R75: 5 sites | 85.8 | 12.9 | 13.5 | 16.8 | 129.0 | 129.0 |
| 1.1.3 | Pool Loading Upgrades | 24.6 | 3.7 | 3.9 | 4.8 | 37.0 | 37.0 |
| 1.1.3.1 | Opt 1/LWT: 26 sites | 0.7 | 0.1 | 0.1 | 0.1 | 1.0 | 1.0 |
| 1.1.3.2 | Opt 1/R125: 17 sites | 5.8 | 0.9 | 0.9 | 1.1 | 8.7 | 8.7 |
| 1.1.3.3 | Opt 2/R125: 11 sites | 11.7 | 1.8 | 1.8 | 2.3 | 17.6 | 17.6 |
| 1.1.3.4 | Opt 1/R75: 14 sites | 0.6 | 0.1 | 0.1 | 0.1 | 0.9 | 0.9 |
| 1.1.3.5 | Opt 2/R75: 5 sites | 5.8 | 0.9 | 0.9 | 1.1 | 8.7 | 8.7 |
| 1.2 | DOE SNF & SNF not in Que | 261.2 | 39.2 | 41.1 | 51.2 | 392.8 | 77.6 |
| 1.2.1 | Dry Storage | 3.6 | 0.5 | 0.6 | 0.7 | 5.4 | 1.1 |
| 1.2.2 | Pool Op after Reactor Shutdn | 257.7 | 38.6 | 40.6 | 50.5 | 387.4 | 76.5 |
| 1.2.3 | Pool Loading Upgrades | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.3 | DOE High-Level Waste | NA | NA | NA | NA | NA | NA |
| 2.0 | X-COUNTRY TRANSPORTATION | 4044.9 | 582.9 | 561.9 | 778.5 | 5968.2 | 4883.9 |
| 2.1 | Commercial SNF in Que | 2839.4 | 425.9 | 447.2 | 556.9 | 4269.3 | 4269.3 |
| 2.1.1 | Cask Shipment Costs | 2035.3 | 305.3 | 320.6 | 399.2 | 3060.3 | 3060.3 |
| 2.1.1.1 | Legal-Wt Truck | 1244.1 | 186.6 | 195.9 | 244.0 | 1870.6 | 1870.6 |
| 2.1.1.2 | Large Rail | 380.1 | 57.0 | 59.9 | 74.5 | 571.5 | 571.5 |
| 2.1.1.3 | Small Rail | 411.1 | 61.7 | 64.7 | 80.6 | 618.1 | 618.1 |
| 2.1.2 | Shipment Escort Costs | 105.4 | 15.8 | 16.6 | 20.7 | 158.4 | 158.4 |
| 2.1.2.1 | Legal-Wt Truck | 77.0 | 11.5 | 12.1 | 15.1 | 115.7 | 115.7 |
| 2.1.2.2 | Large Rail | 11.7 | 1.8 | 1.8 | 2.3 | 17.6 | 17.6 |
| 2.1.2.3 | Small Rail | 16.7 | 2.5 | 2.6 | 3.3 | 25.1 | 25.1 |
| 2.1.3 | Cask Inspection Costs | 48.8 | 7.3 | 7.7 | 9.6 | 73.4 | 73.4 |
| 2.1.3.1 | Legal-Wt Truck | 29.5 | 4.4 | 4.7 | 5.8 | 44.4 | 44.4 |
| 2.1.3.2 | Large Rail | 8.5 | 1.3 | 1.3 | 1.7 | 12.8 | 12.8 |
| 2.1.3.3 | Small Rail | 10.8 | 1.6 | 1.7 | 2.1 | 16.2 | 16.2 |
| 2.1.4 | Cask & Equip Purchases | 373.0 | 55.9 | 58.7 | 73.1 | 560.8 | 560.8 |
| 2.1.4.1 | Legal-Wt Truck | 193.2 | 29.0 | 30.4 | 37.9 | 290.5 | 290.5 |
| 2.1.4.2 | Large Rail | 83.8 | 12.6 | 13.2 | 16.4 | 125.9 | 125.9 |
| 2.1.4.3 | Small Rail | 96.0 | 14.4 | 15.1 | 18.8 | 144.3 | 144.3 |
| 2.1.5 | Cask & Equip O&M | 217.5 | 32.6 | 34.3 | 42.7 | 327.0 | 327.0 |
| 2.1.5.1 | Legal-Wt Truck | 108.3 | 16.2 | 17.1 | 21.2 | 162.9 | 162.9 |
| 2.1.5.2 | Large Rail | 51.8 | 7.8 | 8.2 | 10.2 | 77.9 | 77.9 |
| 2.1.5.3 | Small Rail | 57.4 | 8.6 | 9.0 | 11.3 | 86.3 | 86.3 |
| 2.1.6 | Cask & Equip Decomm | 51.9 | 7.8 | 8.2 | 10.2 | 78.1 | 78.1 |
| 2.1.6.1 | Legal-Wt Truck | 27.6 | 4.1 | 4.3 | 5.4 | 41.4 | 41.4 |
| 2.1.6.2 | Large Rail | 11.2 | 1.7 | 1.8 | 2.2 | 16.8 | 16.8 |
| 2.1.6.3 | Small Rail | 13.2 | 2.0 | 2.1 | 2.6 | 19.8 | 19.8 |
| 2.1.7 | Hvy Haul to Railhead | 7.6 | 1.1 | 1.2 | 1.5 | 11.4 | 11.4 |
| 2.2 | DOE Spent Nuclear Fuel | 392.4 | 58.9 | 61.8 | 77.0 | 590.1 | 123.3 |
| 2.2.1 | Cask Shipment Costs | 130.6 | 19.6 | 20.6 | 25.6 | 196.3 | 45.0 |
| 2.2.2 | Shipment Escort Costs | 6.6 | 1.0 | 1.0 | 1.3 | 10.0 | 2.6 |
| 2.2.3 | Cask Inspection Costs | 4.3 | 0.6 | 0.7 | 0.8 | 6.5 | 1.2 |
| 2.2.4 | Cask & Equip Purchases | 205.8 | 30.9 | 32.4 | 40.4 | 309.4 | 61.1 |
| 2.2.5 | Cask & Equip O&M | 15.8 | 2.4 | 2.5 | 3.1 | 23.7 | 4.7 |
| 2.2.6 | Cask & Equip Decomm | 29.4 | 4.4 | 4.6 | 5.8 | 44.1 | 8.7 |
| 2.3 | DOE High-Level Wastes | 335.9 | 50.4 | 52.9 | 65.9 | 505.1 | 0.0 |
| 2.3.1 | Cask Shipment Costs | 232.5 | 34.9 | 36.6 | 45.6 | 349.6 | 0.0 |
| 2.3.2 | Shipment Escort Costs | 8.2 | 1.2 | 1.3 | 1.6 | 12.3 | 0.0 |
| 2.3.3 | Cask Inspection Costs | 7.7 | 1.2 | 1.2 | 1.5 | 11.6 | 0.0 |
| 2.3.4 | Cask & Equip Purchases | 49.5 | 7.4 | 7.8 | 9.7 | 74.4 | 0.0 |
| 2.3.5 | Cask & Equip O&M | 31.4 | 4.7 | 4.9 | 6.2 | 47.2 | 0.0 |
| 2.3.6 | Cask & Equip Decomm | 6.6 | 1.0 | 1.0 | 1.3 | 9.9 | 0.0 |
| 2.4 | Technical Assist Trng: 180(c) | 477.2 | 47.7 | 0.0 | 78.7 | 603.7 | 491.3 |

## DIRECT & NON-DIRECT COSTS (FY 1997-FY 2071: MIL'96$)

| MASTER | Description | DIRECT | CONTNG | PROJCT | PROGRM | TOTAL | NWFOBL |
|---|---|---|---|---|---|---|---|
| 3.0 | NEVADA TRANSPORTATION | 2077.0 | 412.3 | 332.2 | 423.2 | 3244.7 | 2400.8 |
| 3.1 | Intermodal Transfer Facility | 61.4 | 9.2 | 9.7 | 12.0 | 92.3 | 92.3 |
| 3.1.1 | Land and ROW | 0.3 | 0.0 | 0.0 | 0.1 | 0.5 | 0.5 |
| 3.1.2 | Construction | 16.7 | 2.5 | 2.6 | 3.3 | 25.1 | 25.1 |
| 3.1.2.1 | Security Construction | 3.7 | 0.6 | 0.6 | 0.7 | 5.6 | 5.6 |
| 3.1.2.2 | Site Work | 1.8 | 0.3 | 0.3 | 0.3 | 2.7 | 2.7 |
| 3.1.2.3 | Facility Construction | 11.2 | 1.7 | 1.8 | 2.2 | 16.8 | 16.8 |
| 3.1.3 | Major Equipment | 2.2 | 0.3 | 0.3 | 0.4 | 3.2 | 3.2 |
| 3.1.4 | Operations | 42.3 | 6.3 | 6.7 | 8.3 | 63.5 | 63.5 |
| 3.1.4.1 | Staff | 37.2 | 5.6 | 5.9 | 7.3 | 55.9 | 55.9 |
| 3.1.4.2 | Other | 5.1 | 0.8 | 0.8 | 1.0 | 7.6 | 7.6 |
| 3.2 | Heavy Haul to CSF | 279.6 | 55.9 | 44.7 | 57.0 | 437.2 | 437.2 |
| 3.2.1 | Engineering | 9.9 | 2.0 | 1.6 | 2.0 | 15.4 | 15.4 |
| 3.2.2 | Infrastructure Upgrade | 158.5 | 31.7 | 25.4 | 32.3 | 248.0 | 248.0 |
| 3.2.3 | Midway Service Facility | 5.9 | 1.2 | 1.0 | 1.2 | 9.3 | 9.3 |
| 3.2.4 | Equipment | 23.6 | 4.7 | 3.8 | 4.8 | 36.9 | 36.9 |
| 3.2.5 | Operations | 81.6 | 16.3 | 13.1 | 16.6 | 127.6 | 127.6 |
| 3.2.5.1 | Staff | 31.9 | 6.4 | 5.1 | 6.5 | 49.9 | 49.9 |
| 3.2.5.2 | Road Maintenance | 40.1 | 8.0 | 6.4 | 8.2 | 62.8 | 62.8 |
| 3.2.5.3 | Other | 9.5 | 1.9 | 1.5 | 1.9 | 14.9 | 14.9 |
| 3.3 | Rail Spur to CSF/YMP | 1736.0 | 347.2 | 277.8 | 354.1 | 2715.1 | 1871.3 |
| 3.3.1 | Misc Upfront Costs | 76.3 | 15.3 | 12.2 | 15.6 | 119.3 | 82.2 |
| 3.3.2 | Construction | 1212.4 | 242.5 | 194.0 | 247.3 | 1896.1 | 1306.8 |
| 3.3.2.1 | Rail Spur Const | 1193.9 | 238.8 | 191.0 | 243.6 | 1867.3 | 1286.9 |
| 3.3.2.2 | Ancillary Facil Const | 18.4 | 3.7 | 2.9 | 3.8 | 28.8 | 19.9 |
| 3.3.3 | Major Equipment | 13.4 | 2.7 | 2.1 | 2.7 | 20.9 | 14.4 |
| 3.3.4 | Operations | 434.0 | 86.8 | 69.4 | 88.5 | 678.8 | 467.8 |
| 3.3.4.1 | Staff | 355.9 | 71.2 | 57.0 | 72.6 | 556.7 | 383.7 |
| 3.3.4.2 | Other | 78.1 | 15.6 | 12.5 | 15.9 | 122.1 | 84.1 |
| 4.0 | CENTRALIZED STORAGE FACILITY | 5972.3 | 1060.8 | 948.9 | 1197.3 | 9179.3 | 8686.4 |
| 4.1 | Misc Upfront Costs | 41.7 | 8.3 | 6.7 | 8.5 | 65.2 | 62.5 |
| 4.2 | Construction | 274.7 | 54.9 | 44.0 | 56.0 | 429.7 | 412.1 |
| 4.2.1 | Security Construction | 5.4 | 1.1 | 0.9 | 1.1 | 8.4 | 8.0 |
| 4.2.2 | Site Work & Access | 4.3 | 0.9 | 0.7 | 0.9 | 6.6 | 6.4 |
| 4.2.3 | Pads & Alleys | 149.2 | 29.8 | 23.9 | 30.4 | 233.3 | 223.8 |
| 4.2.4 | Facility Construction | 116.0 | 23.2 | 18.6 | 23.7 | 181.3 | 173.9 |
| 4.3 | Major Equipment | 5518.3 | 970.0 | 876.2 | 1104.7 | 8469.2 | 8005.4 |
| 4.3.1 | Storage Casks, Metal | 2418.2 | 483.6 | 386.9 | 493.3 | 3782.1 | 3319.9 |
| 4.3.2 | Storage Casks, Concrete | 401.8 | 80.4 | 64.3 | 82.0 | 628.4 | 628.4 |
| 4.3.3 | Addl Canisters for Rail Ship | 2673.6 | 401.0 | 421.1 | 524.4 | 4020.0 | 4020.0 |
| 4.3.4 | Other | 24.7 | 4.9 | 4.0 | 5.0 | 38.6 | 37.0 |
| 4.4 | Operations | 137.6 | 27.5 | 22.0 | 28.1 | 215.2 | 206.4 |
| 4.4.1 | Staff | 130.5 | 26.1 | 20.9 | 26.6 | 204.1 | 195.7 |
| 4.4.2 | Other | 7.1 | 1.4 | 1.1 | 1.4 | 11.1 | 10.6 |
| 5.0 | REPOSITORY | 15249.6 | 2616.4 | 2095.0 | 2994.1 | 22955.1 | 17015.5 |
| 5.1 | Site Characterization | 2205.3 | 7.5 | 7.9 | 333.1 | 2553.8 | 1982.0 |
| 5.1.1 | As Proposed in 1991 | 2155.3 | 0.0 | 0.0 | 323.3 | 2478.6 | 1923.6 |
| 5.1.2 | East-West Tunnel | 50.0 | 7.5 | 7.9 | 9.8 | 75.2 | 58.3 |
| 5.2 | Design & License Application | 690.0 | 138.0 | 110.4 | 140.8 | 1079.2 | 837.5 |
| 5.2.1 | Design: Upfront & Ongoing | 622.5 | 124.5 | 99.6 | 127.0 | 973.6 | 755.6 |
| 5.2.2 | Prepare License | 67.5 | 13.5 | 10.8 | 13.8 | 105.6 | 81.9 |
| 5.3 | Surface Facilities | 3927.5 | 785.5 | 628.4 | 801.2 | 6142.5 | 4512.9 |
| 5.3.1 | Construction | 1533.0 | 306.6 | 245.3 | 312.7 | 2397.7 | 1761.6 |
| 5.3.1.1 | North | 1448.2 | 289.6 | 231.7 | 295.4 | 2265.0 | 1664.1 |
| 5.3.1.2 | South | 84.8 | 17.0 | 13.6 | 17.3 | 132.7 | 97.5 |
| 5.3.2 | Equipment | 50.3 | 10.1 | 8.0 | 10.3 | 78.7 | 57.8 |
| 5.3.3 | Operations | 2344.1 | 468.8 | 375.1 | 478.2 | 3666.2 | 2693.6 |
| 5.3.3.1 | Staff | 2257.5 | 451.5 | 361.2 | 460.5 | 3530.7 | 2594.0 |
| 5.3.3.2 | Other | 86.6 | 17.3 | 13.9 | 17.7 | 135.5 | 99.5 |
| 5.4 | Underground Facilities | 4576.9 | 915.4 | 732.3 | 933.7 | 7158.2 | 5259.1 |
| 5.4.1 | Construction | 3230.4 | 646.1 | 516.9 | 659.0 | 5052.4 | 3712.0 |
| 5.4.2 | Equipment | 181.8 | 36.4 | 29.1 | 37.1 | 284.3 | 208.9 |
| 5.4.3 | Operations | 1164.6 | 232.9 | 186.3 | 237.6 | 1821.4 | 1338.2 |
| 5.4.3.1 | Staff | 450.0 | 90.0 | 72.0 | 91.8 | 703.8 | 517.1 |
| 5.4.3.2 | Other | 714.6 | 142.9 | 114.3 | 145.8 | 1117.6 | 821.1 |
| 5.5 | Waste Containers | 3850.0 | 770.0 | 616.0 | 785.4 | 6021.4 | 4423.9 |
| 6.0.0 | OTHER DEVEL & EVAL COSTS | 412.9 | 20.6 | 0.0 | 0.0 | 433.6 | 336.5 |
| 6.1.0 | NRC Fees | 381.0 | 19.0 | 0.0 | 0.0 | 400.0 | 310.5 |
| 6.2.0 | NWTRB | 32.0 | 1.6 | 0.0 | 0.0 | 33.6 | 26.0 |
| 6.3.0 | Nuclear Waste Negotiator | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.0.0 | OTHER PROGRAM COSTS | 1561.6 | 156.2 | 0.0 | 0.0 | 1717.8 | 1260.5 |
| 7.1.0 | PETT Payments | 1120.9 | 112.1 | 0.0 | 0.0 | 1233.0 | 904.8 |
| 7.1.1 | DOE TSLCC 9/95 | 316.4 | 31.6 | 0.0 | 0.0 | 348.0 | 255.4 |
| 7.1.2 | Re Addl NV Components | 804.5 | 80.5 | 0.0 | 0.0 | 885.0 | 649.4 |
| 7.2.0 | Benefits | 440.7 | 44.1 | 0.0 | 0.0 | 484.8 | 355.8 |
| | GRAND TOTAL | 32164.1 | 5276.0 | 4386.1 | 5951.2 | 47777.4 | 38547.3 |

## THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM: DIRECT & NON-DIRECT PROGRAM COSTS (% TOTAL PROJECTED)

| MASTER | Description | DIRECT | CONTNG | PROJCT | PROGRM | TOTAL | NWFOBL |
|---|---|---|---|---|---|---|---|
| 1.0 | ONSITE STORAGE COSTS | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 92.6% |
| 1.1 | Commercial SNF in Que | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.1 | Dry Storage | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.1.1 | Opt 1/LWT: 26 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.1.2 | Opt 1/R125: 17 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.1.3 | Opt 2/R125: 11 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.1.4 | Opt 1/R75: 14 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.1.5 | Opt 2/R75: 5 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.2 | Pool Op after Reactor Shutdn | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.2.1 | Opt 1/LWT: 26 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.2.2 | Opt 1/R125: 17 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.2.3 | Opt 2/R125: 11 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.2.4 | Opt 1/R75: 14 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.2.5 | Opt 2/R75: 5 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.3 | Pool Loading Upgrades | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.3.1 | Opt 1/LWT: 26 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.3.2 | Opt 1/R125: 17 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.3.3 | Opt 2/R125: 11 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.3.4 | Opt 1/R75: 14 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.1.3.5 | Opt 2/R75: 5 sites | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 1.2 | DOE SNF & SNF not in Que | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.8% |
| 1.2.1 | Dry Storage | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.8% |
| 1.2.2 | Pool Op after Reactor Shutdn | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.8% |
| 1.2.3 | Pool Loading Upgrades | NA | NA | NA | NA | NA | NA |
| 1.3 | DOE High-Level Waste | NA | NA | NA | NA | NA | NA |
| 2.0 | X-COUNTRY TRANSPORTATION | 67.8% | 9.8% | 9.4% | 13.0% | 100.0% | 81.8% |
| 2.1 | Commercial SNF in Que | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.1 | Cask Shipment Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.1.1 | Legal-Wt Truck | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.1.2 | Large Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.1.3 | Small Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.2 | Shipment Escort Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.2.1 | Legal-Wt Truck | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.2.2 | Large Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.2.3 | Small Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.3 | Cask Inspection Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.3.1 | Legal-Wt Truck | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.3.2 | Large Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.3.3 | Small Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.4 | Cask & Equip Purchases | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.4.1 | Legal-Wt Truck | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.4.2 | Large Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.4.3 | Small Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.5 | Cask & Equip O&M | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.5.1 | Legal-Wt Truck | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.5.2 | Large Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.5.3 | Small Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.6 | Cask & Equip Decomm | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.6.1 | Legal-Wt Truck | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.6.2 | Large Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.6.3 | Small Rail | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.1.7 | Hvy Haul to Railhead | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 2.2 | DOE Spent Nuclear Fuel | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 20.9% |
| 2.2.1 | Cask Shipment Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 22.9% |
| 2.2.2 | Shipment Escort Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 25.8% |
| 2.2.3 | Cask Inspection Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.2% |
| 2.2.4 | Cask & Equip Purchases | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.8% |
| 2.2.5 | Cask & Equip O&M | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.8% |
| 2.2.6 | Cask & Equip Decomm | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 19.8% |
| 2.3 | DOE High-Level Wastes | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.3.1 | Cask Shipment Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.3.2 | Shipment Escort Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.3.3 | Cask Inspection Costs | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.3.4 | Cask & Equip Purchases | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.3.5 | Cask & Equip O&M | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.3.6 | Cask & Equip Decomm | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 0.0% |
| 2.4 | Technical Assist Trng: 180(c) | 79.1% | 7.9% | 0.0% | 13.0% | 100.0% | 81.4% |

## DIRECT & NON-DIRECT PROGRAM COSTS (% TOTAL PROJECTED)

| MASTER | Description | DIRECT | CONTNG | PROJCT | PROGRM | TOTAL | NWFOBL |
|---|---|---|---|---|---|---|---|
| 3.0 | NEVADA TRANSPORTATION | 64.0% | 12.7% | 10.2% | 13.0% | 100.0% | 74.0% |
| 3.1 | Intermodal Transfer Facility | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.1 | Land and ROW | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.2 | Construction | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.2.1 | Security Construction | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.2.2 | Site Work | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.2.3 | Facility Construction | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.3 | Major Equipment | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.4 | Operations | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.4.1 | Staff | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.1.4.2 | Other | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 3.2 | Heavy Haul to CSF | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.1 | Engineering | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.2 | Infrastructure Upgrade | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.3 | Midway Service Facility | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.4 | Equipment | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.5 | Operations | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.5.1 | Staff | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.5.2 | Road Maintenance | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.2.5.3 | Other | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.3 | Rail Spur to CSF/YMP | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 3.3.1 | Misc Upfront Costs | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.2 | Construction | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.2.1 | Rail Spur Const | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.2.2 | Ancillary Facil Const | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.3 | Major Equipment | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.4 | Operations | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.4.1 | Staff | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 3.3.4.2 | Other | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 68.9% |
| 4.0 | CENTRALIZED STORAGE FACILITY | 65.1% | 11.6% | 10.3% | 13.0% | 100.0% | 94.6% |
| 4.1 | Misc Upfront Costs | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.2 | Construction | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.2.1 | Security Construction | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.2.2 | Site Work & Access | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.2.3 | Pads & Alleys | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.2.4 | Facility Construction | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.3 | Major Equipment | 65.2% | 11.5% | 10.3% | 13.0% | 100.0% | 94.5% |
| 4.3.1 | Storage Casks, Metal | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 87.8% |
| 4.3.2 | Storage Casks, Concrete | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 100.0% |
| 4.3.3 | Addl Canisters for Rail Ship | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 100.0% |
| 4.3.4 | Other | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.4 | Operations | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.4.1 | Staff | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 4.4.2 | Other | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 95.9% |
| 5.0 | REPOSITORY | 66.4% | 11.4% | 9.1% | 13.0% | 100.0% | 74.1% |
| 5.1 | Site Characterization | 86.4% | 0.3% | 0.3% | 13.0% | 100.0% | 77.6% |
| 5.1.1 | As Proposed in 1991 | 87.0% | 0.0% | 0.0% | 13.0% | 100.0% | 77.6% |
| 5.1.2 | East-West Tunnel | 66.5% | 10.0% | 10.5% | 13.0% | 100.0% | 77.6% |
| 5.2 | Design & License Application | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 77.6% |
| 5.2.1 | Design: Upfront & Ongoing | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 77.6% |
| 5.2.2 | Prepare License | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 77.6% |
| 5.3 | Surface Facilities | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.1 | Construction | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.1.1 | North | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.1.2 | South | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.2 | Equipment | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.3 | Operations | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.3.1 | Staff | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.3.3.2 | Other | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.4 | Underground Facilities | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.4.1 | Construction | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.4.2 | Equipment | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.4.3 | Operations | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.4.3.1 | Staff | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.4.3.2 | Other | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 5.5 | Waste Containers | 63.9% | 12.8% | 10.2% | 13.0% | 100.0% | 73.5% |
| 6.0.0 | OTHER DEVEL & EVAL COSTS | 95.2% | 4.8% | 0.0% | 0.0% | 100.0% | 77.6% |
| 6.1.0 | NRC Fees | 95.2% | 4.8% | 0.0% | 0.0% | 100.0% | 77.6% |
| 6.2.0 | NWTRB | 95.2% | 4.8% | 0.0% | 0.0% | 100.0% | 77.6% |
| 6.3.0 | Nuclear Waste Negotiator | NA | NA | NA | NA | NA | NA |
| 7.0.0 | OTHER PROGRAM COSTS | 90.9% | 9.1% | 0.0% | 0.0% | 100.0% | 73.4% |
| 7.1.0 | PETT Payments | 90.9% | 9.1% | 0.0% | 0.0% | 100.0% | 73.4% |
| 7.1.1 | DOE TSLCC 9/95 | 90.9% | 9.1% | 0.0% | 0.0% | 100.0% | 73.4% |
| 7.1.2 | Re Addl NV Components | 90.9% | 9.1% | 0.0% | 0.0% | 100.0% | 73.4% |
| 7.2.0 | Benefits | 90.9% | 9.1% | 0.0% | 0.0% | 100.0% | 73.4% |
| | GRAND TOTAL | 67.3% | 11.0% | 9.2% | 12.5% | 100.0% | 80.7% |

## THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM: NON-DIRECT COST FACTORS

| MASTER | Description | CONTNG | PROJCT | PROGRM | NWFND |
|---|---|---|---|---|---|
| 1.0 | ONSITE STORAGE COSTS | | | | |
| 1.1 | Commercial SNF in Que | | | | |
| 1.1.1 | Dry Storage | | | | |
| 1.1.1.1 | Opt 1/LWT: 26 sites | 15% | 15% | 15% | 100% |
| 1.1.1.2 | Opt 1/R125: 17 sites | 15% | 15% | 15% | 100% |
| 1.1.1.3 | Opt 2/R125: 11 sites | 15% | 15% | 15% | 100% |
| 1.1.1.4 | Opt 1/R75: 14 sites | 15% | 15% | 15% | 100% |
| 1.1.1.5 | Opt 2/R75: 5 sites | 15% | 15% | 15% | 100% |
| 1.1.2 | Pool Op after Reactor Shutdn | | | | |
| 1.1.2.1 | Opt 1/LWT: 26 sites | 15% | 15% | 15% | 100% |
| 1.1.2.2 | Opt 1/R125: 17 sites | 15% | 15% | 15% | 100% |
| 1.1.2.3 | Opt 2/R125: 11 sites | 15% | 15% | 15% | 100% |
| 1.1.2.4 | Opt 1/R75: 14 sites | 15% | 15% | 15% | 100% |
| 1.1.2.5 | Opt 2/R75: 5 sites | 15% | 15% | 15% | 100% |
| 1.1.3 | Pool Loading Upgrades | | | | |
| 1.1.3.1 | Opt 1/LWT: 26 sites | 15% | 15% | 15% | 100% |
| 1.1.3.2 | Opt 1/R125: 17 sites | 15% | 15% | 15% | 100% |
| 1.1.3.3 | Opt 2/R125: 11 sites | 15% | 15% | 15% | 100% |
| 1.1.3.4 | Opt 1/R75: 14 sites | 15% | 15% | 15% | 100% |
| 1.1.3.5 | Opt 2/R75: 5 sites | 15% | 15% | 15% | 100% |
| 1.2 | DOE SNF & SNF not in Que | | | | |
| 1.2.1 | Dry Storage | 15% | 15% | 15% | 20% |
| 1.2.2 | Pool Op after Reactor Shutdn | 15% | 15% | 15% | 20% |
| 1.2.3 | Pool Loading Upgrades | 15% | 15% | 15% | 20% |
| 1.3 | DOE High-Level Waste | | | | |
| 2.0 | X-COUNTRY TRANSPORTATION | | | | |
| 2.1 | Commercial SNF in Que | | | | |
| 2.1.1 | Cask Shipment Costs | | | | |
| 2.1.1.1 | Legal-Wt Truck | 15% | 15% | 15% | 100% |
| 2.1.1.2 | Large Rail | 15% | 15% | 15% | 100% |
| 2.1.1.3 | Small Rail | 15% | 15% | 15% | 100% |
| 2.1.2 | Shipment Escort Costs | | | | |
| 2.1.2.1 | Legal-Wt Truck | 15% | 15% | 15% | 100% |
| 2.1.2.2 | Large Rail | 15% | 15% | 15% | 100% |
| 2.1.2.3 | Small Rail | 15% | 15% | 15% | 100% |
| 2.1.3 | Cask Inspection Costs | | | | |
| 2.1.3.1 | Legal-Wt Truck | 15% | 15% | 15% | 100% |
| 2.1.3.2 | Large Rail | 15% | 15% | 15% | 100% |
| 2.1.3.3 | Small Rail | 15% | 15% | 15% | 100% |
| 2.1.4 | Cask & Equip Purchases | | | | |
| 2.1.4.1 | Legal-Wt Truck | 15% | 15% | 15% | 100% |
| 2.1.4.2 | Large Rail | 15% | 15% | 15% | 100% |
| 2.1.4.3 | Small Rail | 15% | 15% | 15% | 100% |
| 2.1.5 | Cask & Equip O&M | | | | |
| 2.1.5.1 | Legal-Wt Truck | 15% | 15% | 15% | 100% |
| 2.1.5.2 | Large Rail | 15% | 15% | 15% | 100% |
| 2.1.5.3 | Small Rail | 15% | 15% | 15% | 100% |
| 2.1.6 | Cask & Equip Decomm | | | | |
| 2.1.6.1 | Legal-Wt Truck | 15% | 15% | 15% | 100% |
| 2.1.6.2 | Large Rail | 15% | 15% | 15% | 100% |
| 2.1.6.3 | Small Rail | 15% | 15% | 15% | 100% |
| 2.1.7 | Hvy Haul to Railhead | | | | |
| 2.2 | DOE Spent Nuclear Fuel | | | | |
| 2.2.1 | Cask Shipment Costs | 15% | 15% | 15% | 23% |
| 2.2.2 | Shipment Escort Costs | 15% | 15% | 15% | 26% |
| 2.2.3 | Cask Inspection Costs | 15% | 15% | 15% | 19% |
| 2.2.4 | Cask & Equip Purchases | 15% | 15% | 15% | 20% |
| 2.2.5 | Cask & Equip O&M | 15% | 15% | 15% | 20% |
| 2.2.6 | Cask & Equip Decomm | 15% | 15% | 15% | 20% |
| 2.3 | DOE High-Level Wastes | | | | |
| 2.3.1 | Cask Shipment Costs | 15% | 15% | 15% | 0% |
| 2.3.2 | Shipment Escort Costs | 15% | 15% | 15% | 0% |
| 2.3.3 | Cask Inspection Costs | 15% | 15% | 15% | 0% |
| 2.3.4 | Cask & Equip Purchases | 15% | 15% | 15% | 0% |
| 2.3.5 | Cask & Equip O&M | 15% | 15% | 15% | 0% |
| 2.3.6 | Cask & Equip Decomm | 15% | 15% | 15% | 0% |
| 2.4 | Technical Assist Trng: 180(c) | 10% | 0% | 15% | 81% |

## NON-DIRECT COST FACTORS

| MASTER | Description | CONTNG | PROJCT | PROGRM | NWFND |
|---|---|---|---|---|---|
| 3.0 | NEVADA TRANSPORTATION | | | | |
| 3.1 | Intermodal Transfer Facility | | | | |
| 3.1.1 | Land and ROW | 15% | 15% | 15% | 100% |
| 3.1.2 | Construction | | | | |
| 3.1.2.1 | Security Construction | 15% | 15% | 15% | 100% |
| 3.1.2.2 | Site Work | 15% | 15% | 15% | 100% |
| 3.1.2.3 | Facility Construction | 15% | 15% | 15% | 100% |
| 3.1.3 | Major Equipment | 15% | 15% | 15% | 100% |
| 3.1.4 | Operations | | | | |
| 3.1.4.1 | Staff | 15% | 15% | 15% | 100% |
| 3.1.4.2 | Other | 15% | 15% | 15% | 100% |
| 3.2 | Heavy Haul to CSF | | | | |
| 3.2.1 | Engineering | 20% | 15% | 15% | 100% |
| 3.2.2 | Infrastructure Upgrade | 20% | 15% | 15% | 100% |
| 3.2.3 | Midway Service Facility | 20% | 15% | 15% | 100% |
| 3.2.4 | Equipment | 20% | 15% | 15% | 100% |
| 3.2.5 | Operations | | | | |
| 3.2.5.1 | Staff | 20% | 15% | 15% | 100% |
| 3.2.5.2 | Road Maintenance | 20% | 15% | 15% | 100% |
| 3.2.5.3 | Other | 20% | 15% | 15% | 100% |
| 3.3 | Rail Spur to CSF/YMP | | | | |
| 3.3.1 | Misc Upfront Costs | 20% | 15% | 15% | 69% |
| 3.3.2 | Construction | | | | |
| 3.3.2.1 | Rail Spur Const | 20% | 15% | 15% | 69% |
| 3.3.2.2 | Ancillary Facil Const | 20% | 15% | 15% | 69% |
| 3.3.3 | Major Equipment | 20% | 15% | 15% | 69% |
| 3.3.4 | Operations | | | | |
| 3.3.4.1 | Staff | 20% | 15% | 15% | 69% |
| 3.3.4.2 | Other | 20% | 15% | 15% | 69% |
| 4.0 | CENTRALIZED STORAGE FACILITY | | | | |
| 4.1 | Misc Upfront Costs | 20% | 15% | 15% | 96% |
| 4.2 | Construction | | | | |
| 4.2.1 | Security Construction | 20% | 15% | 15% | 96% |
| 4.2.2 | Site Work & Access | 20% | 15% | 15% | 96% |
| 4.2.3 | Pads & Alleys | 20% | 15% | 15% | 96% |
| 4.2.4 | Facility Construction | 20% | 15% | 15% | 96% |
| 4.3 | Major Equipment | | | | |
| 4.3.1 | Storage Casks, Metal | 20% | 15% | 15% | 88% |
| 4.3.2 | Storage Casks, Concrete | 20% | 15% | 15% | 100% |
| 4.3.3 | Addl Canisters for Rail Ship | 15% | 15% | 15% | 100% |
| 4.3.4 | Other | 20% | 15% | 15% | 96% |
| 4.4 | Operations | | | | |
| 4.4.1 | Staff | 20% | 15% | 15% | 96% |
| 4.4.2 | Other | 20% | 15% | 15% | 96% |
| 5.0 | REPOSITORY | | | | |
| 5.1 | Site Characterization | | | | |
| 5.1.1 | As Proposed in 1991 | 0% | 0% | 15% | 78% |
| 5.1.2 | East-West Tunnel | 15% | 15% | 15% | 78% |
| 5.2 | Design & License Application | | | | |
| 5.2.1 | Design: Upfront & Ongoing | 20% | 15% | 15% | 78% |
| 5.2.2 | Prepare License | 20% | 15% | 15% | 78% |
| 5.3 | Surface Facilities | | | | |
| 5.3.1 | Construction | | | | |
| 5.3.1.1 | North | 20% | 15% | 15% | 73% |
| 5.3.1.2 | South | 20% | 15% | 15% | 73% |
| 5.3.2 | Equipment | 20% | 15% | 15% | 73% |
| 5.3.3 | Operations | | | | |
| 5.3.3.1 | Staff | 20% | 15% | 15% | 73% |
| 5.3.3.2 | Other | 20% | 15% | 15% | 73% |
| 5.4 | Underground Facilities | | | | |
| 5.4.1 | Construction | 20% | 15% | 15% | 73% |
| 5.4.2 | Equipment | 20% | 15% | 15% | 73% |
| 5.4.3 | Operations | | | | |
| 5.4.3.1 | Staff | 20% | 15% | 15% | 73% |
| 5.4.3.2 | Other | 20% | 15% | 15% | 73% |
| 5.5 | Waste Containers | 20% | 15% | 15% | 73% |
| 6.0.0 | OTHER DEVEL & EVAL COSTS | | | | |
| 6.1.0 | NRC Fees | 5% | 0% | 0% | 78% |
| 6.2.0 | NWTRB | 5% | 0% | 0% | 78% |
| 6.3.0 | Nuclear Waste Negotiator | 5% | 0% | 0% | 78% |
| 7.0.0 | OTHER PROGRAM COSTS | | | | |
| 7.1.0 | PETT Payments | | | | |
| 7.1.1 | DOE TSLCC 9/95 | 10% | 0% | 0% | 73% |
| 7.1.2 | Re Addl NV Components | 10% | 0% | 0% | 73% |
| 7.2.0 | Benefits | 10% | 0% | 0% | 73% |
| | GRAND TOTAL | | | | |

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# APPENDIX E: ANNUAL PROJECTED TOTAL SYSTEMS COSTS (MIL'96$)

The following tables present projected costs on an annual basis. All figures include direct, contingency and project and program management costs, as estimated for the independent assessment.

**THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM:**
**PROJECTED PROGRAM COSTS (FY 1997-FY 2011; MIL'96$)**

| MASTER | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 0.4 | 8.9 | 28.1 | 31.5 | 46.1 | 66.9 | 62.9 | 45.6 | 56.7 | 69.4 | 73.5 | 74.6 | 65.2 | 65.2 | 89.9 |
| 1.1 | 0.0 | 8.6 | 14.3 | 17.7 | 32.3 | 53.1 | 49.1 | 31.8 | 42.9 | 55.9 | 60.1 | 61.2 | 51.8 | 51.7 | 76.3 |
| 1.1.1 | 0.0 | 1.8 | 7.4 | 6.6 | 13.7 | 20.1 | 18.2 | 10.6 | 20.0 | 36.8 | 35.9 | 24.6 | 23.3 | 15.9 | 27.5 |
| 1.1.1.1 | 0.0 | 0.0 | 1.4 | 0.2 | 0.2 | 0.2 | 4.5 | 0.3 | 11.9 | 12.8 | 20.9 | 13.2 | 3.1 | 6.3 | 3.2 |
| 1.1.1.2 | 0.0 | 0.0 | 1.4 | 0.3 | 0.1 | 5.7 | 6.7 | 2.4 | 4.7 | 13.6 | 4.1 | 4.6 | 7.4 | 1.2 | 4.6 |
| 1.1.1.3 | 0.0 | 1.3 | 4.2 | 3.3 | 11.9 | 12.0 | 6.5 | 5.7 | 1.7 | 4.6 | 1.6 | 4.3 | 8.3 | 5.5 | 6.2 |
| 1.1.1.4 | 0.0 | 0.0 | 0.0 | 2.3 | 1.0 | 1.7 | 0.2 | 2.0 | 1.3 | 0.3 | 5.7 | 1.7 | 1.5 | 1.1 | 1.3 |
| 1.1.1.5 | 0.0 | 0.4 | 0.3 | 0.4 | 0.6 | 0.5 | 0.2 | 0.3 | 0.3 | 5.5 | 3.5 | 0.8 | 2.9 | 1.7 | 12.1 |
| 1.1.2 | 0.0 | 6.8 | 6.9 | 11.1 | 18.6 | 21.3 | 23.1 | 20.9 | 22.9 | 17.7 | 21.8 | 30.6 | 28.5 | 35.9 | 44.8 |
| 1.1.2.1 | 0.0 | 2.5 | 2.6 | 4.2 | 7.9 | 9.1 | 9.9 | 8.5 | 7.8 | 7.0 | 7.3 | 14.5 | 13.1 | 22.2 | 25.0 |
| 1.1.2.2 | 0.0 | 1.4 | 1.4 | 2.3 | 3.5 | 4.1 | 4.4 | 4.8 | 5.9 | 5.3 | 5.5 | 6.1 | 3.2 | 3.6 | 3.5 |
| 1.1.2.3 | 0.0 | 0.8 | 0.8 | 1.2 | 1.9 | 2.2 | 2.4 | 2.6 | 3.2 | 0.0 | 0.0 | 0.0 | 3.2 | 3.6 | 3.6 |
| 1.1.2.4 | 0.0 | 1.5 | 1.5 | 2.4 | 3.7 | 4.2 | 4.6 | 5.0 | 6.1 | 5.5 | 5.7 | 6.3 | 5.7 | 6.4 | 6.3 |
| 1.1.2.5 | 0.0 | 0.6 | 0.6 | 1.0 | 1.5 | 1.8 | 1.9 | 0.0 | 0.0 | 0.0 | 3.3 | 3.7 | 3.3 | 0.0 | 6.4 |
| 1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.6 | 7.7 | 0.3 | 0.0 | 1.4 | 2.4 | 6.0 | 0.0 | 0.0 | 4.0 |
| 1.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 2.4 | 2.7 | 0.0 | 0.0 | 0.0 |
| 1.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.1 | 7.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 |
| 1.1.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 0.0 | 0.0 | 0.0 |
| 1.2 | 0.4 | 0.4 | 13.8 | 13.8 | 13.8 | 13.8 | 13.8 | 13.8 | 13.8 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.6 |
| 1.2.1 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.2 |
| 1.2.2 | 0.0 | 0.0 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.4 |
| 1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 21.5 | 21.5 | 234.3 | 96.2 | 161.0 | 159.6 | 199.4 | 189.4 | 166.8 | 163.9 | 169.9 |
| 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 212.8 | 74.7 | 139.5 | 138.1 | 177.9 | 167.9 | 145.3 | 142.4 | 144.3 |
| 2.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 71.5 | 58.9 | 87.1 | 95.5 | 120.6 | 121.0 | 122.8 | 108.3 | 118.0 |
| 2.1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 58.1 | 44.7 | 59.9 | 73.7 | 89.7 | 80.3 | 83.2 | 62.5 | 73.9 |
| 2.1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.5 | 6.0 | 10.8 | 10.6 | 16.3 | 23.3 | 21.0 | 22.1 | 20.0 |
| 2.1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.9 | 8.3 | 16.4 | 11.2 | 14.6 | 17.3 | 18.6 | 23.7 | 24.0 |
| 2.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.2 | 3.4 | 4.8 | 5.4 | 6.7 | 6.5 | 6.6 | 5.5 | 6.2 |
| 2.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 2.8 | 3.8 | 4.6 | 5.7 | 5.1 | 5.2 | 3.8 | 4.6 |
| 2.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.3 | 0.5 | 0.7 | 0.6 | 0.7 | 0.6 |
| 2.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.3 | 0.7 | 0.5 | 0.6 | 0.7 | 0.8 | 1.0 | 1.0 |
| 2.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.4 | 2.0 | 2.2 | 2.8 | 2.8 | 2.9 | 2.6 | 2.8 |
| 2.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.0 | 1.4 | 1.7 | 2.0 | 1.8 | 1.9 | 1.5 | 1.8 |
| 2.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.5 | 0.5 | 0.5 | 0.5 |
| 2.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.4 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 |
| 2.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 128.7 | 5.0 | 36.3 | 25.3 | 35.3 | 24.7 | 0.0 | 13.5 | 4.5 |
| 2.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 91.6 | 0.0 | 3.2 | 25.3 | 25.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 | 5.0 | 15.1 | 0.0 | 10.1 | 20.1 | 0.0 | 0.0 | 0.0 |
| 2.1.4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 27.1 | 0.0 | 18.0 | 0.0 | 0.0 | 4.5 | 0.0 | 13.5 | 4.5 |
| 2.1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.6 | 5.6 | 8.7 | 9.2 | 11.7 | 12.2 | 12.6 | 11.9 | 12.6 |
| 2.1.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 3.7 | 5.0 | 6.2 | 7.5 | 6.7 | 7.1 | 5.5 | 6.4 |
| 2.1.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 1.4 | 1.4 | 2.1 | 3.0 | 2.9 | 3.1 | 2.7 |
| 2.1.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.2 | 2.4 | 1.6 | 2.1 | 2.4 | 2.6 | 3.3 | 3.4 |
| 2.1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.6 | 0.5 | 0.6 | 0.8 | 0.5 | 0.5 | 0.3 |
| 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.1 |
| 2.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 |
| 2.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 |
| 2.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| 2.2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 |

## PROJECTED PROGRAM COSTS (FY 1997-FY 2011; MIL'96$)

| MASTER | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 3.9 | 88.3 | 139.6 | 141.7 | 66.4 | 412.1 | 432.7 | 451.6 | 445.3 | 466.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| 3.1 | 0.0 | 0.5 | 9.8 | 12.6 | 5.9 | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.1 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2 | 0.0 | 0.0 | 9.8 | 12.6 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.1 | 0.0 | 0.0 | 5.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.2 | 0.0 | 0.0 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.3 | 0.0 | 0.0 | 1.5 | 12.6 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.7 | 12.7 | 12.7 | 12.7 | 12.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.2 | 11.2 | 11.2 | 11.2 | 11.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2 | 3.9 | 87.8 | 91.0 | 90.0 | 19.1 | 25.5 | 25.5 | 43.4 | 25.5 | 25.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.1 | 3.9 | 3.9 | 3.9 | 3.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.2 | 0.0 | 82.7 | 82.7 | 82.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.3 | 0.0 | 1.3 | 4.5 | 3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 19.1 | 0.0 | 0.0 | 17.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 25.5 | 25.5 | 25.5 | 25.5 | 25.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.6 | 12.6 | 12.6 | 12.6 | 12.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3 | 0.0 | 0.0 | 38.8 | 39.1 | 41.4 | 373.9 | 394.4 | 395.5 | 407.1 | 428.3 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| 3.3.1 | 0.0 | 0.0 | 38.8 | 39.1 | 41.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 373.9 | 373.9 | 375.0 | 386.5 | 386.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 373.5 | 373.5 | 373.5 | 373.5 | 373.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 | 1.5 | 13.1 | 13.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| 3.3.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 |
| 3.3.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| 4.0 | 0.0 | 32.3 | 32.9 | 274.2 | 70.7 | 95.1 | 339.7 | 295.0 | 325.9 | 436.5 | 505.2 | 547.0 | 484.1 | 392.2 | 371.6 |
| 4.1 | 0.0 | 32.3 | 32.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2 | 0.0 | 0.0 | 0.0 | 248.4 | 64.7 | 58.3 | 58.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.1 | 0.0 | 0.0 | 0.0 | 5.7 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.2 | 0.0 | 0.0 | 0.0 | 4.3 | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.3 | 0.0 | 0.0 | 0.0 | 58.3 | 58.3 | 58.3 | 58.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.4 | 0.0 | 0.0 | 0.0 | 180.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3 | 0.0 | 0.0 | 0.0 | 25.9 | 6.0 | 6.0 | 250.6 | 264.3 | 295.2 | 405.8 | 474.5 | 516.3 | 484.1 | 392.2 | 371.6 |
| 4.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 220.2 | 217.7 | 215.2 | 332.8 | 355.3 | 350.3 | 285.3 | 177.7 | 157.7 |
| 4.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 22.1 | 23.8 | 42.6 | 35.0 | 51.4 | 65.3 | 63.2 | 68.5 | 54.8 |
| 4.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.5 | 22.8 | 37.4 | 38.0 | 67.7 | 100.7 | 135.7 | 146.1 | 159.1 |
| 4.3.4 | 0.0 | 0.0 | 0.0 | 25.9 | 6.0 | 6.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.7 | 30.7 | 30.7 | 30.7 | 30.7 | 30.7 | 30.7 | 0.0 | 0.0 | 0.0 |
| 4.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 0.0 | 0.0 | 0.0 |
| 4.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 |
| 5.0 | 389.9 | 417.1 | 417.8 | 415.4 | 415.4 | 380.2 | 365.6 | 240.8 | 755.6 | 853.7 | 876.8 | 1120.8 | 269.9 | 301.5 | 350.4 |
| 5.1 | 389.9 | 417.1 | 382.6 | 345.0 | 345.0 | 345.0 | 329.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.1 | 389.9 | 379.5 | 345.0 | 345.0 | 345.0 | 345.0 | 329.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.2 | 0.0 | 37.6 | 37.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2 | 0.0 | 0.0 | 35.2 | 70.4 | 70.4 | 35.2 | 35.2 | 35.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 |
| 5.2.1 | 0.0 | 0.0 | 0.0 | 35.2 | 35.2 | 35.2 | 35.2 | 35.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 |
| 5.2.2 | 0.0 | 0.0 | 35.2 | 35.2 | 35.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 44.7 | 572.1 | 664.5 | 680.0 | 635.8 | 72.5 | 72.5 | 72.5 |
| 5.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 7.4 | 534.8 | 627.3 | 642.7 | 547.9 | 0.0 | 0.0 | 0.0 |
| 5.3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 480.9 | 593.0 | 641.7 | 547.9 | 0.0 | 0.0 | 0.0 |
| 5.3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 6.1 | 53.9 | 34.2 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.6 | 0.0 | 0.0 | 0.0 |
| 5.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 37.3 | 37.3 | 37.3 | 37.3 | 37.3 | 72.5 | 72.5 | 72.5 |
| 5.3.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.2 | 35.2 | 35.2 | 35.2 | 35.2 | 70.4 | 70.4 | 70.4 |
| 5.3.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 5.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 160.9 | 161.4 | 167.0 | 174.7 | 452.4 | 143.7 | 143.7 | 143.7 |
| 5.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 113.1 | 113.5 | 119.2 | 126.9 | 120.2 | 95.8 | 95.8 | 95.8 |
| 5.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 284.3 | 0.0 | 0.0 | 0.0 |
| 5.4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 |
| 5.4.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 |
| 5.4.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 |
| 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.5 | 31.6 | 63.2 | 112.2 |
| 6.0.0 | 26.8 | 26.8 | 26.8 | 26.8 | 31.2 | 31.2 | 29.0 | 24.6 | 19.0 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 3.3 |
| 6.1.0 | 24.4 | 24.4 | 24.4 | 24.4 | 28.9 | 28.9 | 26.6 | 22.2 | 16.6 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 3.3 |
| 6.2.0 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 0.0 |
| 6.3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.0.0 | 0.0 | 0.0 | 0.4 | 3.0 | 18.6 | 21.2 | 24.2 | 26.7 | 29.3 | 32.0 | 32.3 | 32.7 | 32.6 | 39.6 | 38.8 |
| 7.1.0 | 0.0 | 0.0 | 0.4 | 3.0 | 9.2 | 12.2 | 15.4 | 18.1 | 21.0 | 23.9 | 24.5 | 25.0 | 25.2 | 25.5 | 25.3 |
| 7.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 4.8 |
| 7.1.2 | 0.0 | 0.0 | 0.4 | 3.0 | 3.9 | 6.9 | 10.1 | 12.8 | 15.7 | 18.6 | 19.2 | 19.7 | 19.9 | 20.2 | 20.5 |
| 7.2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.3 | 9.1 | 8.8 | 8.6 | 8.3 | 8.1 | 7.9 | 7.6 | 7.4 | 14.1 | 13.5 |
| | 420.9 | 573.4 | 645.6 | 892.7 | 669.8 | 1028.2 | 1488.4 | 1180.5 | 1792.9 | 2031.3 | 1721.3 | 1998.7 | 1052.7 | 996.5 | 1044.6 |

**THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM:**
**PROJECTED PROGRAM COSTS (FY 2012-FY 2026; MIL'96$)**

| MASTER | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 76.2 | 82.5 | 126.7 | 149.9 | 157.9 | 181.9 | 180.5 | 187.3 | 180.4 | 196.8 | 190.4 | 187.5 | 198.7 | 232.8 | 228.6 |
| 1.1 | 62.8 | 69.1 | 113.3 | 136.4 | 144.5 | 168.5 | 167.1 | 173.9 | 167.0 | 183.4 | 177.0 | 174.1 | 185.3 | 219.4 | 215.2 |
| 1.1.1 | 22.1 | 24.9 | 29.2 | 32.9 | 38.0 | 26.1 | 19.3 | 20.2 | 14.1 | 8.0 | 8.3 | 7.5 | 9.1 | 19.6 | 10.5 |
| 1.1.1.1 | 1.7 | 7.3 | 4.8 | 7.1 | 3.9 | 1.7 | 1.1 | 2.8 | 0.7 | 1.7 | 0.8 | 3.3 | 3.2 | 11.5 | 1.2 |
| 1.1.1.2 | 2.0 | 4.2 | 3.4 | 0.6 | 8.8 | 2.6 | 1.9 | 3.0 | 2.1 | 0.3 | 2.3 | 0.3 | 0.3 | 2.5 | 0.3 |
| 1.1.1.3 | 2.5 | 7.2 | 12.7 | 16.6 | 12.0 | 12.6 | 9.7 | 10.7 | 7.7 | 4.6 | 4.1 | 2.7 | 4.0 | 2.9 | 6.6 |
| 1.1.1.4 | 1.1 | 0.1 | 0.5 | 5.6 | 1.3 | 0.4 | 1.3 | 0.5 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.5 | 14.8 | 6.0 | 7.8 | 3.1 | 12.1 | 8.8 | 5.4 | 3.2 | 2.5 | 1.5 | 1.0 | 1.1 | 1.6 | 2.7 | 2.4 |
| 1.1.2 | 40.7 | 43.2 | 81.6 | 103.5 | 106.5 | 142.4 | 147.7 | 153.7 | 152.9 | 175.4 | 168.7 | 166.7 | 176.1 | 199.9 | 204.7 |
| 1.1.2.1 | 21.0 | 21.8 | 36.8 | 46.0 | 48.8 | 69.9 | 77.5 | 78.3 | 88.1 | 100.7 | 90.7 | 87.1 | 83.9 | 69.8 | 60.7 |
| 1.1.2.2 | 3.0 | 2.6 | 6.8 | 6.6 | 7.0 | 7.8 | 8.3 | 14.9 | 11.7 | 13.4 | 24.8 | 32.5 | 39.6 | 73.0 | 83.3 |
| 1.1.2.3 | 3.0 | 2.7 | 15.9 | 26.9 | 21.8 | 25.1 | 30.4 | 25.3 | 23.8 | 21.5 | 9.6 | 5.3 | 0.0 | 0.0 | 0.0 |
| 1.1.2.4 | 5.3 | 8.6 | 12.8 | 15.5 | 16.5 | 22.4 | 24.1 | 26.9 | 24.9 | 34.7 | 38.8 | 41.8 | 52.6 | 57.1 | 55.1 |
| 1.1.2.5 | 8.4 | 7.5 | 9.3 | 8.6 | 12.4 | 17.1 | 7.5 | 8.3 | 4.4 | 5.0 | 4.8 | 0.0 | 0.0 | 0.0 | 5.5 |
| 1.1.3 | 0.0 | 1.0 | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.2 | 0.0 | 0.0 | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.3 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 |
| 1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.2 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 |
| 1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2.0 | 152.8 | 149.4 | 144.2 | 215.5 | 166.3 | 160.0 | 168.3 | 173.1 | 161.3 | 162.5 | 178.8 | 311.7 | 178.7 | 196.6 | 168.9 |
| 2.1 | 131.3 | 134.2 | 129.0 | 142.4 | 132.1 | 126.7 | 135.6 | 141.0 | 129.8 | 131.2 | 147.8 | 280.8 | 148.0 | 166.0 | 138.8 |
| 2.1.1 | 110.6 | 113.0 | 108.6 | 120.0 | 111.4 | 106.5 | 110.0 | 111.0 | 109.2 | 110.4 | 124.9 | 112.8 | 120.0 | 104.9 | 92.1 |
| 2.1.1.1 | 68.8 | 71.0 | 63.8 | 76.7 | 68.0 | 61.3 | 66.7 | 63.1 | 67.4 | 65.3 | 81.1 | 73.0 | 74.5 | 58.2 | 46.9 |
| 2.1.1.2 | 21.3 | 20.9 | 22.6 | 21.6 | 19.7 | 20.7 | 24.7 | 19.7 | 21.3 | 20.7 | 21.4 | 19.2 | 21.4 | 20.2 | 24.9 |
| 2.1.1.3 | 20.6 | 21.2 | 22.2 | 21.7 | 23.8 | 24.5 | 18.6 | 28.2 | 20.5 | 24.4 | 22.4 | 20.6 | 24.1 | 26.5 | 20.2 |
| 2.1.2 | 5.7 | 5.9 | 5.6 | 6.2 | 5.8 | 5.3 | 5.6 | 5.6 | 5.6 | 5.6 | 6.6 | 5.8 | 6.2 | 5.3 | 4.5 |
| 2.1.2.1 | 4.2 | 4.4 | 4.0 | 4.6 | 4.2 | 3.7 | 4.1 | 3.8 | 4.1 | 4.0 | 5.0 | 4.4 | 4.6 | 3.6 | 2.9 |
| 2.1.2.2 | 0.7 | 0.6 | 0.7 | 0.7 | 0.6 | 0.6 | 0.8 | 0.6 | 0.7 | 0.6 | 0.7 | 0.6 | 0.7 | 0.6 | 0.8 |
| 2.1.2.3 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 1.1 | 0.8 | 1.0 | 0.9 | 0.8 | 1.0 | 1.1 | 0.8 |
| 2.1.3 | 2.7 | 2.7 | 2.6 | 2.9 | 2.7 | 2.6 | 2.6 | 2.7 | 2.6 | 2.7 | 2.9 | 2.8 | 2.9 | 2.5 | 2.2 |
| 2.1.3.1 | 1.7 | 1.7 | 1.5 | 1.9 | 1.6 | 1.5 | 1.6 | 1.5 | 1.6 | 1.6 | 1.9 | 1.8 | 1.8 | 1.4 | 1.1 |
| 2.1.3.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 0.5 | 0.6 |
| 2.1.3.3 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.7 | 0.5 | 0.7 | 0.6 | 0.5 | 0.6 | 0.7 | 0.6 |
| 2.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.0 | 9.0 | 0.0 | 0.0 | 0.0 | 128.7 | 5.0 | 36.3 | 25.3 |
| 2.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 91.6 | 0.0 | 3.2 | 25.3 |
| 2.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 | 5.0 | 15.1 | 0.0 |
| 2.1.4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | 0.0 | 0.0 | 0.0 | 27.1 | 0.0 | 18.0 | 0.0 |
| 2.1.5 | 11.9 | 12.2 | 11.7 | 12.9 | 12.0 | 11.9 | 11.8 | 12.3 | 11.7 | 12.2 | 12.8 | 12.3 | 12.7 | 11.6 | 10.5 |
| 2.1.5.1 | 6.1 | 6.3 | 5.5 | 7.0 | 5.9 | 5.5 | 5.9 | 5.7 | 6.0 | 5.8 | 7.0 | 6.8 | 6.6 | 5.0 | 4.0 |
| 2.1.5.2 | 2.9 | 2.9 | 3.0 | 2.9 | 2.7 | 2.9 | 3.3 | 2.8 | 2.8 | 2.9 | 2.9 | 2.6 | 2.9 | 2.8 | 3.5 |
| 2.1.5.3 | 2.8 | 3.0 | 3.1 | 3.0 | 3.3 | 3.4 | 2.6 | 3.9 | 2.9 | 3.5 | 3.0 | 2.9 | 3.2 | 3.8 | 3.0 |
| 2.1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.1 | 0.7 | 4.9 | 3.6 |
| 2.1.6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.1 | 0.0 | 0.5 | 3.6 |
| 2.1.6.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.7 | 2.0 | 0.0 |
| 2.1.6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 0.0 | 2.5 | 0.0 |
| 2.1.7 | 0.5 | 0.4 | 0.5 | 0.4 | 0.3 | 0.4 | 0.5 | 0.3 | 0.6 | 0.3 | 0.4 | 0.3 | 0.5 | 0.5 | 0.7 |
| 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3 | 0.0 | 0.0 | 0.0 | 57.9 | 19.0 | 18.1 | 17.5 | 17.0 | 16.4 | 16.1 | 15.9 | 15.7 | 15.5 | 15.4 | 14.9 |
| 2.3.1 | 0.0 | 0.0 | 0.0 | 17.8 | 16.2 | 15.3 | 14.6 | 14.2 | 13.6 | 13.3 | 13.1 | 12.9 | 12.8 | 12.7 | 12.1 |
| 2.3.2 | 0.0 | 0.0 | 0.0 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 |
| 2.3.3 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 2.3.4 | 0.0 | 0.0 | 0.0 | 37.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.5 | 0.0 | 0.0 | 0.0 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| 2.3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.4 | 21.5 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 |

## PROJECTED PROGRAM COSTS (FY 2012-FY 2026; MIL'96$)

| MASTER | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| 3.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| 3.3.4.1 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 |
| 3.3.4.2 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| 4.0 | 301.8 | 267.2 | 171.8 | 154.3 | 174.0 | 180.0 | 172.6 | 191.9 | 196.3 | 166.5 | 170.3 | 176.5 | 181.4 | 180.9 | 178.5 |
| 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3 | 301.8 | 267.2 | 171.8 | 154.3 | 174.0 | 180.0 | 172.6 | 191.9 | 196.3 | 166.5 | 170.3 | 176.5 | 181.4 | 180.9 | 178.5 |
| 4.3.1 | 115.1 | 95.1 | 10.5 | 16.1 | 22.8 | 24.1 | 22.3 | 22.4 | 47.9 | 22.5 | 28.7 | 32.7 | 37.9 | 8.9 | 5.1 |
| 4.3.2 | 42.7 | 24.5 | 6.0 | 4.3 | 2.8 | 2.4 | 6.9 | 4.6 | 3.3 | 1.7 | 3.8 | 0.7 | 5.4 | 4.0 | 7.4 |
| 4.3.3 | 144.0 | 147.6 | 155.3 | 133.9 | 148.5 | 153.5 | 143.5 | 164.9 | 145.0 | 142.3 | 137.9 | 143.1 | 138.1 | 167.9 | 165.9 |
| 4.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.0 | 413.6 | 451.4 | 448.7 | 448.7 | 448.7 | 448.7 | 450.6 | 448.7 | 448.7 | 448.7 | 448.7 | 465.7 | 448.7 | 448.7 | 448.7 |
| 5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 |
| 5.2.1 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 |
| 5.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3 | 72.5 | 75.2 | 72.5 | 72.5 | 72.5 | 72.5 | 74.4 | 72.5 | 72.5 | 72.5 | 72.5 | 89.5 | 72.5 | 72.5 | 72.5 |
| 5.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.2 | 0.0 | 2.8 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 17.1 | 0.0 | 0.0 | 0.0 |
| 5.3.3 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 |
| 5.3.3.1 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 |
| 5.3.3.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 5.4 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 |
| 5.4.1 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 |
| 5.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.3 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 |
| 5.4.3.1 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 |
| 5.4.3.2 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 |
| 5.5 | 175.3 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 |
| 6.0.0 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| 6.1.0 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| 6.2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.0.0 | 38.7 | 38.4 | 38.1 | 37.8 | 37.5 | 37.2 | 36.9 | 36.6 | 36.3 | 36.1 | 35.8 | 35.6 | 35.4 | 35.1 | 34.9 |
| 7.1.0 | 25.5 | 25.7 | 25.7 | 25.7 | 25.7 | 25.8 | 25.8 | 25.9 | 25.9 | 26.0 | 26.0 | 26.0 | 26.1 | 26.1 | 26.1 |
| 7.1.1 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 7.1.2 | 20.7 | 20.8 | 20.9 | 20.9 | 20.9 | 20.9 | 21.0 | 21.0 | 21.1 | 21.1 | 21.2 | 21.2 | 21.3 | 21.3 | 21.3 |
| 7.2.0 | 13.2 | 12.8 | 12.4 | 12.0 | 11.7 | 11.4 | 11.0 | 10.7 | 10.4 | 10.1 | 9.8 | 9.5 | 9.3 | 9.0 | 8.8 |
| | 1007.1 | 1012.9 | 953.4 | 1030.0 | 1008.3 | 1031.7 | 1032.7 | 1061.5 | 1047.0 | 1034.5 | 1047.9 | 1200.9 | 1066.8 | 1118.0 | 1083.4 |

**THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM:**
**PROJECTED PROGRAM COSTS (FY 2027-FY 2041; MIL'96$)**

| MASTER | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 249.8 | 241.5 | 217.4 | 153.0 | 49.1 | 13.4 | 0.0 | 11.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1 | 249.8 | 241.5 | 217.4 | 153.0 | 49.1 | 0.0 | 0.0 | 11.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1 | 12.0 | 7.0 | 3.5 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.1 | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.2 | 5.7 | 0.3 | 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.3 | 3.8 | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.5 | 0.7 | 2.1 | 0.3 | 0.3 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2 | 237.8 | 234.4 | 213.9 | 152.8 | 48.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.1 | 81.9 | 65.9 | 40.6 | 32.2 | 7.6 | 0.0 | 0.0 | 11.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.2 | 92.6 | 104.3 | 110.2 | 68.2 | 22.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.4 | 57.1 | 64.2 | 63.1 | 52.4 | 18.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.5 | 6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.3 | NA | NA | NA | NA | NA | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.0 | 202.8 | 179.1 | 132.0 | 157.0 | 142.0 | 512.6 | 93.3 | 21.5 | 65.1 | 21.7 | 21.7 | 22.3 | 22.9 | 15.8 | 0.0 |
| 2.1 | 173.7 | 148.9 | 100.6 | 125.6 | 107.1 | 14.3 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 | 0.7 | 1.2 | 0.0 | 0.0 |
| 2.1.1 | 112.5 | 102.2 | 84.6 | 92.8 | 85.9 | 12.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.1 | 65.2 | 57.6 | 32.1 | 42.3 | 41.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.2 | 20.2 | 22.7 | 22.9 | 22.7 | 23.6 | 3.6 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.3 | 27.1 | 21.9 | 29.6 | 27.9 | 20.6 | 8.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2 | 5.7 | 5.2 | 3.9 | 4.4 | 4.2 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.1 | 4.0 | 3.6 | 2.0 | 2.6 | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.2 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.3 | 1.1 | 0.9 | 1.2 | 1.1 | 0.8 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3 | 2.7 | 2.4 | 2.0 | 2.3 | 2.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.1 | 1.6 | 1.3 | 0.8 | 1.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.2 | 0.4 | 0.5 | 0.5 | 0.5 | 0.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.3 | 0.7 | 0.6 | 0.8 | 0.7 | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4 | 35.3 | 24.7 | 0.0 | 13.5 | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.1 | 25.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.2 | 10.1 | 20.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.3 | 0.0 | 4.5 | 0.0 | 13.5 | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5 | 12.1 | 10.9 | 10.0 | 10.8 | 9.8 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.1 | 5.9 | 4.9 | 2.8 | 3.8 | 3.5 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.2 | 2.6 | 3.1 | 3.1 | 3.1 | 3.3 | 0.5 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.3 | 3.6 | 3.0 | 4.1 | 3.8 | 3.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6 | 5.0 | 3.3 | 0.0 | 1.9 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.1 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.2 | 1.3 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 1.2 | 0.0 | 0.0 | 0.0 |
| 2.1.6.3 | 0.0 | 0.6 | 0.0 | 1.9 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.7 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 | 466.9 | 71.8 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 |
| 2.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 136.4 | 59.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | 2.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.3 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 3.2 | 303.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 15.9 | 7.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3 | 14.0 | 15.0 | 16.2 | 16.2 | 16.2 | 16.1 | 16.2 | 16.2 | 58.4 | 16.4 | 16.4 | 16.4 | 16.4 | 10.6 | 0.0 |
| 2.3.1 | 11.3 | 12.3 | 13.5 | 13.4 | 13.4 | 13.4 | 13.5 | 13.5 | 13.4 | 13.6 | 13.6 | 13.6 | 13.6 | 8.8 | 0.0 |
| 2.3.2 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.0 |
| 2.3.3 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.0 |
| 2.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 37.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.5 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.2 | 0.0 |
| 2.3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.4 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 15.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 0.0 |

## PROJECTED PROGRAM COSTS (FY 2027-FY 2041; MIL'96$)

| MASTER | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4.1 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4.2 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.0 | 179.2 | 168.2 | 246.0 | 263.7 | 221.4 | 432.2 | 164.8 | 61.5 | 63.8 | 59.3 | 59.9 | 59.3 | 59.3 | 58.9 | 15.1 |
| 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3 | 179.2 | 168.2 | 246.0 | 263.7 | 221.4 | 432.2 | 164.8 | 61.5 | 63.8 | 59.3 | 59.9 | 59.3 | 59.3 | 58.9 | 15.1 |
| 4.3.1 | 20.8 | 6.1 | 6.1 | 7.9 | 2.6 | 380.4 | 159.0 | 53.7 | 50.7 | 51.4 | 52.0 | 51.4 | 51.4 | 51.0 | 13.1 |
| 4.3.2 | 3.5 | 0.4 | 5.1 | 4.4 | 3.1 | 2.0 | 5.8 | 7.9 | 7.6 | 7.9 | 7.9 | 7.9 | 7.9 | 7.9 | 2.0 |
| 4.3.3 | 154.9 | 161.6 | 234.8 | 251.4 | 215.6 | 49.8 | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.0 | 448.7 | 450.6 | 448.7 | 448.7 | 448.7 | 448.7 | 451.4 | 401.8 | 401.8 | 401.8 | 401.8 | 403.6 | 323.2 | 51.9 | 31.7 |
| 5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 0.0 |
| 5.2.1 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 22.2 | 0.0 |
| 5.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3 | 72.5 | 74.4 | 72.5 | 72.5 | 72.5 | 72.5 | 75.2 | 72.5 | 72.5 | 72.5 | 72.5 | 74.3 | 72.5 | 2.1 | 30.8 |
| 5.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.2 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.3 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 72.5 | 2.1 | 30.8 |
| 5.3.3.1 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 0.0 | 28.7 |
| 5.3.3.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 5.4 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 143.7 | 96.7 | 96.7 | 96.7 | 96.7 | 96.7 | 96.7 | 0.9 | 0.9 |
| 5.4.1 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 95.8 | 0.0 | 0.0 |
| 5.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.3 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 5.4.3.1 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.3.2 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 5.5 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 210.4 | 131.9 | 26.7 | 0.0 |
| 6.0.0 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 0.6 |
| 6.1.0 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 0.6 |
| 6.2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.0.0 | 34.7 | 34.4 | 34.2 | 34.0 | 33.8 | 34.1 | 34.1 | 34.0 | 33.8 | 33.7 | 33.6 | 33.5 | 33.4 | 33.3 | 33.2 |
| 7.1.0 | 26.2 | 26.2 | 26.2 | 26.2 | 26.2 | 26.7 | 26.9 | 27.0 | 27.1 | 27.2 | 27.3 | 27.3 | 27.4 | 27.5 | 27.5 |
| 7.1.1 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 7.1.2 | 21.3 | 21.3 | 21.4 | 21.4 | 21.4 | 21.9 | 22.1 | 22.2 | 22.3 | 22.3 | 22.4 | 22.5 | 22.6 | 22.7 | 22.7 |
| 7.2.0 | 8.5 | 8.3 | 8.0 | 7.8 | 7.6 | 7.4 | 7.1 | 6.9 | 6.7 | 6.6 | 6.4 | 6.2 | 6.0 | 5.8 | 5.7 |
| | 1139.1 | 1097.6 | 1102.2 | 1080.3 | 918.9 | 1464.8 | 767.4 | 554.2 | 588.3 | 519.8 | 520.3 | 522.1 | 442.2 | 163.3 | 80.6 |

**THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM:**
**PROJECTED PROGRAM COSTS (FY 2042-FY 2056; MIL'96$)**

| MASTER | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2.0 | 0.0 | 18.1 | 0.7 | 4.9 | 3.6 | 5.0 | 3.3 | 0.0 | 1.9 | 1.1 | 43.2 | 0.0 | 0.0 | 4.9 | 0.0 |
| 2.1 | 0.0 | 18.1 | 0.7 | 4.9 | 3.6 | 5.0 | 3.3 | 0.0 | 1.9 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6 | 0.0 | 18.1 | 0.7 | 4.9 | 3.6 | 5.0 | 3.3 | 0.0 | 1.9 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.1 | 0.0 | 13.1 | 0.0 | 0.5 | 3.6 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.2 | 0.0 | 1.3 | 0.7 | 2.0 | 0.0 | 1.3 | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.3 | 0.0 | 3.7 | 0.0 | 2.5 | 0.0 | 0.0 | 0.6 | 0.0 | 1.9 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 43.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 43.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 0.0 |
| 2.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 0.0 | 0.0 |

## PROJECTED PROGRAM COSTS (FY 2042-FY 2056; MIL'96$)

| MASTER | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.0 | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 36.4 | 36.4 | 33.3 | 24.2 | 24.2 | 24.2 | 24.2 | 24.2 | 23.7 |
| 5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3 | 23.2 | 23.2 | 23.2 | 23.2 | 23.2 | 23.2 | 35.5 | 35.5 | 32.4 | 23.2 | 23.2 | 23.2 | 23.2 | 23.2 | 22.8 |
| 5.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.3 | 23.2 | 23.2 | 23.2 | 23.2 | 23.2 | 23.2 | 35.5 | 35.5 | 32.4 | 23.2 | 23.2 | 23.2 | 23.2 | 23.2 | 22.8 |
| 5.3.3.1 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 | 33.4 | 33.4 | 30.3 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 | 21.2 |
| 5.3.3.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 1.7 |
| 5.4 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 5.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.3 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 5.4.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.3.2 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.0.0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| 6.1.0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| 6.2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.0.0 | 33.0 | 32.9 | 32.7 | 9.9 | 9.8 | 9.6 | 9.5 | 9.4 | 9.2 | 9.1 | 9.0 | 8.9 | 8.8 | 8.6 | 8.5 |
| 7.1.0 | 27.5 | 27.5 | 27.5 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 7.1.1 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 7.1.2 | 22.7 | 22.7 | 22.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.2.0 | 5.5 | 5.4 | 5.2 | 5.1 | 4.9 | 4.8 | 4.6 | 4.5 | 4.4 | 4.3 | 4.1 | 4.0 | 3.9 | 3.8 | 3.7 |
| | 57.8 | 75.7 | 58.1 | 39.6 | 38.1 | 39.3 | 49.8 | 46.3 | 45.0 | 34.9 | 76.9 | 33.6 | 33.5 | 38.3 | 32.8 |

**THE CURRENTLY-PROPOSED HI-LEVEL NW MGT PROGRAM:**
**PROJECTED PROGRAM COSTS (FY 2057-FY 2071; MIL'96$)**

| MASTER | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.1.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## PROJECTED PROGRAM COSTS (FY 2057-FY 2071; MIL'96$)

| MASTER | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.1.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.2.5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3.3.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.0 | 23.7 | 36.0 | 37.6 | 393.6 | 330.4 | 330.4 | 330.4 | 330.4 | 330.4 | 142.9 | 127.7 | 127.7 | 127.7 | 23.7 | 16.4 |
| 5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3 | 22.8 | 35.0 | 36.7 | 113.8 | 95.7 | 95.7 | 95.7 | 95.7 | 95.7 | 41.9 | 37.6 | 37.6 | 37.6 | 7.7 | 5.6 |
| 5.3.1 | 0.0 | 0.0 | 0.0 | 5.5 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 2.0 | 1.8 | 1.8 | 1.8 | 0.3 | 0.2 |
| 5.3.1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.1.2 | 0.0 | 0.0 | 0.0 | 5.5 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 2.0 | 1.8 | 1.8 | 1.8 | 0.3 | 0.2 |
| 5.3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.3.3 | 22.8 | 35.0 | 36.7 | 108.3 | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 | 39.9 | 35.8 | 35.8 | 35.8 | 7.4 | 5.4 |
| 5.3.3.1 | 21.2 | 33.4 | 35.0 | 106.6 | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 38.3 | 34.1 | 34.1 | 34.1 | 5.8 | 3.8 |
| 5.3.3.2 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| 5.4 | 0.9 | 0.9 | 0.9 | 279.8 | 234.7 | 234.7 | 234.7 | 234.7 | 234.7 | 101.0 | 90.2 | 90.2 | 90.2 | 16.0 | 10.8 |
| 5.4.1 | 0.0 | 0.0 | 0.0 | 225.6 | 189.1 | 189.1 | 189.1 | 189.1 | 189.1 | 81.0 | 72.2 | 72.2 | 72.2 | 12.2 | 8.0 |
| 5.4.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5.4.3 | 0.9 | 0.9 | 0.9 | 54.2 | 45.6 | 45.6 | 45.6 | 45.6 | 45.6 | 20.0 | 18.0 | 18.0 | 18.0 | 3.8 | 2.8 |
| 5.4.3.1 | 0.0 | 0.0 | 0.0 | 53.3 | 44.7 | 44.7 | 44.7 | 44.7 | 44.7 | 19.1 | 17.1 | 17.1 | 17.1 | 2.9 | 1.9 |
| 5.4.3.2 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.0.0 | 0.6 | 0.6 | 0.6 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| 6.1.0 | 0.6 | 0.6 | 0.6 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| 6.2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.0.0 | 8.4 | 8.3 | 8.2 | 8.3 | 8.2 | 8.1 | 8.0 | 8.0 | 7.9 | 7.8 | 7.7 | 7.6 | 7.6 | 7.5 | 7.4 |
| 7.1.0 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 7.1.1 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| 7.1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7.2.0 | 3.6 | 3.5 | 3.4 | 3.5 | 3.4 | 3.3 | 3.2 | 3.1 | 3.0 | 3.0 | 2.9 | 2.8 | 2.7 | 2.7 | 2.6 |
| | 32.7 | 44.8 | 46.4 | 403.0 | 339.7 | 339.6 | 339.5 | 339.5 | 339.4 | 151.8 | 136.6 | 136.5 | 136.4 | 32.3 | 24.9 |